The Determinants of Firefighter Physical Fitness: An Inductive Inquiry into Firefighter Culture and Coronary Risk Salience

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A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Health Policy and Administration, School of Public Health.

Chapel Hill
2008

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ABSTRACT

John Alexander Staley III: The Determinants of Firefighter Physical Fitness:
An Inductive Inquiry into Firefighter Culture and Coronary Risk Salience
(Under the direction of Dr. James V. Porto)

Objective: An extensive body of research demonstrates firefighters are at risk of sudden cardiac death, with physical fitness a significant contributor to coronary outcomes. Emergency response events place considerable physiological demands on firefighters that require high levels of fitness and cardiovascular endurance many firefighters do not possess. Additionally, interventions demonstrate little effectiveness improving firefighter long term fitness level. Yet previous research demonstrates that unique socio-cultural and normative factors may influence firefighter health behaviors, but little is understood regarding the presence of overall fitness culture. It is uncertain if fitness and readiness expectations translate into practice, *i.e.*, whether physical fitness is a core value in firefighter culture. Therefore it may be inappropriate to implement behavioral change without first considering the part physical fitness plays in firefighting. This research informed these critical knowledge gaps by: 1) Determining the cultural meaning of physical fitness, worksite program adherence, and coronary health from the firefighter's perspective, 2) Identifying if fitness norms exist in the absence of mandatory programs, and 3) Ascertaining factors that facilitate overall firefighter physical fitness.

Study Design: Full time firefighters were recruited from four urban North Carolina fire departments. The study was guided by a social ecological framework in which data was gathered via a three phase, mixed methods design. Ethnographic key informant interviews provided intrapersonal perspectives into the cultural meaning of fitness,

worksite program adherence, and coronary health. Focus groups identified structural components of fitness norms and socio-cultural factors influencing fitness within fire service culture. The results of the focus groups were then used to guide development of a survey administered to approximately 1,000 firefighters to test emergent hypotheses regarding socio-cultural factors influencing fitness, including any correlation between fitness level and normative structural characteristics of fitness and smoking behaviors in the work environment.

Principal Findings: Key insights into socio-cultural and normative factors affecting firefighter fitness has provided significant insights to assist fire departments to improve the effectiveness of workplace fitness programs, and change the culture of fitness and low coronary risk salience.

To my “Life Beat” Amy, Abby Nub, and Noah

ACKNOWLEDGEMENTS

Though many people might say the dissertation journey is but a hurdle in the marathon of completing the Ph.D., I can say that it was an arduous, yet joyful and life-changing experience. During the course of my research I learned that firefighters are much more than we expect and admire in our public servants; they truly are heroes in the purest and greatest sense. They put their lives on the line every day, and suffer from the same human frailties that plague us all. Yet still, as one firefighter reminded me, "we run into the fire when others are running out".

I found through the course of two years of close work with firefighters that they are wonderfully passionate about their work and care deeply for the needs of the public health. My thanks go to the Cary, Chapel Hill, Durham, and Raleigh Fire Departments, and I can only hope that my research will someday help improve and save your lives, to in some small part return the favor for those of us whom you save everyday.

Additionally, I learned that I have considerably more physical and mental strength than I previously thought possible. To work through chronic back pain (at times lying on an ice pack with my laptop on my chest), my wife's own work and graduate education schedule, and the birth of two precious children that bring me joy and wonder daily that only a parent can understand, I realize that throughout this phase of the journey of my life, how gracious and merciful our Heavenly Father is. Beyond a doubt, His mercies are renewed daily and He has given me unlimited strength when I needed it; for as "those who hope in the LORD will renew their strength. They will soar on wings like eagles; they will run and not grow weary, they will walk and not be faint."

(Isa 40:31 (NIV)) Thank you Heavenly Father for saving my life and giving me the second chance to glorify you at the university I love, through the gift to all of your Son and my savior Jesus Christ.

And now, to thank those who have been so integral to my life, I would first like to thank my beautiful "Life Beat" Amy, my wife and partner in life, for her patience, love, and sweet reassurance when I felt overwhelmed during those sleepless nights when I though I might never complete my research. She always reminds me to turn to the Lord for renewed peace and focus, as He ALWAYS comes through.

I must also thank my two year old daughter Abigail Grace, for when I come home from work mentally exhausted and back aching, she always yells "Daddy!", and runs up, hugs me and invites me to join her for "marker markers", which is drawing in her coloring book on our kitchen floor. Simple pleasures such as these are the best treasures in life. Additionally, though only two months old at the time of completion of my Ph.D., my son Noah James's smile will always be a snapshot for my joyful mental scrapbook.

I would also like to thank my mom and dad, Coble and John Staley, who during all my life crises and despite foolish life choices you were always (and still are) there for me. I have always known your love, and I too love you so very much. Mom, you are so very smart and gifted with helping me and others through life's obstacles, and Dad, you have always supported me unconditionally in my life decisions, despite knowing many were doomed for failure. I am overjoyed that we can share the excitement of completing my Ph.D. together, as your love, help, and reassurance were critical to the mental health of Amy and me! Additionally, we can share in the joy of the daily wonders of your grandchildren. How abundantly blessed we are Poppa and Gigi!

To my chair, mentor, “psycho-therapist”, and friend, Dr. Jim Porto, you have been integral to my growth as a researcher and scholar. Your open door mantra and ability to answer any question, calm any fear, and save my family’s financial stability, despite being involved with a dozen other research projects, students, and putting out “fires” will never be forgotten. Thank you so very much Jim! You will always be the person I look up to as the model of a faculty member who personifies the “Carolina Way”.

To my committee members, I would like to thank Dr. Bryan Weiner, as your unwavering support and guidance as my second mentor throughout my research and doctoral career were vital to the success of my research and scholarly growth. To Dr. Laura Linnan, your direction through the health behavior, education, and promotion jungle was invaluable; to Dr. Felicia Mebane, your guidance from the earliest days of my program and our monthly political science dinners was both fun and greatly supportive; and to Dr. Bonnie Rogers, your faith in my ability to be a member of a top doctoral program, and fighting for my right to be in a program among high caliber candidates recruited by several tier one doctoral programs will not be forgotten.

I would also like to acknowledge the research expertise and assistance of Dr. Jennifer Griffith in the development and facilitation of my focus group discussions, as well as Doug Melton for his coding proficiency and more importantly, his friendship. Lastly, I would like to thank ex-officio committee members for their insights and support during my doctoral program tenure. My thanks and gratitude goes to Dr. Tom Griggs, Dr. Kerry Kilpatrick, and Susan Randolph. Additionally, I wish to thank Drs. Ned Brooks, Bill Zelman, Sue Havala-Hobbs, and John Paul of the Department of Health

Policy and Administration, UNC School of Public Health, for their mentoring and support of me as a colleague and “one of them”.

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INTRODUCTION

1. 1. Overview of the Problem

In 1998, Congress funded the National Institute for Occupational Safety and Health's (NIOSH) Fire Fighter Fatality Investigation and Prevention Program to investigate on-duty firefighter fatalities, with specific focus on the high on-duty death rate due to coronary heart disease (CHD), so as to prevent future CHD related morbidity and mortality (NIOSH, 2008). It is clearly recognized that firefighters are at increased risk of CHD and sudden cardiac death, with the largest proportion (44 percent) of firefighter on-duty mortality attributable to heart attack (Fahy, 2005). In terms of cardiac and cardiovascular risks in firefighters, the three primary areas of concern are personal, smoke related, and workplace factors. Personal factors include common influences such as age, gender, family history, diabetes mellitus, hypertension, smoking, high blood cholesterol, obesity, and lack of exercise (AHA 2008). Smoke exposure and its related by-product factors include hydrogen cyanide, carbon monoxide, and particulate matter. In terms of workplace factors, increased heart rate due to event stress and/or physical exertion are frequently present, due to firefighters repeatedly moving from a sedentary position to fully engaged response within approximately 90 seconds; this combined with 60 to 90 pounds of turnout gear, e.g., clothing, self-contained breathing apparatus, required for working in the harsh environmental conditions of a

response scene. Additionally, there is associated heat stress, noise exposure, long shift hours, and direct and indirect (second hand) exposure to cigarette smoke.

In terms of this study, I focus on physical fitness as a significant risk factor for CHD and sudden cardiac death, as it is recognized that high risk occupations such as firefighting require a high level of aerobic fitness (Sothman, Suape et al., 1992), muscular endurance, and strength (Gledhill and Jamnik, 1992), yet firefighters frequently lack the level of physical fitness deemed necessary to handle rigorous occupational stressors. While firefighter physical fitness level can be classified as comparable to that of the general population, many fire suppression activities require an above average fitness capacity that both current firefighters and new recruits do not possess (Guidotti, 1992; Swank, Adams et al., 2001; Roberts, O'dea, et al., 2002).

Recognizing this issue, both researchers and firefighting organizations are targeting poor physical fitness, CHD, and sudden cardiac death risk. Firefighter physical fitness interventions have been shown to reduce CHD risk in the short term (Cady, Thomas, Karwasky, 1985; Roberts, O'Dea, et al., 2002; Conrad, Reichelt, et al., 2005), and the International Association of Fire Fighters/ International Association of Fire Chiefs (IAFF/IAFC) national level joint labor-management "Wellness-Fitness Initiative" (IAFF, 1999) has actively assisted fire departments in developing more holistic physical fitness programs. However, although physical fitness and CHD/sudden cardiac death risk is a recognized issue, no national level policy mandates firefighters participation in workplace fitness programs. As a result fire departments have considerable discretion in terms of 'required' worksite fitness programs. In the absence of mandatory fitness programs, personal motivation for sustaining physical fitness via worksite programs becomes a

noteworthy issue to reduce risk factors for firefighter CHD morbidity and sudden cardiac mortality. This highlights the importance of understanding the cultural determinants or the "pattern of shared basic assumptions" (Schein, 1985) acting to influence physical fitness and CHD health. Characterizing fitness within firefighter culture in terms of the values, beliefs, and assumptions held from the firefighter's perspective could yield valuable information for improving the design and implementation of physical fitness interventions, as well as sustaining worksite program adherence and improved physical fitness levels.

1. 2. Background and Significance

1. 2.1. Physical Activity Reduces Coronary Heart Disease Risk

Coronary heart disease (CHD) is the leading cause of death among the United States population, killing more Americans than the rest of major causes of death annually (AHA, 2005). CHD has a prevalence of about thirteen million in the United States population, with an estimated cost in 2005 of $140 billion (AHA, 2005). Additionally, specific individual level risk factors such as smoking, high blood pressure, high blood cholesterol, poor diet, and physical inactivity are recognized as modifiable factors for CHD. In this study, particular attention is given to physical activity, specifically in terms of adherence to worksite fitness programs as a means to increase physical activity and improve physical fitness levels.

While most individuals can benefit from a range of physical activities, more than 50 percent of adults do not achieve the recommended amount of regular, moderate physical activity to provide health benefits, as noted by the United States Surgeon General (Department of Health and Human Services [DHHS], 1996). Regular physical activity for 30 to 45 minutes a day has been shown to substantially reduce CHD risk, including brisk walking, bicycling, and work around the house or yard (AHA, 2005; DHHS, 1996). There is

consistent evidence that individuals who are regularly physically active are less likely to develop health problems than sedentary individuals, and a review of physical activity studies lends "compelling evidence" that regular physical activity extends longevity and reduces CHD risk (Blair, Cheng, and Holder, 2001).

1.2. 2. CHD and Physical Fitness are recognized as Critical Issues by both Research and Firefighting Communities

An extensive body of research shows that firefighters are at risk for CHD, with physical fitness a contributing factor to coronary outcomes. An emergency response event places considerable physiological demands on firefighters, including elevated heart rate and oxygen consumption, both of which require a high level of physical fitness and cardiovascular endurance (Sothman, Suape, et al., 1992; Gledhill and Jamnik, 1992; Horowitz and Montogomery, 1993). Additionally, studies show that physical fitness is correlated with firefighter job performance during fire suppression activities (Davis, Dotson, et al., 1982; Williford, Duey, et al., 1999, Rhea, Alvar, and Gray, 2004). Although firefighter physical fitness levels can be classified comparable to that of the general population, both current firefighters and new recruits often do not possess the level necessary for the rigors of the occupation (Guidotti, 1992; Swank, Adams et al., 2001; Roberts, O'dea, et al., 2002). Firefighters as an occupational group also have a high prevalence of sedentary lifestyle, obesity, hypertension, and high total cholesterol (Guidotti, 1992; Guidotti, 1995; Byczek, Walton, et al., 2004). Research provides consistent evidence that an inadequate level of physical fitness places firefighters at direct risk for a cardiac event, and indirectly through elevated body mass index (BMI), triglyceride levels, and blood pressure (Kales, Aldrich, et al., 1998; Kales, Aldrich, et al., 1999; Byczek, Walton, et al., 2004; NFPA, 2004).

Recognizing the issue of poor physical fitness, as well as high injury, morbidity, mortality rates, firefighter organizations have teamed to address this problem. In 1999 the IAFF and IAFC created the fire service joint labor management "Wellness-Fitness Initiative", in order to assist fire departments to create 'holistic' systems that evaluate fitness and medical status, provide rehabilitative services to injured or sick firefighters, assess behavioral health, and develop data collection mechanisms (IAFF, 1999). Yet even in the midst of the IAFF/IAFC initiative, a key underlying issue still exists inhibiting improvement in firefighter physical fitness levels. A national, mandatory fitness standard does not exist for firefighters; as a result considerable variability exists across fire departments in terms of physical fitness and worksite fitness program adherence. Although some departments have programs that assess and record cardiovascular fitness, strength, and flexibility, there are departments with few or no program measures. Additionally, many fire departments do not require firefighters to maintain physical fitness levels necessary for the occupation that they may have had when entering as new recruits (Horowitz and Montgomery, 1993). 'Fitness for duty' is also problematic, as assessment criteria can vary and be subjectively applied, and fitness for duty has also become more of a euphemism for "drug free" workplace protocols than physical fitness level (Gochfeld, 1999).

1.2. 3. The firefighter Workplace is Conducive for Worksite Health Promotion Targeting Physical Fitness

The 1999 National Worksite Health Promotion Survey indicated that a third (34%) of employers with 50 or more employees offered comprehensive health promotion programs meeting Healthy People 2010 criteria (Partnership for Prevention, 2001). In general, workplace health promotion programs address a variety of health concerns, including physical activity and CHD risk. The worksite is an important channel for reaching a large

proportion of the adult population (Linnan, Sorensen, et al., 2001), as two-thirds (66%) of the U.S., civilian non-institutional population ages 16 years or older are employed (Bureau of Labor Statistics, 2005).

In terms of firefighters and worksite health promotion, there are several reasons why the firefighter workplace is ideal for worksite health promotion targeting physical fitness. Similar to other high risk occupations, firefighters have a quasi or paramilitary organizational structure with established channels of communication, which could be utilized to implement health promotion programs. As firefighters experience long periods of sedentary activity while waiting for an emergency to occur, 'downtime' could be used for promoting worksite health from the top down (management to frontline responders), as well as across crew/shift members. Additionally, while variable in design, most fire departments have an established time for physical fitness that is written into standard operating procedures. This organization or policy norm establishes that physical fitness is expected of new and existing firefighters, and often includes new candidate entry physical ability tests (CPATS), annual physical fitness exams, and/or medical evaluations for existing firefighters. This environment readily lends itself to health promotion implementation, such as monitoring and evaluation of existing physical fitness programs, as well as periodic monitoring of new and existing firefighters during the 24.5 hour working shift found in most professional fire departments.

Additionally, the fire service has an established safety focus in which physical fitness could be integrated into the existing occupational health and safety program. As Sorensen and Barbeau (2004) note, integration of worksite health promotion into the existing occupational safety program is important because of four overarching reasons, including 1) worker's risk of disease is increased by exposures to occupational hazards and risk-related

behaviors, 2) worker's at highest risk for exposure to hazardous working conditions are also those most likely to engage in risk-related health behaviors, 3) integration of worksite health promotion and occupational health and safety may increase program participation and effectiveness for high risk workers, and 4) integration may also benefit the broader work organization and environment. This integration of worksite health promotion and occupational health and safety in the firefighting work environment could prove especially useful, given that firefighter occupational injury and mortality rates exceed law enforcement, emergency medical service personnel, and the national average (Kales, Soteriades, et al., 2003).

Yet before implementing any worksite health promotion targeting firefighter physical fitness, consideration must be given to the physical activity and worksite fitness intervention literature. The overall trend is that of mixed success and study design issues. Several studies lack sound theoretical designs, resulting in vague conceptualization of how interventions work, or how effectiveness can be transferred to other organizations (Wilson, Holman, and Hammock 1996). As Dishman (1998) notes, physical activity and fitness interventions should be based on "contemporary theories of behavioral and organizational change", as well as compare broad based social-ecological and individual motivation-to-change physical activity and fitness behavior interventions.

Workplace physical fitness and activity studies have also seen variable effectiveness, influenced by high attrition rates, self selection bias by healthy study participants, and strong Hawthorne effects in which control groups are contaminated by daily contact with worksite participants (Shepard, 1996). Some studies also use self-report of fitness level and health outcomes, potentially inducing respondent bias (Shepard, 1996; Dishman, Oldenburg, et al.,

1998; Proper, Koning, et al., 2003) which could have otherwise been reduced by direct measures of physical fitness and health outcomes. The most notable result of worksite physical fitness and activity interventions is their ineffectiveness in reducing cardiac risk factors and improving cardio-respiratory fitness. While studies generally result in increased physical fitness or activity levels, cardiac risk factor and cardio-respiratory fitness change is often more short term in nature. This general trend could be attributable to, as Dishman (1998) indicates, interventions not making use of "the workplace environment and organization optimally". In other words, for physical fitness and activity studies to produce increasingly sustainable long term results, they must not only address individual factors that impact fitness, *e.g.*, self-efficacy, but also environmental factors, e.g., lack of adequate space and equipment, and organizational attributes, *e.g.*, workplace culture and norms. As Shepard notes, the most effective studies in terms of reducing cardiac risk factors are those that address issues of facility access (environmental) in conjunction with organizations that support an active lifestyle (socio-cultural/normative).

Consistent with worksite physical fitness and activity studies, firefighter physical fitness interventions draw attention to similar design issues, as well as methodological concerns and uncertainty regarding long term health outcomes. For example, though Reid and Morgan's (1979) clinical trial of firefighter participation in physician prescribed exercise, health education, and patient self-monitoring to improve exercise adherence did have a theoretical design based on the Health Belief Model (Rosenstock, 1966; Becker and Maiman, 1975), the study resulted in variable, short term exercise adherence. The researchers noted that fitness-minded fire chiefs may have exerted normative power on exercise behavior, demonstrating that the organizational or cultural environment could factor

prominently in firefighter exercise adherence. The short term success of the study (less than six months) suggests that a more comprehensive program employing individual, socio-cultural, and organizational behavior change might improve long term outcomes. Similarly, another firefighter fitness study highlights the importance of workplace culture in an intervention targeting flexibility among municipal firefighters. The study intervention reduced severity and costs of joint injuries among the treatment group; however, peer pressure may have influenced lost time costs, in addition to a possible Hawthorne effect which may have inflated the flexibility results (Hilyer, Brown, et al., 1990). While the study highlights the need to control for design issues such as the Hawthorne effect, it also emphasizes the importance of addressing the socio-cultural/normative influence of interpersonal peer pressure, which could be expected to factor prominently in close knit social occupations such as firefighting.

Likewise, other firefighter fitness interventions have resulted in some degree of improvement in firefighter flexibility and physical work capacity (Cady, Thomas, Karwasky, 1985), and aerobic capacity (Roberts, O'Dea, et al., 2002), yet these too were only short term successes. Both lacked clear theoretical designs outlining specific behavioral and socio-cultural/normative factors influencing physical fitness activity; consequently this ambiguity reduced understanding of what change mechanisms should be addressed to promote sustained, long term improvement in health outcomes.

Recognizing the need for theoretically driven research, Pakapong (2003) predicted firefighter exercise participation and physical fitness in a convenience sample of 341 Birmingham, Alabama firefighters, based on two contemporary behavioral change models, the Health Promotion Model (HPM) (Pender, 1996) and the Theory of Reasoned Action

(TRA) (Fishbein and Ajzen, 1975). The HPM suggests that participation in health promotion behavior, such as worksite fitness program participation, is influenced by individual, situational and interpersonal modifying behaviors. The TRA posits that intention (to exercise for example) is an immediate determinant of behavior. Intention is in turn a function of attitude and subjective norm. In terms of physical fitness outcomes, participants who had high self-efficacy and a positive attitude towards exercise and fitness tended to have higher participation rates and physical fitness levels. Overall though, the models had low predictive power, suggesting that the instruments used to measure key variables such as barriers to exercise and subjective norms were not fully context specific to the firefighter workplace. Taking an insider perspective to understand the unique context of the firefighter's socio-cultural environment could be useful in delineating the factors affecting firefighter worksite physical fitness program adherence and subsequent physical fitness level.

The results of the Pakapong study also demonstrate the complexity of firefighter exercise behavior, resulting from several factors not captured by traditional exercise models. Recognizing this issue, the Promoting Healthy Lifestyles: Alternative Models' Effects (PHLAME) study evaluated the efficacy of two distinct behavioral change interventions, both designed to improve nutrition and physical activity practices in firefighters (Moe, Elliot, et al., 2002). Developed for 600 firefighters over five districts in Oregon and Washington State, the study was based on the Transtheoretical Model of Behavioral Change (Prochaska, DiClemente, and Norcross, 1992; Prochaska and Velicer, 1997) and Social Learning Theory (Bandura, 1986). The study's two interventions employed motivational interviewing based on stage of readiness to change behavior, as well as the unique elements of team and work shift to promote desired health behaviors (Moe, Elliot, et al., 2002). While both approaches

improved health behaviors, researchers noted that the individual approach may be more appropriate for the clinical setting, whereas the team based intervention was easier to implement and was acceptable to firefighters (Elliot, Goldberg, et al., 2004). Of particular note, the study demonstrated that lack of a shared 'team' experience concerning diet and exercise resulted in no significant increase in shift-related cohesion and coworker perception that team members were exercising more. The PHLAME study highlights the unique cohesive and normative influences of the team (crew)/shift within the firefighting organization and its potential to affect health behaviors. It also demonstrates the need to further explore how the crew/shift influences health-related behavior in stations where fitness programs include variable, non-mandatory programs allowing firefighters to choose any variety of activity (or none) to improve his/her physical fitness level.

1.2. 4. A Stronger Knowledge Base is needed to Guide the Design and Implementation of Future Firefighter Fitness Promotion Interventions

The preceding research highlights the unique socio-cultural environment of the firefighting work setting. Normative influences such as those of the crew/shift highlights a key potential factor that has received little attention in firefighter physical fitness research: organizational culture. It is recognized that firefighting has a strong culture of safety, including in-depth standard operating procedures for emergency response, daily inspection of turn-out gear, safety equipment and response vehicles, and frequent hands-on training exercises to maintain a high level of operational readiness. There is a pervasive safety ethos that firefighting is not about the individual hero, but of 'team safety'. It is equally recognized that firefighter physical fitness is a critical component of firefighter cardiovascular health and overall readiness, as evidenced by national joint labor management initiatives such as the IAFF/IAFC Wellness-Fitness Initiative. However, there is no clear picture of how physical

fitness expectations translate into practice, *i.e.*, whether physical fitness is a core value in firefighter culture. Does management expectation that firefighters maintain a certain level of physical fitness translate into a cultural expectation for physical fitness and adherence to fitness programs among firefighters? It is uncertain if this is the case in the firefighting organization, as firefighters and fire chiefs clearly differ in their perceptions of injury causative factors (Conrad, Reichelt, et al., 2005); therefore it may be inappropriate to implement a fitness behavioral change without consideration of what part physical fitness plays in the firefighter culture. As Green and Kreuter (1991) note, planning any health program change without considering what the problem means to the target population and what health outcomes they value is critical to program success.

1.2 5. Significance of the Study

> "There are two classes of men and women in our cities who, more than almost any others, need daily and systematic bodily exercise in order to make them efficient for their duties. They do on the home front what the army does for the whole country in war time -- they protect life and property. These are the police and fire fighters. And what training have these fire fighters or police officers for this trying work outside of what the fire or incident itself actually gives? Practically none. Suppose every man and woman on the force was required to spend an hour, or even half an hour, daily in work which would call into play not all their muscles, but simply those likely to be most needed when the real work came...Is there any question that a force made up of such men and women would be far better qualified for their work, and far more efficient at it?"
>
> Blakie, 1879

The preceding passage, although written over one hundred years ago, summarizes the vital importance of physically fit emergency responders. Firefighters are the critical component of society's first line response to natural and manmade emergencies in which the physiological and psychological rigors of the occupation require a high level of physical fitness. Yet many firefighters lack adequate fitness levels necessary for the job, placing them at in increased risk of CHD morbidity, sudden cardiac death, and other deleterious health outcomes. To date physical fitness interventions have done little to improve firefighter's

long term physical fitness, and there is little understanding of the context of physical fitness within fire service culture. This study will address these knowledge gaps and practical needs by inductively exploring physical fitness and coronary health issues from the firefighter's perspective in order to better inform the research community as to the socio-cultural factors that should be addressed in future physical fitness interventions.

1. 3. Specific Aims of the Study

The purpose of this study is to determine how socio-cultural factors affect physical fitness within the firefighting occupation, as well as identify other factors that should be targeted to assist fire departments in cultivating a culture that promotes workplace physical fitness.

Accordingly, this study addresses three specific aims:

1. Determine the cultural (shared) meaning of physical fitness, worksite fitness program adherence, and coronary health issues from the perspective of the professional firefighter.
2. Identify if any physical fitness norms exist among professional firefighters.
3. Identify the barriers and facilitators of firefighter physical fitness via worksite physical fitness programs.

To accomplish these aims, professional firefighters were recruited from four North Carolina city/town fire departments that agreed to participate in the study. The study is guided by a social ecological framework, informed by inductive exploration of physical fitness behavior. The study employs a mixed methods design, including ethnographic key informant interviews, focus group discussions, and quantitative survey.

1. 4. Conceptual Framework

Workplace health promotion researchers have increasingly recognized the importance of framing worksite health promotion and interventions within theoretically-driven approaches, particularly in terms of addressing the issue of low participation in worksite health promotion (Glasgow, McKaul, and Fisher, 1993; Linnan, Sorensen, et al., 2001). While several theories exist to explain participation in worksite health promotion programs, the social ecological framework is often utilized as a model for theoretical application. Within the social ecological framework, multiple "levels of influence" act to affect worksite health behaviors, such as adherence behavior to fire department worksite physical fitness programs. Specifically, the social ecological framework reinforces that individuals do not function alone, but rather, are embedded in formal and informal groups, interacting within the multiple levels of influence of the human and physical environment (LeCompte and Schensul, 1999). A basic assumption of the social ecological framework is that health encompasses physical health, emotional wellbeing, and social cohesion (Stokols, 1992), influenced by multiple levels of influence, including intrapersonal, interpersonal, institutional/organizational, community/society, and policy factors (McLeroy, Bibeau, et al., 1988). Table 1 provides an illustration of the social ecological model in terms of levels of influence, targets for intervention, and potential variables of interest, as identified by Linnan, Sorensen, et al (2001). For the purpose of this study, I address the intrapersonal, interpersonal, and organizational levels influencing firefighter behavior, with specific attention given to factors affecting physical fitness program adherence and physical fitness level.

Although past interventions have been conducted within each level of influence, *e.g.*, targeting individual/group behavior or changing the work environment, the social ecological model assumes that the effectiveness of worksite health promotion can be best achieved through multilevel interventions targeting both behavioral and environmental modification strategies (Stokols, 1992). As noted earlier, the study's social ecological framework suggests that healthfulness is multifaceted, encompassing physical and emotional health, as well as social cohesiveness. Likewise, the multiple levels of influence on firefighter fitness program adherence are likely closely interrelated. Therefore, while the proposed study focuses on socio-cultural factors, it is still attentive to factors that may emerge from other levels of the social ecological framework.

Figure 1 provides an illustration of the social ecological framework as applied specifically to the firefighter work environment. In terms of the application of the social ecological framework to firefighter physical fitness, on the intrapersonal level, the firefighter may be motivated to exercise to improve his/her cardiovascular endurance for an emergency response. Likewise, fellow firefighters may encourage him/her to exercise during the 24.5 hour shift (interpersonal level), and he/she may be expected via prevailing department norms to work out in the station fitness room by the crew/shift, battalion chief, fitness coordinator, or department fire chief (organizational level). The quality and availability of exercise equipment may be affected by the budget allotted by the city/town management (community/society level), and the degree of adoption of a national fitness plan such as the IAFF/IAFC Wellness-Fitness Initiative may be affected by North Carolina's status as a right-to-work state that prohibits union membership of workers, thereby subsequently reducing the likelihood of plan implementation (policy level).

Table 1. Social Ecological Conceptual Model of the Determinants of Participation in Worksite Health Promotion Programs

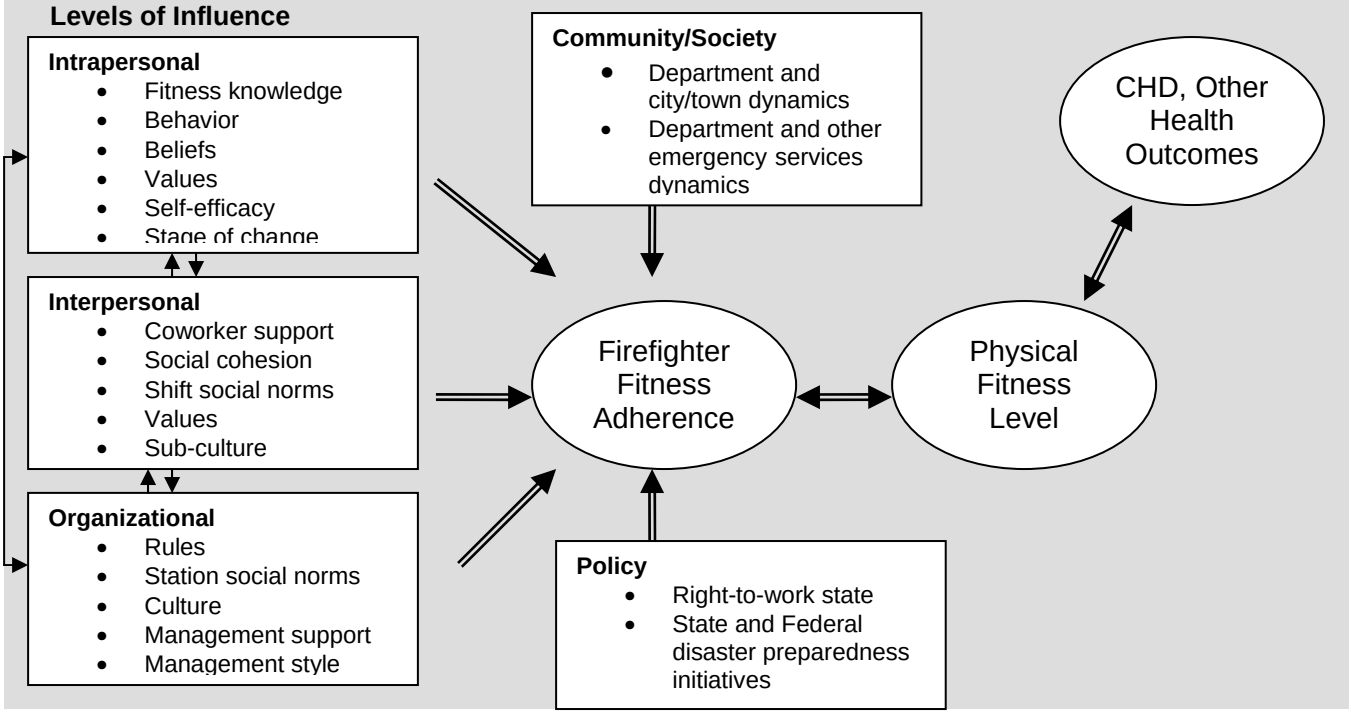
Level of Influence	Intervention Target	Variable of Interest
Intrapersonal	Individual	Psychological (motivations, intention, beliefs, self-efficacy, attitudes, knowledge) Biologic (health status, risk factors)
Interpersonal	Individual/dyad/small group (family, coworkers, friends)	Social support; social networks; communication patterns; peer/family influence; norms; membership in groups/departments and role responsibility; employee-supervisor relationship
Institutional/ organizational	Worksite	Social norms; participatory strategies; management style; work design; corporate climate or culture; work pace; site-specific rules/policies
Community/society	Local, state, regional, national, international community	Relationships between/among worksite and larger community related to economic, political, or social factors
Policy	Government laws or standards at local, state, national, and international levels	Legislative and/or regulatory approaches at multiple levels (explicit or implicit; intentional or unintentional)

From Linnan, Sorensen, et al. *Using Theory to Understand Multiple Determinants of Low Participation in Worksite Health Promotion Programs*. 2001. Used with permission from Sage Publications

To gather data for each level of the social ecological framework, a mixed methods design of both qualitative and quantitative methods will be used. On the intrapersonal level, ethnographic key informant interviews will provide insight into the cultural meaning of physical fitness, fitness program adherence, and coronary health issues from the individual firefighter's perspective. Relevant factors that have cultural meaning might be, for example, health beliefs and self-efficacy. Additionally, the ethnographic key informant interviews will identify domains for further exploration on the interpersonal and organizational levels via focus group discussions. Physical fitness norms might be identified as existing in fire service

culture, as well as social support, cohesiveness, and management style as key factors influencing physical fitness.

Figure 1 Conceptual Model of Factors Affecting Firefighter Fitness Adherence, as Illustrated Within a Social Ecological Framework



In the quantitative portion of the study, a survey will be developed and administered to all firefighters to determine if these interpersonal and organizational influences, *i.e.*, socio-cultural factors identified in the focus group discussions, are indeed predictive of physical fitness level, while controlling for intrapersonal factors identified in phase one and two.

As a result of the study findings, an intervention might target multiple pathways by combining individual level educational strategies to improve knowledge of firefighter CHD events and self-efficacy, while offering an education program for peers, fitness leaders, and/or management to promote social support mechanisms aimed at increasing physical fitness. The intervention might also incorporate an educational program designed to produce a more democratic management style as well as improve management participation in

achieving prescribed fitness goals. While this is only one example of a multi-level intervention, it demonstrates the potential applicability of study findings for a multi-level physical fitness intervention to improve worksite physical fitness program adherence and subsequent physical fitness level over the long term.

1. 5. Methods Overview

This study has three chronological phases, with each phase informing a portion of the study. I draw upon multiple qualitative and quantitative data sources, including ethnographic key informant interviews, focus group discussions, and firefighter survey. Multiple sources of data are used to not only reduce potential construct validity threats such as mono-methods and mono-operations bias (Cook and Campbell, 1979), but also to provide a rich and full contextual picture of physical fitness in the fire service from the firefighter's perspective. A brief introduction of each of the study's methods is provided in this overview, with subsequent chapters providing complete details, including use, application in terms of the specific study aim addressed, the findings for that phase/method of the study, and any implications for the next phase and/or further research. The three methods are:

1. 5. 1. Phase one ethnographic key informant interviews- with professional, acculturated firefighters closely familiar with the values, traditions, and culture of fire department life. The ethnographic key informant interviews borrow from Spradley's linguistic approach to ethnography (1979) emphasizing language as a primary lens on culture. Ethnography maps out key cultural content domains in terms of the semantic relationships or aspects of meaning used by the speaker of a specific language to link the subtleties of the meaning related to *folk terms*, or cultural symbols within the culture of interest (Spradley, 1979).

1. 5. 2.Phase two focus group discussions- again with acculturated firefighters to build upon the results of the ethnographic interviews; exploring fire service culture with semi-structured questions to determine if normative expectation for physical fitness exist, and the socio-cultural factors affecting physical fitness level, fitness program adherence, and heart issues, including the barriers and facilitators to improving physical fitness outcomes, all from the perspective of the professional, acculturated firefighter.

1. 5. 3. Phase three quantitative survey instrument- conducted with all firefighters, i.e., rookie to chief level; builds upon the physical fitness, fitness program adherence, and any coronary health themes identified through the analysis of the ethnographic and focus group discussion data in which a deductive position is taken, and hypotheses derived from the focus group discussions are tested based on the socio-cultural factors affecting physical fitness level, while controlling for other factors identified across the study's social ecological framework. A strict protocol is used for this and the other two methods to collectively inform the study aims through data triangulation, thereby reducing multiple validity and reliability threats.

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CHAPTER II

Understanding Fitness within the Fire Service: The Cultural Meaning of Physical Fitness, Worksite Fitness Program Adherence, and Coronary Health Issues

2. 1. Introduction

Most interventions targeting firefighter physical fitness and/or health outcomes have taken a deductive, 'general to specific' approach, in which data are gathered to test hypotheses from existing general theory, resulting in mixed successes. While this research approach has utility for inference to population outcomes, it does not afford the ability to generate new concepts and theoretical propositions induced from specific empirical observation, which could prove useful through development of new constructs for use in intervention design. For example, the conceptual definition of physical fitness used by researchers is typically defined within parameters of individual health, as noted in the Promoting Healthy Lifestyles: Alternative Lifestyle's Effects (PHLAME), a large study of west coast professional firefighters. Outcome measures of physical fitness were defined as "indices of physical activity [cardio-respiratory fitness]), flexibility (sit-and-reach test, hand grip and quadriceps strength); nutrition and eating habits (percent calories as fat), dietary behaviors, daily servings of fruits and vegetables; and anthropometric measures (percent body fat by skin-fold measures, waist/hip circumference, height, weight and body mass index) (Moe, Elliot et al, 2002). While these are useful, comprehensive measures of physical fitness level, it may be that the definition of physical fitness should expand to include how firefighters define physical fitness, as their unique cultural perspective may provide insights

not considered within the tradition measures of physical fitness, such as functional ability for the rigors of the job. In turn, considering key cultural perspectives could provide significant insights for expanding the definition of physical fitness, and thereby improve the design and delivery of physical fitness programs within the fire service.

Therefore, the ethnographic approach is a useful tool to provide insight into the firefighter cultural lens regarding physical fitness, as it is a useful inductive research technique derived from anthropology that describe a culture, and can be used to elicit grounded theory (Glaser and Strauss, 1967), a "constant comparative method" in which the researcher formulates a theory, either substantive (setting specific) or formal, about the phenomena they are studying. This differs from the deductive approach in which theoretical models are chosen a priori to apply to the phenomena at hand. Ethnography moves way from ethnocentrism to develop theories "grounded" in empirical data to describe a culture from the 'native' point of view (Spradley, 1979). As Schwartz and Davis (1981) note, there is an underlying belief that a normative order or culture can characterize an organization and powerfully shape the behavior of individuals and groups, and this is believed true within the tightly knit social structure of fire departments, in which a pattern of beliefs and expectations are held by the organization's members, i.e., firefighters within a specific fire department. Therefore, ethnographic techniques are well suited to elucidate the meaning of this cultural system.

While there are many styles of ethnography and ethnographic interviewing, I borrowed from Spradley's linguistic approach to ethnography, which emphasizes focus on language as the primary lens on culture. The method used to accomplish this goal is to map out the content of cultural domains of the participant's knowledge, in terms of the semantic

relationships or approach by which the speaker uses his/her specific language to link the subtleties of meaning related to *folk terms*, or cultural symbols within the culture of interest (Spradley, 1979). To illuminate understanding of the content of cultural domains that explain physical fitness within the fire service, ethnographic interviews of key informants were used to explore the language and semantic relationships used to describe the cultural meaning of physical fitness, worksite fitness program adherence, and coronary health. This approach does imply asking firefighters the direct 'meaning' of physical fitness, adherence, or heart attack, but rather inductive explores the issue through the tacit meaning of these topics *in relation* to other cultural symbols, such as firefighters being America's 'bravest' or 'finest'. This study followed basic assertions of a relational theory of meaning (Spradley, 1979) as applicable to the firefighting population:

- Firefighter fitness cultural meaning systems are encoded in symbols for fitness adherence, coronary health, etc.
- Language is the primary symbol system that encodes fitness cultural meaning, and can be used to talk about all other encoded symbols
- The meaning of any firefighter fitness symbol is its relationship to other symbols in the firefighter culture
- Ethnography acts to decode fitness cultural symbols and identify underlying coding rules via discovery of the relationship among cultural symbols

2. 2. Design and Methods

2. 2. 1. Selection of Ethnographic Informants

Prior to the ethnographic interviews, I conducted preliminary interviews and fire department observation to become familiar with the department life of firefighters and to

identify potential cultural domains for exploration. Additionally, several experienced firefighters were identified as possible study informants. During the actual selection process the sample of informants was determined with the assistance of the firefighter fitness committee by means of employing a purposive sampling strategy; informants were selected from a list of firefighters meeting baseline acculturation and other interview requirements from the Cary, Chapel Hill, Durham, and Raleigh fire departments, located in the central piedmont region of North Carolina. To ensure suitable firefighters were selected for the ethnographic interviews, I followed guidelines from Spradley's seminal work on ethnography, *The Ethnographic Interview* (1979). The selection of key cultural informants from the study fire departments were those who were, as Spradley would note, "good informants (who) know their culture so well they no longer think about it".

Following Spradley's minimum requirements for a key informant, firefighters were selected who had at least one year of professional service at their respective fire departments to make certain they had a detailed knowledge of departmental traditions, practices, and values. Additionally, key informants were those firefighters currently involved in fire suppression and other emergency response activities, to ensure job tasks were common place and occur frequently through hands on training for real time emergency response events. Additionally, the firefighter informants were selected from a cultural scene readily known to them but predominantly unknown to the PI, thus allowing the informants freedom to describe fire service culture in their own language without need to analyze their own responses as to meaning or significance. In turn this reduced the potential use of the firefighters' or researcher's own translational competence, or attempts to translate the 'meaning' of his/her culture for the benefit of the other person. This can be a serious obstacle in attempts to

understand cultural meaning in ethnographic research, as both participants could try to describe questions and answers in the language perceived to be specific to the person asking/answering the question, no longer using their own cultural language. By reducing the effects of translational competence, informants could provide responses in their own language without pressure or concern for hidden judgment components on the part of the ethnographer, thereby providing emic (insider) answers that could be analyzed for implicit meaning of the topic of interest, *e.g.*, physical fitness. It should also be noted that my work with the firefighter fitness committee prior to the ethnographic interviews permitted time for flexible selection and scheduling of key informants, thereby allowing for full exploration of the culture of fitness during the primary and follow-up interviews.

2. 2. 2. Data Collection

As Spradley (1979) notes, the key informant is a "native speaker engaged to repeat words, phrases, and sentences in his own language", acting as "a model of imitation and a source of information". To acquire language and appropriate information to achieve an in-depth understanding of the cultural context of physical fitness within the fire service, I, in the role of ethnographer, interviewed a sample of six key informant firefighters several times during March of 2006 who met the acculturation and other requirements outlined earlier. For clarity, it should be noted that the number of key informants in the ethnographic study phase differs from traditional numbers in subject research testing specific *a priori* hypotheses, or respondent interviews assessing topical or general information where the participants may be any person who also employs the language of the researcher. In contrast, the selection of specific key informants for interviews that are repeated several times allows me to specifically identify cultural patterns through frequent analysis of "utterances" of each

firefighter (Spradley, 1979), in which implicit meaning is determined from the language used by informants. The utterances or statements in the cultural language of the informant are then dissected to identify specific semantic relationships or the way by which the speaker uses his/her specific language to describe cultural meaning in the discussions, which is then followed by repeated interviews to clarify meaning through additional questions and probes. With this specific interview design, I attempt to develop a deeper understanding of the meaning of physical fitness as understood within fire service culture.

Through a set of open-ended questions, I asked for specific words *used* in describing aspects of physical fitness in firefighter culture, avoiding asking direct *meaning* of unique characteristics of physical fitness, thereby reducing the chance a firefighter invokes his/her translational competence to explain physical fitness in terms I, as the researcher, might use. The firefighter informants were asked to speak in their own language as used in the fire service, and to provide a model of firefighter culture to imitate. In this scenario, I hoped to learn the native language of firefighters; to be literally 'taught' by the informants about the culture of the fire service and in particular physical fitness. With the assistance of the firefighter fitness committee comprised of representatives from each department, who provided insight into firefighter life as well as logistical assistance, key informants were selected and interviewed per open-ended initial and follow-up question guides approved by the University of North Carolina Institutional Review Board (IRB) to completely explore emergent cultural domains, with each interview lasting one to two hours over the course of several days. Two of the selected ethnographic informants were acculturated female firefighters to ensure physical fitness domains were fully explored by gender. Open-ended descriptive questions regarding firefighter physical fitness, worksite fitness program

adherence, and coronary health issues were asked that provided the informants general parameters but allowed them to convey there own life experiences and what was important to them within a "grand tour" of the topic of interest via a combination of ethnographic questions, including (Spradley, 1979):

> **Descriptive questions**: these questions provided a grand tour and allowed the PI to gather information on the firefighter's language. Example questions are "Could you describe a typical day at the fire house?" or "Could you describe what one would see firefighters doing during worksite PT (physical training)?"
>
> **Structural questions**: these questions provide background on *domains*, or basic units of cultural knowledge, and *how* information is organized in firefighter culture. Questions include "What are all the stages of a firefighter workout during worksite PT?" or "What are the reasons firefighters do/do not workout during worksite PT?"
>
> **Contrast questions**: these questions allowed discovery of the dimensions of meaning used to distinguish the objects and events in the firefighter's world. After discovering some of the reasons firefighters do/do not workout, the firefighter is asked "Here are some of the barriers I have learned about working out in the worksite PT program. Have I got these correct?"

Appendix A provides a list of questions used in the phase one ethnographic interviews, as well as questions used during the follow-up or repeat questioning phase with each firefighter to further explore evolving domains. Notes were taken by the PI during the interviews, and all sessions were recorded on audiotape with the permission of the informant.

2. 2. 3. Data Analysis

I transcribed the ethnographic interview audiotapes and conducted a domain analysis to identify semantic relationships that link folk categories (two simple terms) together regarding physical fitness, worksite fitness program adherence, and/or coronary health. In the simplest terms, a domain is any symbolic category that includes other categories. Additionally, to fully understand the domain structure of interest, there are four elements that

help in its identification (Spradley, 1979), as noted in this example of the domain 'exercise' in firefighter culture:

> **Element One**: there is a *cover term*, or the name for a category of cultural knowledge. *Exercise*, for example, is the cover term for a larger category of knowledge, the various types of exercise, such as running, walking, or bike riding.
>
> **Element Two:** Each domain has two or more included terms, or folk terms that belong to the category of knowledge named by the cover term. In our example, the firefighter informant may indicate that running, walking, and riding a bike are all types of activities that may go together, possibly under the cover term exercise (although this may not always be the case). In addition, the firefighter informant may indicate that besides the included terms that other terms such as climbing stairs during an emergency response or pulling line (water hose) to the fire are also included under the same cover term. In turn, this takes us to element three.
>
> **Element Three:** All domains have a single semantic relationship linking two or more folk categories. For example, if a person asked "what is riding a bike?" the firefighter might define riding a bike as "*a way to* exercise." Further, folk categories such as running, walking, climbing stairs in a response, and pulling line may all be linked to the domain 'exercise' through the semantic relationship of means-end or "*a way to*".
>
> **Element Four:** Every domain has a boundary. In our exercise example, a firefighter, when asked if a particular job related task is exercise may state that "No, this is not exercise; this activity is continuing education training". The emphasis here is that all domains have boundaries to delineate inclusion or exclusion.

In addition to domain structure, cultural content domains of knowledge are based on semantic relationships used to explain 'meaning' of the informants' culture. While the number of semantic relationships is limited, a "universal list" (Spradley, 1979; LeCompte and Schensul, 1999) was utilized to begin the analysis of semantic domains as illustrated in Appendix C. In addition to the exercise domain example, analysis may also identify other semantic relationships such as "lifting weights" being recognized *as a way* to exercise during the worksite PT period, or "preventing heart disease" *is a reason to* ride the stationary bike, and "lack of exercise equipment" *is a kind of* barrier to improving physical fitness (see Appendix D for a sample domain analysis worksheet).

Utilizing the universal semantic relationships as a guide, and considering the four elements of domain structure, emergent physical fitness domains were coded and analyzed via the multi-functional qualitative analysis software Atlas.ti (Muhr, 2005). This allowed full exploration of the study's first specific aim, the determination of firefighters' cultural meaning of physical fitness, worksite fitness program adherence, and coronary health. Then, using the domain analysis as a guide, common cultural themes concerning the first research aim were identified and subsequently used to inform the development of the second phase focus group discussion question guide, as well as partially inform the second and third research aims: to identify the existence of any fitness norms among professional firefighters, and what barriers and facilitators exist to firefighter physical fitness via worksite fitness programs.

2. 3. Results

2. 3. 1. Sample Description

With the assistance of the fire department fitness representatives, I contacted six participants meeting the acculturation requirement, who were subsequently selected for key informant interview during March 2006. All six agreed to be interviewed and informed consent was obtained. It should be noted that informants from the Raleigh Fire Department could not be selected at the time the ethnographic interview phase was to begin, as an unforeseeable event occurred in which the Raleigh chief at that time suddenly retired, and during the transition period there was no department representative available to work with me to arrange continued study participation. Therefore, the six ethnographic informants were selected from the Cary, Chapel Hill, and Durham Fire Departments. The informants consisted of three Caucasian males, one African-American male, and two Caucasian females,

ranging from ages 24 to 49 in years. Four participated in follow-up in-person interviews to further explore identified domains and ensure the accuracy of my interpretation of the transcripts. The two informants who could not be scheduled for follow-up interview, due to work and/or second job commitments, were contacted by telephone and interviewed per the follow-up question guide. Additionally, each informant was further interviewed by telephone at their place of work or home to further delineate information gathered during the ethnographic study phase. The primary and follow-up question guides are found in Appendices A and B.

2. 3. 2. Findings

The broader purpose of this study was to determine how socio-cultural factors affect physical fitness within the firefighting occupation, and to identify other factors that should be targeted to assist departments in cultivating a culture that promotes workplace fitness. Within this overarching goal, three specific aims were addressed; including 1) determination of the cultural (shared) meaning of physical fitness, worksite fitness program adherence, and coronary health issues from the perspective of the professional firefighter, 2) identification of any fitness norms existing among professional firefighters, and 3) what barriers and facilitators to firefighter physical fitness exist via worksite fitness programs. Using the primary and follow-up ethnographic question guides, the domains of cultural knowledge were identified for the first aim of the study, to understand the cultural meaning of physical fitness, worksite fitness program adherence, and coronary health. The ethnographic interviews also partially informed the subsequent aims for later phases of the study. It should be noted that aliases are used when providing sample portions of dialog from the

ethnographic informant transcripts to provide an additional layer of confidentiality for the key informants. A sample of the ethnographic questions is found in Figure 2.

- "Could you describe what firefighters typically do during the physical training period?"
- "You mentioned that firefighters have several reasons they do/do not follow the required PT; can you give me some examples?"
- "You mentioned that some firefighters are killed in the line of duty by CHD; can you give me some examples?"
- "If you were talking to another firefighter about the benefits of PT, what would you say?"
- From past interviews, I've heard that firefighters exercise for many reasons. Frequently mentioned was body strength, putting on mass. For what other purposes do firefighters exercise?

Figure 2: Sample initial and follow-up questions from the ethnographic interviews.

After reviewing the ethnographic transcripts, a list of common topics were identified, and these topics set the foundation for identification of the cultural domains of physical fitness within the fire service. The list of topics discussed were typical/daily shift activities, activities done during the fitness or physical training (PT) period, reasons firefighters do/do not participate in PT, interesting experiences had while in the fire service, and coronary heart disease and heart attack within the fire service. From this list, cultural domains were identified and coded using two sources to identify semantic relationships: topics/issues identified inductively from the ethnographic interviews, and those listed in the specific aims of the study. Examples of the former include, "reasons to do PT or fitness", "night calls", "too busy to PT", and "motivation"; examples of the latter include "reasons for non-adherence", "barriers to exercise", or "facilitators to exercise". Appendix D provides a sample domain analysis worksheet carried out for the construct "exercise".

2. 3. 2A. The "meaning" of physical fitness in fire service culture

When firefighters typically use the word physical fitness, or more commonly, "fitness", it is often in the 'official' or formal sense of one's own fire department policy. Fitness is used to describe the organizational physical training (PT) period in which firefighters exercise, as in "I do fitness at 9:00am", or "the captain says we all have to do

fitness today". In this sense, fitness is normally synonymous with exercise. Additionally, "fitness" is also framed in the organizational capacity in terms of "fitness" readiness, tested formally through annual physical fitness examination, gathering measures such as flexibility, aerobic endurance, and strength, in addition to height, weight, and blood pressure. Yet in terms of the cultural meaning of fitness from the emic perspective of the firefighter, it is more complex, reflected through differing language and semantic relationships used to describe fitness "for the job", and in subcategories of fitness such as "age". In terms of the job, the semantic relationship frequently used is strict inclusion, in the form of X is a kind of Y, as in "being able to pull a victim from a fire" *is a kind* of fitness. The language used to describe this relationship is expressed through one's own ability, or the crew member's ability/readiness to do the job. Common phrases expressing this relationship include "being able to pull hose", "humping that gear" up stairs during a response event, "pulling one's own weight", being "ready to make the attack", and "air consumption". Such phrases are used to describe fitness in terms of stamina and physical strength necessary for the rigors of the job. As one informant sums up fitness for the job:

The more fit you are the better you are in everything. I mean, humping that gear, everything. Air consumption. We have these 4500 PSI bottles. There's guys out there that will suck them down in 8 minutes on a fire scene. And then there are guys who will last 20 minutes, on a fire scene. So, it plays a big role there. If you can't consume your air, if you're not in shape you're (makes quick breathing sounds) like crazy after making an initial attack on a fire, then, you need to start working out.

Essentially, fitness is equated with, or 'means' the ability to adequately do the job through "staying with your crew"; a firefighter's ability to avoid being recognized as the firefighter "not able to hang" for the rigors of the job. If a firefighter can carry out his/her response scene tasks necessary of the job, which is often viewed as paramount to supporting the crew throughout the entire event process via adequate levels of stamina and strength, then one is

identified as having “good” fitness . This also holds true in training activities, many of which mirror the rigors of actual fire suppression on a response scene. Successful completion of these activities is often synonymous with adequate fitness for the job, as well as meeting the requirements of participation in the organization’s PT program. As one informant notes when asked about training in the field and then not working out during the PT period, she responds:

A lot of times, you know, we won’t come back and do anything if it’s a lot of physical work. Like the other day we went for four hours of training of crawling around, going around obstacles, taking your air pack on and off. So that’s a lot of physical work.

In terms of defining the meaning of fitness, we must also consider its definition within the sub-categories of the young and older firefighters. While there is still the overarching cultural meaning of fitness described earlier as the ability to do job tasks adequately on the response scene, having appropriate stamina for the rigors of fire suppression, when portrayed in terms of the young firefighter, fitness is viewed more as the aesthetic, portrayed through phrases such as “my appearance”, or “I wanted to look good”, to avoid gaining weight and “gutting out”.

With respect to older firefighters, while there is the desire to improve one’s appearance, fitness is defined more within the context of physical health, both on and off the job, especially in terms of coronary health. We find fitness described as the long term act in which the firefighter must “start early” to avoid heart related issues over long term:

What I would like is that the cardiovascular, I would like to see firefighters acknowledge that what you do now is gonna affect you in the future. Because you want to see your grandchildren. You want to get old a little bit…

…I think if each, to get the message out that what you do now will affect your future. Cause the fire department is not your life. Your life is at home. And your life is after you retire. This is just a part of it. And this job can definitely kill people. Not just in a fire, but the lifestyle,

and the emotional and physical toll. If firefighters would recognize how dangerous this is to your future, and to start early…

Additionally, the state of fitness is frequently defined by senior firefighters as being "'older-older", where firefighters have made it through the long term physiological and psychological stressors of night calls and its chronic impact on the heart through sustained fitness:

I worry about my heart. [Laughs] I mean you do. You just jump up and you start going, and I'm thinking whoa, yea. I can't imagine being 'older' older where, unless I really had, beyond a shadow of a doubt knew that I was physically fit and in really good shape and my heart could take that. I'll be very worried about this when I'm 'older' older. …

2. 3. 2B. The cultural meaning of worksite fitness program (PT) adherence

The complexity of the cultural meaning of fitness is emphasized when considering the meaning of adherence to the voluntary fitness program in most fire stations, typically an allotted time period set aside for fitness activities or exercise. The cultural domain "PT" also has subcategories related to the second and third aims of the study; in terms of identifying the barriers and facilitators to program adherence, and any fitness norms existing in fire service culture. These subcategories are specified as "reasons for doing PT" and "reasons for not doing PT".

In terms of the primary domain "PT", there are various descriptors in firefighter language expressed through the strict inclusion semantic relationship, or that X is *a kind of* Y, such as "running is a kind of PT". We see conventional descriptors for PT primarily in terms of types of exercise, such as "walking", "lifting free weights", "working out", and "ride the bike or treadmill". But we find the unconventional to describe the cultural meaning of PT as well, with phrases such as "training" and "doing the job". Overall, the PT fitness period is described both in terms of traditional exercise activities and the nontraditional

activities that affect fitness level, e.g., job training that increases heart rate. Through further exploration of the informant transcripts, I found PT generally described as the "freedom to do what they want", indicating that motivation to adhere is a contributing factor to the specific activities firefighters engage in during the PT period.

In terms of the subcategories of PT, the "reasons for/for not doing PT", PT fitness adherence is most influenced by individual motivation, followed by interpersonal crew and/or captain level influence to participate. Additionally, organizational factors are prevalent, such as job tasks, be they emergency response activities, or non response public relations events, daily training and in-station duties. Descriptors for not doing PT include "a call", and is used regardless of the level of severity of an event, or if it is frequent "meetings" or daily "con-ed" (continuing education training). Additional organizational factors influencing participation are readily apparent, from environmental factors ("space" and "equipment"), management level support in terms of "the battalion chief does PT" to influence adherence, or that firefighters "just don't want to get in trouble" for non-participation. Positive organizational descriptors include the "freedom in the PT" period, and PT described as "chummy", and "family oriented".

2. 3. 2C. The cultural meaning of coronary health: heart attack awareness versus salience

In terms of coronary heart disease and subsequent heart attack, the cultural content domain is "heart attack", and has varying levels of cultural relevance, with salience most apparent in older firefighters. The semantic relationship largely used to describe heart attack is cause-effect, i.e., X is *a result or cause of* Y, as in "lack of stamina is a cause of heart attack". Frequent folk terms associated with heart attack are

"what you do now", "feed 'em at the fire stations these fire house meals", "it's because you wake up" in the middle of the night, the "buzzer goes off and the lights come on", and "you're heart just gets up and goes". Essentially, when discussing heart attack in the fire service, it is associated with older firefighters, in terms of long term career fitness lifestyles and aerobic exercise and nutrition practices. Additionally, the chronic affects of frequent sleep interruption leading to a quick rise in heart rate and anxiety level when going to an unknown response event is also relevant. As one informant indicates, frequent sleep interruption changes the firefighter's long term sleep patterns:

…if I'm really tired, or if I don't feel well at work and I'm in a really deep sleep, I can tell when the call comes out much more, yea, oh, whoa, your heart starts pounding. And so, I think we've just conditioned ourselves where we don't fall into a really, really heavy sleep at work.

Overall, the cultural perception of physical fitness, worksite program adherence, and heart attack paints a colorful picture in the fire service. In the official capacity, the fitness is defined as exercise during the organization's PT period, yet culturally it is of vital importance to the fire service; it is the ability to adequately do the job and support the crew, which affirms my initial department observations, engine ride-alongs, and informal discussions with firefighters, where an initial conversation about fitness usually pointed towards an explanation of fitness in terms of the morning workout period. Yet when the discussion turned toward the perception of the physically fit firefighter, fitness was often equated with adequate ability to do job tasks. Additionally, the cultural meaning of fitness as the ability to do the job did often bring mention of traditional or 'research' definitions of fitness in terms of the holistic, in terms of inclusion of nutrition, lean body mass and physiological biomarkers of 'good' fitness.

When ethnographic discussion centered on PT program adherence, by and large folk terms were traditional terms used to define exercise, such as running, walking, and working out, but included mention of non-traditional activities such as smoking, eating, and watching television, thereby indicative of the relative autonomy in PT adherence. And the subcategories or taxonomy for the reasons firefighters do and do not do PT, intrapersonal (individual), interpersonal (crew and captain) and organizational influences were frequently mentioned. Finally, the cultural meaning of coronary health, in terms of the domain "heart attack" appears simplistic in firefighter culture: younger firefighters may have limited awareness of the issue but little, if any salience of the severity of the problem is found, whereas heart attack in older firefighters is a readily salient cultural term, exaggerated by the interplay of irregular sleep patterns and sudden awakening for a stressful response event.

2. 3. 3. Identification of Cultural Themes

Using the domain analysis as a guide, I arranged transcripts together so that the informal taxonomy of sub-categories based on the informants' own language could be employed to identify common cultural themes for the primary aim of the ethnographic phase of the study. The following provides a description of the themes categorized by the ethnographic informant interviews aim, to identify the cultural meaning of physical fitness, fitness program adherence, and coronary health/heart attack salience.

2. 3. 3. A. The Cultural Meaning of Physical Fitness in the Fire Service: Common Themes

2. 3. 3. A1. Theme 1: Physical fitness in terms of stamina is important for the job

After reviewing the ethnographic interview transcripts, firefighter physical fitness is a complex topic not easily defined within the narrow definition of 'exercise'. Yet common themes are present that describe the general meaning of fitness within the context of

firefighter culture. First, it is clear that all firefighters know they 'should' work out; fitness is important to their job and their overall health. When presented the hypothetical question of talking to another firefighter about the benefits of physical training or PT and how firefighters would respond, the informants provided comparable answers, regardless of age or gender. As 'Mike', age 34, exclaims:

Well, the biggest benefit is it might save your life (emphasizes life) [laughs]. You could get trapped or whatever else and you need to get out. Or you need to get out of the building; you may be below on air (self contained breathing apparatus). And in those situations you're gonna need your physical fitness. Your fitness level, I think, is going to determine whether you're gonna get out alive or not. You know if you are sucking air because you're winded, your oxygen tanking like mad, because you're winded, and you are in a place you can't get out of and you have to wait for someone to come help you. I mean, you could suffocate very easily. If you're in a room or you need to escape somehow and you don't have the stamina or the strength to be able to get through a wall or anything like that, there again, you're gonna die. That's the biggest thing that I would tell somebody the most important thing. Obviously it's good for your overall general health. Studies have said you're gonna live longer, you're gonna be healthier, you're gonna live longer, you're gonna be happier. Everybody knows that. But in this particular job I think the biggest thing is that, you know, it will help you survive.

Similarly, Mary, age 40, notes:

Because the thing about us with our job, especially when you are woken up in the middle of the night and you have to get right to it, you know the thing about it is our heart goes and it stops, goes and it stops. You know we go fast and we slow down, go fast and we slow down. So the only way to get your heart used to that is to do some type of physical fitness where you can get your heart rate up and let it to slow down, heart rate up and let it slow down. And so you know, to me, that's why I even do it, just if nothing else to try to protect my heart in some way. I am scared I am gonna get up some night and rush to working and all of the sudden my heart go " you know, I'm not working and doing this any more. So I would just tell them you know that it's important, it is important for our job for what are hearts are put through.

And Jim, age 24, the rookie of his crew, describes his impression of the importance of physical fitness in the fire service:

There's lot of benefits of physical fitness for being in the fire department and it's important to be in shape because it's a very physical job. People might come up here, we might get ride-alongs that come up here and say there's nothing to that job, but they (may) not see anything that day. We might, when they leave at 10:00 we might go out at 10:05 to a fully involved apartment complex and we might be trying to stop this fire from burning, say, one

portion of this complex where we are humping hose up upstairs and trying to do all we can to stop this thing. But um, we had high rise training a few months back and um, we all learned a lot (emphasis) from that. Pretty much I'm the rookie on the truck, and they loaded me down with hose, and water can, and a thermal imager, and a rabbit tool. Told me to hump up, I think it was 8 floors. (He) told me to hump up 8 flights of stairs. Couldn't use the elevator, the elevators for some reason were broke this day, is what they said. [Both laugh] We hump up these stairs, and I mean I'm in pretty good shape, and I'm slow up those stairs. After we had walked up the bottom level in the parking garage, walked up some stairs. Found out that wasn't the right way up, came back down the stairs, and then we had to walk back up the stairs, walk around the front of the courtyard, before we went in to go up 8 flights of stairs. So, we really went up about 11 to 12 flights of stairs. And, it's not bad around here. If you were in New York, this is common for them. I mean it's very common, where around here were not having to do those high rise buildings. High rise fires are, they really test your physical ability. It's all the equipment you have to carry up there. I mentioned all the equipment that is on you. Your turn out gear, your air pack, and the tool you're assigned. Then you have so much stuff on I mean, its um, you take a like today where it's 90 degrees out there and you give us a structure fire in the middle of the day. You're gonna see, you're gonna see who's in shape, and who's not.

2. 3. 3. A2. Theme 2: Physical fitness is a recent phenomenon in the fire service

When discussing physical fitness, the informants agree that physical fitness has only recently become a topic of interest, one generally associated with rookie academies during the last decade of the fire service. Physical fitness is a state acquired in the rookie academy when new recruits are required to exercise in a paramilitary fashion, i.e., several hours daily.

As Larry, age 49 notes:

Sometimes when guys come on they may be at their top physical level to get here. To pass the academy, well, first to get on through the physical agility test, to get to where you can get hired, and throughout the academy you're gonna stay in physical shape. Once they come out some will continue it, some don't. But this has been only in recent years that physical fitness has become a focus seen in the rookie academies.

And Michelle, age 34, notes:

It's (academy) like boot camp. That's exactly what it's like. But let me say one thing before, the academy, the academy that I came through three and a half years ago was the first real academy that really done PT everyday. And every since then, it's, everybody's done PT everyday. The academies before that were kind of lax. They would do it some days and some days they wouldn't. And you can tell a difference by the ones that come on shift that come out of these recent academies because they do PT everyday. They make sure they get it in. You can tell a big difference in the mind set.

And Mike, an officer age 34, describes this change from the rookie mindset to the regular fire service job as ultimately the individual's decision to continue with a high level of fitness:

In rookie school it's instilling discipline and teamwork. I don't mean that discipline is not there, it's just not in your face like it is there. They may not choose to work out as hard or something else. It's a mindset I think. You're in this rookie school and their being pushed and pushed and pushed as a group to mold and work together and that sort of thing, and out here its more individual. I mean at least at the station. You're granted a lot more individual freedom to do your individual thing. And unfortunately, some guys take advantage of that, and don't work out as hard. I don't think there's really anyway you can change that.

And this new phenomena and the inertia of change is clearly stated by Barry, age 40:

This business has been in business for hundreds of years, but we try to strive to keep it as backwards as possible. Unimpeded by progress. Put water on fire. [Laughs] And hang on to your traditions. Its not, its not a, they don't like change. Firefighters do not like change. They're 13 year olds in 40 year old and 30 year old bodies. They view types, they view women just like they did when they were 13 years old. [Laughs] We don't grow much emotionally. Intellectually maybe, physically, definitely, but emotionally they're still the little kid that saw the fire truck drive by and say I want to do that. [Both laugh] So no, we don't follow our, hardly ever follow our SOPs (for physical fitness).

2. 3. 3. B. The Cultural Meaning of Fitness Program Adherence

2. 3. 3. B1. Theme 3: Fitness program "PT" adherence is the responsibility of the individual

In the general context, there is an expectation for good physical fitness within the fire service, an expectation coming primarily into play within the circumstances of the response scene and how effective firefighters are at his/her duties. Outside of the response scene, fitness expectations and adherence to the PT program are variable, and is primarily the individual's responsibility. On the intrapersonal level, Larry, age 49, points out that good nutrition and physical fitness habits realistically falls on the individual and his/her own decision:

We have some country cookers. We have some good guys, chefs here. They try, we always, I'm not a big cooker myself. When they cook they try to cook a fit meal. I mean, not a real lot of fatty stuff. But I tell you everybody loves fried chicken or fried pork chop here and there. Things like that. but most times there is always a green. It's either grilled or, they cook pretty

healthy here. We try to watch what we eat sometimes."

"Pretty much everybody here tries to watch what we eat. Again, that goes back to an individual. So you can say a lot of things we do is individual. Some people get together and do it as a unit, or as a truck. You know as far as walking or running, or working out. Some stations are better than others. Depends on the people (and) who are there."
"…because it's not a mandatory thing to do it. You're given the opportunity, the time in a day to do it. That's your choice, it's your crew's choice. I think you're given an hour, hour and a half to work out. So, it's not that you don't have the opportunity to. It's up to you whether you do it.

Similarly, when asked what you would see firefighters doing during the typical physical

training (PT) period, Michelle indicates a mixed scenario:

[Laughs] you would see a variety of things. [Laughs] It scared the boys to death when I told them you were coming up to do the study on physical fitness. They were all sitting around doing nothing. [Both laugh] "Hurry up let's get busy and look like were doing something." But you'll see different things. You've got some people who like to work out in here and some jogging and things. Other people will mainly lift weights. We've got free weights back there, and the hand weights and the weight bench. You'll see some people that will do a combination of the weights, and we got a bicycle. And they'll ride the bicycle or the treadmill. Then we got some people, like, I will out and walk or jog. There's a couple of more who will go out and do the same thing outside. And if it's really nasty outside I'll just run around in circles in the bay if it's really bad outside.

And you got some who just sit around and do nothing. [PI: And if I came in and saw people doing nothing, no PT, what kind of things would they be doing?] Sitting there talking, drinking coffee.

And Mike, an officer age 34, gives his impression of adherence to his department's fitness

program:

…I prefer not to have a regimen. I mean, I want, you know there might be days that I want to work on certain muscle groups, or different things. Not do a regimented, 20 minutes of this, 20 minutes of that. The positive of that is that it keeps the freedom to do what you feel, you know, what you feel you need to work on. You keep things fresh. Because if you keep doing the same things day after day after day after day it gets boring, monotonous. I think that's the biggest thing right now. [PI: Umhm.] I don't, like I said, I don't make the guys that I supervise, I give them the freedom to do what they want. Just as long as they are doing something. They understand that this is part of their job. And when you look at it, you are getting paid to work out. Yea, my gosh, who can say that?

So on the individual level, there is relative autonomy when working out, and personal

motivation acts as a key issue. And this is true even when a firefighter takes pleasure from participating in the PT program, as Mary, age 39, indicates:

…I enjoy working out, but it's hard to motivate yourself. And I think the main reason is because, um, a lot of times, I work with (name removed) and he is a huge motivation, to have (name removed). But if you are not working with someone like (name removed) you, there is just no motivation, even if you know its good for you and good for your heart and it will help you in your job, even if you know that, I think the best motivation is that if everyone will, if everyone will do something together. And you know, even (name removed), he doesn't, you know, push people to do that, so if you know that they work out a lot, that they motivate themselves, it would mean a lot if they work out as a team, and having something to go by. Like you know, we know that to have something to actually follow to do. To see goals, to have goals, and have some way to obtain those goals, and as far as PT and all that.

In addition, Mary notes that a firefighter's own self-confidence or self-efficacy in his/her fitness abilities may play a role as well:

… a lot of people who have never worked out or done anything, they don't know where to start. They don't know what to do. They need direction, and you don't want to ask for it because it's kind of embarrassing. Firefighters tend to be fairly prideful.

2. 3. 3. B2. Theme 4: Unfit firefighters on the response scene are handled in different ways

Although firefighters are expected to be fit and capable of doing their job tasks, they work with others in the fire service that may not always fulfill this role. When asked if there are any repercussions in this situation, Mary notes:

The crew would talk junk about them behind their back. [Laughs] They'll rag them like crazy in front of each other. Yea, talk bad about them. [Laughs] [PI: And would there be any repercussions as far as] If there is I've never heard any. If anybody takes them aside and says "hey you need to", I don't know (pauses). And it all depends on who it is, to be honest. You kind of know the people in the fire service, who you can pick on and who you can't [laughs] so. …firefighters know who physically can't pull their weight. In the department you know that, and it's just something you work with, and go with.

And Larry, age 49, makes a similar observation:

Well, I guess you could say it would be like a little picking thing, you know. "Man, you're weak, you know? [Laughs] You little weakling." Especially if it's a big guy, and he's weak. And I would say in all this when it comes to fitness it will always go back to self pride.

And younger firefighters make similar observations about firefighters who lack the physical

shape necessary for the rigors of the job, but Jim, age 24, goes a step further regarding unfit firefighters and the result of poor physical fitness on the job:

They'll (management) find positions for them, find somewhere for them to be. They'll, yea, they'll keep things straight. I mean, if you're not in as good of shape maybe you'll, somebody will pick up the slack. Somebody will have to pick up the slack for you. And, there could be guys who are not in good shape at all and say, they're a driver for the engine. Some of the engines are busy and really doing it, but you put them on a slower engine and they don't have to hump the hose as much and go in the fires.

Yet Jim reiterates the primary importance of being physically fit on the response scene:

They can be pumping and but, it's still important for the driver to be physically fit. [PI: OK, so that's what it really comes down to, if you were talking to other firefighters it would] Yea, yea, tell em'. I wouldn't even have to tell them they would know. If they've done any firefighting, especially the high rise stuff I was referring to. Any fire you're going into is gonna be tough on you, because you're going into the heat anyways. And on hot days it's a lot worse. The more fit you are the better you are in everything. I mean, humping that gear, everything. Air consumption. We have these 4500 PSI bottles. There's guys out there that will suck them down in 8 minutes on a fire scene. And then there are guys who will last 20 minutes, on a fire scene. So, it plays a big role there. If you can't consume your air, if you're not in shape you're (makes quick breathing sounds) like crazy after making an initial attack on a fire, then, you need to start working out.

2. 3. 3. B3. Theme 5: The crew and crew captain apply some influence on fitness program adherence

In general, some firefighters recognize that adherence to fitness programs should include exercise, as well as good nutritional and sleeping habits, but adherence varies depending on the individual's motivation, the crew influence (primarily on the captain level), and upper management's overall commitment to improving physical fitness practices while on duty.

Mary indicated earlier that self motivation, in addition to self-efficacy, has some effect on the individual's adherence to the PT program. And personal motivation is reinforced when a strong interpersonal influence is present, with the crew and/or management involved in PT participation as well as motivation to adhere to fitness programs.

The interview informants generally agree that the crew captain's underlying normative expectation and/or in conjunction with his/her own personal participation with the crew, is a significant motivator to exercise, not only to improve the individuals' fitness level and overall health, but also as a means to sustain the crew as a coherent and productive working unit.

As noted earlier, when asked how an unfit firefighter is treated on a fire scene, you often see varied positive/negative responses, with the crew sometimes influencing the individual comically through friendly teasing to encourage exercise. As Jim, age 24 notes:

…the only time they are gonna say something to you is if you're not pulling your own at a fire scene. If you're not staying with your crew, if your not able to hang. Or, if you're, we call it "gutting out" (gaining weight). If you are, if you can start to see it on somebody. (You say) "You're starting to gut out there a little bit. Then it's just kind of an initiative to. [PI: OK.] The guys you're working with will say something…

Along a similar vein, older firefighters note this influence by captains, but it tends more toward the old adage of essentially "walking the walk", as Larry, age 49, notes:

…it depends on the people there. What they think about that person. It may give us something about that person. It may not. Of course, I would say every, hopefully the captain of that truck or station, if he is physically fit himself he would promote that. But if he's not, what can you say to that person? If you're not doing it. Cause what is he or she gonna say? "You're not doing it. Why should I do it?

And Mike, age 34 and a crew captain, notes:

…as long as they are doing something that's you know, improving their physical fitness. I've got no problems now with (them). If I find them not doing anything and I have to say something to them, I don't like to do that, but unfortunately that comes with the territory.

But generally speaking, it is most frequently the interpersonal influence of the firefighter's crew through positive encouragement, as Larry, age 49, notes:

Well, something that I've noticed since I've been here (regarding fitness), that, you've got camaraderie in some stations. You have truck camaraderie, and, we know we have a chain of command. And of course you are always gonna have different leadership skills. Everybody that's a leader is not necessarily meant to be a leader, but sometime we have them. But

anyway. But in saying that, you get on a friendly, on a friendship basis, because, you're tight. You know, you eat together, you sleep together, you workout together. You clean together. In 24 hours you do a lot of things together. And you know, as the years go on, you get very friendly, chummy, family, its family oriented.

As does Barry, age 40:

…we do as a team. We even got numbers, where we function as a, we like to call ourselves like a mini fire squad. Like the military, you know, they have the machine gun first, then, like a mini squad. So we try and do stuff together. When we go to a call where we are uncomfortable with the situation we all put our back to each other and stuff like that. We do it together. So it would be very unusual, on my crew, for some person to straggle off (fitness) and not do anything. If one person did, the other two would say "what the hell are you doing. Come over here. We're doing this" That's on our crew.

And this influence increases with the level of friendship and comfort level with crew members, as Michelle explains:

…it's your crew's choice (physical training). I think you're given an hour, hour and a half to work out. So, it's not that you don't have the opportunity to. It's up to you whether you do it. Because 2 people out of a 3 man or 4 man crew could work out and the other 2 may not. You have some cases of that. [PI: And will firefighters say anything to those firefighters not working out?] It's according to how well you know them, how long you've been working with them. Pretty good friends, you know just to mess with them, "why don't you come over here and work out? You need it you know." You try and coax them on to try to come on and do it.

2. 3. 3. B4. Theme 6: Firefighters believe management has contradictory expectations for adherence

As mentioned earlier, management can have a variable effect on fitness adherence, with the captain or battalion chief acting as the primary persons influencing the level of participation. Although some officers such as Mike give relative autonomy to the individual's fitness practices as long as he/she is doing 'something', there are differing perspectives on how management influences participation. The firefighter informants agree that this is a mystery to many firefighters, as battalion, deputy, and primary chiefs 'exercise' influence in contrary ways, establishing opposing expectations within the department.

As Michelle, age 34, notes:

My chief on my shift PTs with us every morning. Now, different ones do not PT. [Laughs] But the (battalion) chief here on C shift, he PTs every day with us. He tries to push you a little bit to make you do better. But you also know, some shifts don't PT. Their chiefs don't PT. And it varies. [PI: And is that something that you might also see, if the chief doesn't] I think that has a lot to do with it. I was on B shift for about a year before I changed shifts and their (battalion) chief don't PT. And you'll see a lot of those sitting around. But with my shift the chief back there you don't see any sitting around, because he is back there the whole time. He's in and out, so he is in and out back there, knowing what you're doing. I think it does make a difference.

And Mary, age 39, paints a variable picture as well:

Our battalion chief does (work out). He'll either work out here or go to the track, or work out with one of the other stations. And then our other chief, see our chiefs just switched around, their doing cross training, so, so the chief that used to be our deputy chief of operations is now chief of training. He, when he was here he worked out, but he's stationed at another station now so I don't ever see him in the mornings, and I don't know if he works out or not. Our, our fire marshal does not work out here. If he does anything at home I don't know, but he doesn't do anything here at work. [PI: Do you think that firefighters, including everybody here, if they are influenced by battalion chief or deputy chiefs, would it be because they're, is it because they are walking the walk, or is it because they would just come in and say (you need to work out).] They just don't want to get in trouble. [PI: So it's not necessarily by example] No! [Laughs]

Similarly, when asked if the battalion or higher order chiefs regularly exercise, Mike, an

office age 34, reiterates this issue regarding his administration:

[Laughs] I can vouch for 2 of the 6 (battalion chiefs) I know who workout personally. … sets a good example (pause) but the older ones don't. This is a new concept (fitness) for the profession. These guys have been around 25 years and, you know, they never did before and their not about to now. But some of the younger guys that have come up the ranks are like "hey, this is good". I think the attitude is changing. [PI: Would the battalion chiefs who work out expect you to workout too?] Yes, Yes. But, now the administrative staff that sets procedures (pause) they don't workout. That kind of sends the wrong message. Although their job is a little different than what we are, that is (fire) suppression, but, if you are gonna make rules, you need to follow them. And they have a workout room up there too. .. If they wanted to set a good example that would be good

Finally, Larry, age 49,when asked if there are repercussion for non-adherence to the PT

program, he sums up the general belief held by the informants, that in terms of management

influence and enforcement of physical fitness, it is generally not a culturally relevant

concept:

…it's not like it's a report (taken) "like well firefighter such and such couldn't, couldn't lift a sofa or couldn't pull that wall down." Hey, somebody else would say hang on man, ah, you're weak just get out of the way.

2. 3. 3. B5. Theme 7: Organizational reasons for lack of fitness program adherence abound

Workplace activities, such as emergency calls and training activities (continuing education) are typically given as the reasons why firefighters do not adhere to department fitness programs. When asked why firefighters do not follow programs that are technically mandated yet not enforced, Mary, age 39, describes the typical scenario regarding how firefighter job tasks and activities take the place of the PT period:

Like a lot of times they'll have something else scheduled for us. Like this meeting, for example, they had a meeting, we had to move around some people. So one truck that had to bring someone here, they had to be here so early they didn't get their designated, so to speak, time for fitness. And more than likely they won't go later this afternoon and make it up. [PI: OK. And if a firefighter misses a, misses the PT period, are there ever any repercussions for missing it?] No.

And Michelle, age 34, describes how work tasks affect her shifts' fitness time, and the lack of repercussions for missing physical training during the fitness period:

We've missed it every day this cycle. So it varies. Some days, sometimes you will go a month and never miss it. Um, we've had to change stations the first day of the cycle. We missed it today. Last cycle we had a call during PT time. That kind of throws everything out of whack. … Sometimes it's more than that depending on which station you are at or what else is going on. But I would say its average at least two times a month that you, you miss it. And it's probably more than that if you get right down and think about it.

…No, no repercussions. And I will say it is really hard even though we have during the day you can do it anytime. But when you miss it in that morning time it seems like your whole day gets messed up and it's hard to go back and make it up anytime during that day. …a lot of times, you know, we won't come back and do anything if it's a lot of physical work. Like the other day we went for four hours of training of crawling around, going around obstacles, taking your air pack on and off. So that's a lot of physical work.

In addition to station tasks and training activities, normally occurring response calls such as fire suppression, EMS, and First Aid/CPR play a significant role in non-adherence to fitness programs, as Jim, age 24, notes:

If they are on a busy engine (responding to many calls) they might not have time every day to work out. They might, you could say, they can find time everyday. Say, they slow down in the evening time they could do it then. But if they've been running all day they're not gonna feel like working out then. So, if you are at a slower station you, of course, you have a whole lot more time to work out.

And as mentioned earlier, if physical training during the fitness period is missed due to work and response activities, ultimately, it is the individual's decision to work out later in the day or evening, and depends on self-motivation and/or the crew's influence, as described by Jim:

It depends on the person um, and how dedicated they are to working out. Now if, if they have a set routine, some trucks have a set routine where they're gonna go to the gym everyday whether they make it in the morning or in the afternoon. So, it, it really depends on the person or the people you're on the truck with.

And Larry, age 49:

Well, a lot of times that depends on your captain, what he has scheduled. Sometimes if he is a fitness buff, I mean, or a fitness type person that may be a priority to him. As well as other members, cause usually if you happen to be in a station with equipment or if you have to, if there is usually a fitness center in your area, your district. … But either way if he is a fitness type person it a may be a priority to do it first thing that morning before he does anything else. If not, you know, he may, it may prioritize, or he may have a class, or he may have inspections, or something else scheduled. You may have a PR event, something like that. And you may not get to it that afternoon. Or you know you may have a big fire. It may last for hours. By the time you finished with that fire you know you may be tired. You may be out of the mood. You may be a morning person. In the afternoon you may rather do other things. Again, it depends on the person, or the captain of that truck.

Lack of organizational level team sports is also a significant issue from the firefighter's perspective, as many fire departments allow little or no competitive sports while on duty, i.e., basketball and soccer, due to management's perception that it results in higher rates of injury and worker's compensation claims. Yet firefighters such as Larry, age 49, suggest that competitive sports act as a significant incentive for improved adherence and physical fitness levels for the job:

…because you probably wouldn't have as many accidents I would say because that person would be, at least in that sport, physically fit. If we played often enough. Even seasonal, because, even say right as that season is coming up, that person hopefully is going to do

something to get himself prepared. That's why I say there's really no incentive (to exercise without team sports)..

And other seasoned firefighters, such as Mary, age 39, agree:

We exercised a lot more when we played team sports… you don't have to guess at what to, like if you're not, you've never belonged to a gym or you've never had a work out program, or you've never been into really working out, you know, or doing fitness, it's pretty much thoughtless. You know you don't have to think about doing a team sport. And its fun and you get results. It is the competitive edge of it. Nobody really fails in that aspect, so to speak. Or if you're failing you're failing with other people. You're not going down by yourself.

This also resonates with younger firefighters such as Michelle, age 34:

The only one (sport) we are not allowed to play is basketball. We have too many people getting hurt. [Laughs] But um, other than that after five o'clock you can play any team sports you want to play. I mean they promote it that way you build good team work, so.

…I think they (playing team sports) would (improve adherence) because a lot of times when get the whole team involved in playing a game you know, it's better than trying to sit back there and workout by yourself. Or, you're not really working out by yourself but you're doing each individual thing by yourself. And it does make it a lot more fun when you can get out there together and play and cut up and have a good time.

And officers such as Mike, age 34:

I think the majority of people would get more out of it. I don't know necessarily more about exercise out of it, but they would get more from the activity than probably what they are doing now. There's a lot of people that think being on a stationary bike out there (in the truck bay) is awful. But hitting a whiffle ball or something, I mean who wouldn't. I personally would rather be doing that than pedaling on a stationary bike forever. I think the majority of people would get more out of the team sports if they allowed it.

Lastly, environmental factors play a prominent role in specific fire stations, including space,

temperature, and equipment issues, as Mary, age 39 describes:

…the main barrier (reason) we don't work out is space. When we are trying to work out all these vehicles are sitting in here and it gets so frustrating. The equipment is old. It's boring and depressing to work out in a fire station. [Laughs] Extremely (depressing). And, I mean, not every, I don't mean different stations, but not everyone in the same shift, we all work out differently. I mean, so yea every station the barrier is the equipment is crammed into the bay where all the fire trucks are and you know, in the winter we have we have a little heater, but in the winter it's freezing down here. In the summer it's burning up, you know its old, dilapidated equipment that you get on it and workout and your hands if you don't wear gloves your hands are all rusty when you're all done. It's just like sometime you are like

"why bother?"

As well as Michelle:

We need more equipment. [Laughs] [PI: What type of equipment would that be?] Like more treadmills at the station. The one we have here is like, donated.

And Jim:

They might feel like they don't have the right equipment at the station to workout. Because like I said some of the stations have some equipment but don't have room to have adequate equipment to get a good workout.

And later, during her interview, Mary demonstrates her frustration again with the equipment issue and also discusses the misplaced use of incentives:

…somehow some money got found and that we needed to spend $4500 on, and our chief bought big screen TVs for all the stations, instead of more exercise equipment or which, a nice TV, you know we have downtime, which is a nice thing, which is a nice gesture. But is that type of thing where here is a really nice thing, a nice TV where you can sit around on your rear ends and watch TV, instead of going out and buying, you know, a treadmill, or extra bikes?

2. 3. 3. C. The cultural meaning of coronary heart disease and heart attack salience

2. 3. 3. C1. Theme 8: Heart attack risk is more salient to the old than the young in the fire service

"It can't happen to me" is essentially the predominant mindset of younger firefighters when it comes to a coronary related death, or any other form of work related injury or death. While firefighters generally see the importance of physical fitness to overall health and specifically for the rigors of the fire service, older informants tend to view younger firefighters as self-identifying as immortal and having a self-resistance to injury, especially a coronary event. This makes focus on adverse health outcomes in an intervention such as coronary heart disease/heart attack prevention a challenge for maintaining fitness program adherence. As Barry, age 40 notes, the issue is not readily on the 'radar' of younger

firefighters:

…this is a young man's game. It's not an older man's game. It's a, well, the older you get the more mortal you feel. When you got here you fell like immortal. Everybody looks up to you. A lot of respect, women dig you. When you get older, wife and 2 kids, you feel vulnerable and mortal, so…

And when asked about motivation to exercise, Barry again mentions the lack of salience and the immortality complex in younger firefighters:

Once again, they don't think they can die until they get older. It's hard to get somebody to work on some, to keep them alive when they don't think they're gonna die. And I've known retired ones, who still don't think they're gonna die yet. [PI: That's interesting.] Why work out your heart when your not gonna go to nirvana? [Laughing says] It's (fitness) a waste of time.

Similarly, Larry notes:

…it's my opinion but you know when you were young, I mean like you kind of feel invincible I guess. It's, it's nothings gonna get me, you know? I don't have to worry about that until I get 45, 50, something like that. And that's not a true statement no more. Due to the things, you know, we eat, things in the environment. It's a lot worse now and ah, fast foods, oh, you hear about it all the time. And so really, it's a, it's an everyday life type of thing not only on the job, off the job.

And Mary, age 39, notes the difference from young to progressing to an older firefighter:

I'm right around the corner from 40. [Both laugh] But you know, their always 42, 45 and older (who have a coronary event). And, I mean, I think, I would just think that firefighters in the work that we do, we can't think that it will happen to us. Every time you go on a call, and it's a house fire, at least I'm not, I assume other people are not thinking about "Oh, I could go in there and die today". You know, you just don't think that way. And so I guess so you just feel like because, and a lot of times because of what we do, you feel like that in itself keeps us physically fit. But it really doesn't. But when we're younger our bodies can handle that better, and jumping up in the middle of the night, grabbing a lot of weight, running with it. You know, and working really hard you know, at a house fire or something and all, and then, when you're older, I mean, it's just a lot harder on your body, but we're not thinking about that now, staying fit now…

And nearing the conclusion of his interview, Barry, age 40, gives his impression of the impact of physical fitness and cardiovascular health, and the future of a firefighter after the fire service:

A person of relatively good physical fitness can perform this job because we perform like a team. We're like ants. We go in together as a team, and all of us pick up the same person or whatever, as a team. So you don't need to be 6-5, 250, to do this job. What I would like is that the cardiovascular, I would like to see firefighters acknowledge that what you do now is gonna affect you in the future. Because you want to see your grandchildren. You want to get old a little bit… I, you know, you get tired of reading about this firefighter dying of a heart attack, this firefighter dying of a heart attack. That's funny, because you know, I'm just the opposite. I don't do a lot for my heart either, even though I know I should. I think if each, to get the message out that what you do now will affect your future. Cause the fire department is not your life. Your life is at home. And your life is after you retire. This is just a part of it. And this job can definitely kill people. Not just in a fire, but the lifestyle, and the emotional and physical toll. If firefighters would recognize how dangerous this is to your future, and to start early, with not letting your weight get, you know, too bad. You know, not lifting heavy weights so much that it injures your joints, in later years. That's what I would like to see.

…I mean the young ones, like I said, they're not worried about their health right now. "I feel fine". Feed 'em at the fire station these fire house meals and we'll see in 10 years how much they pack on, and what they think.

And Jim, age 24 and the rookie of his crew, makes an astute observation regarding younger

firefighters, not only regarding coronary disease/heart attack salience, but life in general:

…because they're young at the time, they aren't thinking about it like me right now. I, I eat what I want to. I don't, I don't think about my diet a whole lot unless I'm trying to gain muscle and then I don't think about the right things to eat. I just eat. What we had that night, what I feel like eating. I don't ever not, not get anything just because like maybe a piece of bread, I don't say "oh look at me I don't need this piece of bread." [Laughs] I eat what I want to or yeah, yeah, I mean it's, the world's proactive, I mean well not proactive but reactive and that's, that's pretty much true for everything.

2. 3. 3. C2. Theme 9: Sleep patterns are perceived to be related to sudden cardiac death risk in the fire service

As Barry notes, another common fitness theme is firefighter sleep patterns and the potential

for subsequent sudden cardiac death, or heart attack, on the job:

This (sleep at the fire department) is a lower level of sleeping. It's not quality sleeping. It's, it's when you hear something, pop up, and after so many years. I used to jump, sit straight up in the bed, and my heart would, I know why people have, I know why firefighters have heart attacks. I know why they have heart attacks. It's because they wake up. You go home, one night you go at 3:00 in the morning. You have your wife shake you and say your house is on fire. Wake you up out of a dead sleep and say your house is on fire. You've got fight or flight, so that quick rush of adrenaline comes in. You go do your work; you come and lay back down at the station. When your blood pressure drops, you have a heart attack and die, after

all the adrenaline leaves you. And that's why they have a heart attack the next day, or two hours after the call. But during the call they're running full blast, but then all of a sudden you're expected to drop back into normalcy after all that excitement. So, it's like, somebody scaring you in dead asleep.

And younger firefighters, while generally having lower coronary risk salience, are also aware that sleep patterns in the fire service could increase risk for heart attack, as Jim, age 24 notes:

…you're sleeping and your heart rates way down at its minimum and then that buzzer goes off and the lights come on and all of a sudden before you even know it's you, your heart rate jumps up because you come awake real fast. And then you've got to listen to the radio and hear it to see if it's you or not and then, then you've got to get up. And you go from your heart rate at its lowest (and) your heart rate's gonna be too wide open. And ah, that's been an issue with, with the heart problems in the fire department.

Additionally, Larry, age 49, notes that sleep while on duty at the department is not your conventional sleep:

I listen to the radio at night you know to just get a jump on things, you know before the tones go off. So, you could say that I'm a light sleeper. I never get into an unconscious sleep here. Because I'm laying there asleep but I also I'm listening to the radio. So when I hear structure fire, eyes open. It may not be us but still I heard it. So I'm listening.

Mary, age 40, paints a similar picture in two parts- first a description of waking for a night call:

I worry about my heart. [Laughs] I mean you do. You just jump up and you start going, and I'm thinking whoa, yea. I can't imagine being 'older' older where, unless I really had, beyond a shadow of a doubt knew that I was physically fit and in really good shape and my heart could take that. I'll be very worried about this when I'm 'older' older. You know, you're heart just gets up and goes, and that's why I think if we ever do jump up and do a fitness program here, so to speak, it does need to be where you start your heart, stop your heart, start your heart. You know? I mean it needs to be, it doesn't need to be continual stuff. I mean, I think you need to run around the track as fast as you can, as fast as possible, and then stop. We need some type of exercises like that, that gets your heart going and stops your heart. I mean, because that's what we do.

And then she describes sleep patterns in the fire service using an analogy of a new mother with a baby at home:

We were just talking about that today actually. I think what a lot of us do, is just when you're here you just don't sleep. You just don't go into a deep, deep sleep. You stay in kind of an

alert, kind of, kind of like listening out for your baby at night. When you have a small child, which I probably do that better than the guys do because I'm a mom, and I don't even stay asleep at home. I'm always listening out for the baby monitor, or the child to cry. You know? So for me it's not that big of an adjustment, because I do that at home, I think, you know. And fathers may do the same thing. I don't know. I'm just a mother. I do that. But if you, or if I'm really tired, or if I don't feel well at work and I'm in a really deep sleep, I can tell when the call comes out much more, yea, oh, whoa, your heart starts pounding. And so, I think we've just conditioned ourselves where we don't fall into a really, really heavy sleep at work.

And in summary, Barry makes a comment that appears to be the general consensus of many older firefighters when it comes to sleep and heart attack risk:

…this is a young man's game. It's not an older man's game. It's a, well, the older you get the more mortal you feel. ...it's a combination of diet, lack of exercise. Feeling like your immortal. Being awoken at night, seeing that somebody is trapped inside of a house, your adrenaline shoots up. It's like a track athlete, all of sudden not stretching, expected to run the 50 yard dash in a record.

2. 4. Discussion

Upon reflection on informants' comments regarding physical fitness, fitness program adherence, and coronary health, it is clear that fitness is a complex topic, yet firefighters share common thematic cultural perceptions of physical fitness. It is clear that all firefighters know they 'should' work out; fitness is important to their job and their overall health. And while the crew, captain, and upper management can influence the firefighter's PT and subsequent fitness level through personal action ('walking the walk') or verbally via teasing or positive encouragement, the primary responsibility for fitness lies with the individual firefighter. Additionally, firefighters perceive that management views fitness as culturally irrelevant through personal inaction (in terms of their own exercise) or variable expectations for adherence, and this sends mixed signals to firefighters as to the true expectations for overall physical readiness for the job.

Of key note is that the emic (firefighter's perspective) and etic (cultural outsider definition, i.e. researcher) meanings of physical fitness are somewhat related, that firefighters

recognize an official or organization definition of physical fitness in terms of fitness test measures, but the cultural view meaning from the firefighter perspective is more a functional definition, in terms of the ability to do the job and support your crew, not having a specific blood pressure level, waist size, or aerobic endurance measure per a fitness standard.

In general, the common themes identified in this phase of the study set the stage for further investigation into the multiple reasons why firefighters do not work out during the allotted physical training (PT) time. Although there is a designated time for fitness, usually early in the morning, firefighters may not participate for a variety of personal and/or work related reasons. A call may partially disrupt or prevent participation entirely. Firefighters may simply "opt out" of exercising during the PT period and read, talk with other firefighters, eat, smoke, or answer email. This appears to be dictated by the relative norms that exist by crew, station, or department, and should be further explored.

With discussions of peer influence and expectations for fitness, I have alluded to the possible fitness norms that may exist on the crew, station, or department level, but I suspect they exist primarily through the station and/or crew levels, influenced by the expectations of the crew captain or battalion chief overseeing a specific shift of firefighters. Although there is an allotted time for PT in which firefighters are generally expected to "do something, anything" fitness related there is much variation in this expectation by management as well as by immediate crew firefighters. Exploration of motivation to workout is warranted, especially normative expectations of fellow firefighters and the command structure within a station.

By and large, poor fitness is generally 'frowned' upon, but when it comes into play on the scene the crew generally makes up for the deficiencies of the individual. The

perception of the importance of this issue is mixed, as some firefighters see it as something you come to expect, but additional observation and informal discussion with firefighters gave the impression that this is quite important when it comes to direct response activities on the fire scene. That is, as firefighters go into a response event such as a house fire, they go in pairs on bottled air from self contained breathing apparatuses. If a firefighter becomes low on air, both crew members must immediately leave the response scene, regardless of the nature of event containment and victim status at that time. This 'early' exit is perceived to be directly correlated with unfit firefighters quickly consuming their oxygen, leading to delays in containment, and/or firefighters becoming lost and running out of air while exiting, resulting in death on the response scene. This issue also presents as a significant topic for further exploration.

Additionally, older informants tend to view younger firefighters as self-identifying as immortal and resistant to injury. This perception is held regarding some older firefighters as well, as many are "13 year olds in 40 year old bodies". Not that this would be surprising to firefighters themselves, as the fire service tends to appeal to competitive and aggressive individuals who are attracted to the danger and excitement of the calls they encounter, a scene where the risk of entry is unknown but exciting. As one firefighter notes, "do you want somebody that is coming into your house going "it's too hot in there"? I'm just gonna give up. These guys pitch fits when they lose a competitive thing. You don't want any wimps". Yet he and other seasoned firefighters indicate that this establishes a serious obstacle in maintaining good physical fitness as well as overall readiness. "Why work out when your not gonna go to nirvana? It's a waste of time. They don't think they're gonna die…" Therefore, this too is an area of inquiry ripe for further research during the study's

focus group discussions in phase two with a larger sample of firefighters. Specifically, are there perceived means of improving firefighters' acknowledgement that fitness affects their lives later in life, when younger firefighters may perceive little or no risk to their health? And is this view of immortality commonly held among other firefighters?

Along this line of investigation, it appears that firefighters as a group may not fully recognize their increased risk of an on duty death due to heart attack. The informants as a group did not mention increased risk of heart disease and/or heart attack as a reason why firefighters work out directly, or as a reason they would tell other firefighters to work out. They did mention it as a means to improve stamina on the job, but not directly to reduce coronary event risk. It primarily appears as a means to lose weight and build muscle mass, but further investigation is needed to identify the reasons for participating in physical training, especially by age, as heart attack salience is low in younger firefighters, unless they have first hand experience with a coronary event, such as an immediate family member who had a heart attack.

A final point should also be made regarding firefighter mention of the possible correlation between sleep patterns and heart attack risk. The older firefighters mention that the abrupt nature of waking for a response event places considerable demands on the cardiovascular system, and that exercise during the PT program helps reduce the risk of coronary events during a night call. Exploring if this perception is held by most firefighters would prove useful as well.

In conclusion, areas of future study should be 1) the physical environmental barriers, 2) rookie academy fitness expectations, and 3) physical fitness as function versus physical fitness as health. In terms of environmental barriers such as physical space and the number

and condition of fitness equipment, I am uncertain as to the extent of these potential barriers when compared to cultural barriers to PT participation and achieving adequate levels of physical fitness for the job. With regard to the rookie academy expectations for fitness, I find this to be one of the most interesting topics for study, as this expectation for maintaining a high physical fitness level seems to change after leaving the fire academy. While in the academy, new recruits work out daily, where participation and maintenance of physical fitness is strongly 'encouraged', especially activities promoting stamina. Running and circuit weight lifting occur daily, yet when a rookie firefighter graduates from the academy, the personal training regimen is essentially left to the individual, which may disappear entirely. Why does this happen? A firefighter's regimen is not questioned unless job performance jeopardizes the team, but why does such a strong academy expectation seem to fade away?

Lastly, as mentioned earlier, the definition of physical fitness differs depending on the perspective of those involved, be they firefighters or researchers. To develop successful interventions over the long term, it would useful to further investigate the differences in the conceptual differences of physical fitness meaning, and how both can be integrated to improve to the physical fitness of firefighters.

2. 5. Limitations and Implications

The ethnographic approach provides a detailed understanding of culture within the fire service, but it is necessarily limited by small sample size. As Brett, Heimendinger et al (2002) note, this results in ethnographic studies being criticized for not being "statistically representative". In the present study, six key informants were interviewed who were thoroughly acculturated to life within their respective fire departments, to gain insights into the shared values, perceptions, and overall meaning of culture within the fire service with

respect to physical fitness, workplace fitness program adherence, and coronary health. The original study plan called for informants from each fire department (Raleigh, Durham, Cary, Chapel Hill), yet due to changes in administration mentioned earlier, informants could not be obtained from the Raleigh Fire Department. Therefore, Raleigh's cultural perspective for fitness could not be ascertained in interview format. Still, I did conduct departmental observation and ride-alongs with Raleigh firefighters while on duty, asking a variety of informal questions concerning departmental and individual firefighter fitness practices. The final sample ranged in age from the youngest firefighter at age 24, to the oldest one nearing 50, and this sample included two acculturated females to capture overall cultural meaning by age and gender. It should be noted that this purposive sampling strategy was not, and should not be used to strengthen external validity similar to traditional subject interview designs, but rather, it is used to generalize the findings to other firefighters demonstrating 'proximal similarity' (Campbell and Stanley, 1966), *i.e.*, firefighters working under similar conditions.

Additionally, care must be taken when considering the results of an individual key informant interview, as sizable variation can exist from one firefighter's thoughts and impressions to the next. Therefore, I identified common fitness, adherence, and coronary health themes based on consideration of the transcripts as a whole, not solely on the responses of one informant. Still, working closely with the fitness committee representatives from each fire department, I was able to utilize a specific, purposive sampling strategy to identify key informants meeting the acculturated requirements as outlined by Spradley (1979) to discover meaning through interpretation of language via analysis of semantic relationships of specific words and phrases used in firefighter culture.

In conclusion, it should be noted that to overcome the inherent limitations of sample

size and external validity, the ethnographic interview data represent the first of three phases of data collection in a larger study of physical fitness within the fire service. The results set the foundation for later focus group discussions to identify if any physical fitness norms exist in the fire service, and what barriers and facilitators factor in maintaining physical fitness and fitness adherence, and a quantitative survey to test the emergent focus group hypotheses in a sample of 1,000 firefighters. This use of mixed qualitative and quantitative methods allows for triangulation of data evidence and therefore strengthens construct validity of the study, thereby reducing the likelihood of mono-operations and mono-methods bias.

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CHAPTER III

Understanding the Normative Environment of the Firefighter Workplace and the Facilitators of Physical Fitness through Workplace Programs

3. 1. Introduction

The fire service is an intensely social, tight knit group when compared to traditional occupations, especially on the crew or shift level making up individual fire stations. The very nature of stressful, life threatening emergencies that firefighters encounter reinforces group bonds and the need for dependability among crew members, for both public citizens and each member of the team. These strong interpersonal bonds often lead to a second extended family within stations, one that may at times have the appearance of stronger bonds than that within the firefighter's immediate family. Fire service culture also has a clearly defined, strong safety ethos based on the team unit, one that is never based on the individual 'hero'. But do these strong interpersonal bonds that support the team safety culture lead to any normative expectation for physical fitness within the fire service? This is a complex question, as all firefighters know they 'should' be physically fit, not only for their personal health, but also to support a cohesive and dependable crew, station, and department as a whole. Yet firefighters themselves indicate that this is not always reflective of actual behavior, as most firefighters can choose to participate minimally during the PT period or sometimes not at all, instead turning to activities such as checking email, reading the paper, drinking coffee, smoking, or eating breakfast. Additionally, non-personal activities such as

job tasks, continuing education, and response calls clash with the allotted time for fitness, often resulting in no fitness activity during that day. Therefore, this phase of my study takes a closer look at fire service culture via focus group discussions to better determine the normative expectations for physical fitness in the absence of non-mandatory physical fitness programs in the workplace. Likewise, in the absence of mandatory programs and subsequent variable levels of voluntary adherence, it begs the question as to what facilitates physical fitness and overall fitness adherence in the firefighter workplace. In turn, do any of these factors play a part in the high rate of coronary heart disease and heart attack form the firefighter's perspective? It is clearly recognized that improving firefighter physical fitness level via adherence to organizational fitness programs is an important step in reducing coronary heart disease (CHD) and improving job performance, by researchers and firefighter organizations alike (Davis, Dotson, et al., 1982; Williford, Duey, et al., 1999, Rhea, Alvar, and Gray, 2004 ;IAFF, 1999). Yet the results of the phase one ethnographic interviews with acculturated firefighters indicate that although there a degree of CHD awareness, the level of overall heart attack salience in firefighters is low, especially among younger firefighters.

Specifically, the focus group discussions build upon these results of the ethnographic interviews by exploring fire service culture deeper to examine both the normative expectation for physical fitness, in terms of socio-cultural factors affecting physical fitness, fitness program adherence, and heart issues, but also the multiple facilitators and barriers to improving fitness from the perspective of the professional firefighter. Focus group discussions were utilized for this task as they provide a prime means of formative research to aid understanding of culture and other themes relevant to firefighters in terms of the socio-cultural factors affecting physical fitness, worksite fitness program adherence, and coronary

health issues. They provide a "fast" way to obtain individual perspectives and local norms, with high face validity due in large part to the believability of comments from participants, in which people open up and share insights that may not be obtainable from interviews, surveys, or other sources (Kreuger, 1994).

3. 2. Design and Methods

3. 2. 1. Data Collection

Six focus group discussions, consisting of nine to twelve firefighters each, were conducted in four urban, professional fire departments- Raleigh, Durham, Cary, and Chapel Hill, in the area commonly known as the Research Triangle Park, from the central piedmont region of North Carolina. These numbers fall within traditional focus group sample expectations in the health education and behavioral literature (Saffman and Sobal, 2004). The focus group discussions lasted approximately one and one-half to two hours, and were conducted over the three month period of July to September of 2006.

The original sample plan (Staley, 2005) was four to six focus group discussions with firefighters who volunteered to participate, based on a financial incentive to take part on his/her day off from work. Additionally, groups would be stratified by the homogeneity of participants, e.g., similar socio-economic status, and if enough females could be gathered for gender specific focus group discussions. The original sampling plan also called for focus groups to be classified by firefighter self-reported fitness status, so that pattern matching logic could be used to explore if firefighters of similar fitness levels identified similar socio-cultural factors influencing physical fitness. However, during the recruitment process it was quickly realized that a small financial incentive, combined with the fact that many firefighters work second jobs, prohibited adequate participant numbers for the focus groups.

Subsequently, a new plan was established in which focus groups were coordinated and conducted with the assistance of each fire department fitness representative, with the focus groups conducted in house at stations of each fire department, consisting of firefighters currently on duty but who were allowed to go "off-line" or "10-7" to participate in the focus group activity. Appendix E provides a survey screener that was administered to each focus group participant prior to the group discussion, to obtain socio-demographic information, including data on smoking status, history of exercise, and current physical fitness status (Appendix E). Prior to the focus group discussions, the PI was trained in focus group methodology by the School of Social Work at University of North Carolina, followed by the University of North Carolina's Decision Support Laboratory assisting the PI with focus group logistics and moderation, as the laboratory has an established track record of specializing in focus group design and facilitation. The PI and a trained facilitator acted as co-facilitators for the first two focus group discussions, and after extensive debriefing and additional meetings, the PI then acted as primary facilitator of the remaining four focus groups, with the assistance of a note taker/assistant from the Decision Support Laboratory.

It should be noted that while the intended purpose of group stratification was to ensure group homogeneity and thereby increase *theoretical saturation* per each group (Glaser and Strauss, 1967), in which no new or relevant themes emerged regarding physical fitness norms, barriers, and facilitators, the investigator took additional steps to ensure this overall goal. Following completion of each focus group, the facilitator immediately reviewed the transcript and accompanying notes in detail, to determine if secondary probing questions should be modified, deleted, or emphasized more to ensure the theoretical saturation goal could be met. Subsequently, later focus group discussions followed the primary, semi-

structured question guide based on the cultural domains that emerged during the ethnographic interviews, but also used the available IRB approved modified probing questions to allow for thorough investigation of emergent physical fitness themes from the intrapersonal, interpersonal, and organizational perspectives of the participants. The focus group question guide is found in Appendix F, and is a modification of question guides initially designed by Meier (2005) and Krueger (1994). However, a rigid question structure was not imposed during the focus group discussions, as it would not have afforded the facilitator the flexibility to fully explore emergent themes within a particular group. The question guide consisted of 21 primary questions with appropriate secondary probes, broken into four sections covering the following areas of inquiry: 1) questions exploring the meaning of physical fitness in general and within the context of the fire service, including activities considered important to maintain fitness level, 2) questions exploring the meaning of exercise, and if it differed conceptually or culturally from the meaning of physical fitness; this also included questions regarding exercise within the context of the fire service and its importance to the crew, shift, management, etc., and 3) a section asking firefighters to reflect on the high rate of firefighter on-duty death due to coronary heart disease and/or heart attack, and what this statistic brought to mind, and a subsequent hypothetical scenario that explored what firefighters would do as "consultants" to improve this issue if they acted in an advisory capacity during creation of a new fire house, and 4) a final question to reflect on the perception that fire houses are frequently described as paramilitary, and to consider the possible success of implementing of a mandatory fitness program similar to the military. The ending questions were designed to capture any key topics or areas of interest that firefighters

felt were important for future research studies, and anything missed regarding our current understanding of physical fitness and exercise in the fire service.

Prior to asking these questions, consistent background information on the study purpose was provided to participants to minimize tacit assumptions. This began with the provision of detailed information about the study aims during the recruitment process as well as just prior to the focused questioning of the group session. During the question period, inquiry was presented within the context of problems regarding firefighter physical fitness, exercise, and adverse coronary health outcomes. Questions directed the participants to think back to prior issues affecting worksite fitness program adherence and to consider what they did/did not due in the past, not what they *should* have *done*. This cued the respondent to speak from actual experiences as opposed to their wishes, intentions, or perceived responses desired by the researcher (Krueger, 1994). Notes were taken by the moderator and the assistant during the focus group discussions, and all sessions were recorded on audiotape. Immediately following the conclusion of each focus group discussion, the moderator and assistant conducted a private debriefing session to share their perceptions of critical points, notable quotes, or other events that occurred during the session.

3. 2. 2. Data Analysis

Following each focus group discussion, all notes were transcribed and verified against the audiotape recording. Analysis of each focus group discussion occurred simultaneously during data gathering so that early findings could be incorporated into future focus groups discussions. As stated earlier, this allowed for theoretically saturated themes to emerge, as well as new themes to be explored further. Additionally, it allowed for feedback from the

dissertation committee, department firefighter fitness committee, and focus group participants.

A full transcript-based analysis was conducted to identify major re-occurring factors in terms of normative expectations for fitness, as well as the barriers and facilitators to fitness within the fire service, using the Atlas.ti qualitative analysis software (Muhr, 2005). Transcripts and field notes were carefully read and coded to identify emergent topics by specific question as well as within the overall context of the group discussion. Similar to the coding process in the ethnographic interviews, the analysis revealed key issues through a multi stage process in which the data was coded along higher order constructs, *i.e.*, domains, made up of sub-codes or included terms that semantically link cultural components of physical fitness, worksite program adherence, and emergent fitness norms. The coding constructs were initially established from the cultural domains and themes identified in the ethnographic informant interviews. For example, the coding construct, "dependability", was derived from the cultural meaning of fitness in terms of being able to "pull your weight" and support your crew during a response. Similarly, the code "Age" was selected informant's identifying it as a major sub-category of the cultural meaning of fitness, supported by its recognition in the fitness literature as a factor in physical fitness. Other codes were derived from the cultural meaning of physical training (PT) adherence, such as intrapersonal "motivation", interpersonal crew and captain "peer influence", organizational "job tasks/activities", "participation strategies", *e.g.*, the PT period itself, and "environmental factors" such as equipment available for use during the PT period. Coding constructs were also identified from the cultural meaning of coronary health and subsequent heart attack, such as coronary health/heart attack knowledge, and stress, be it sleep and/or job related.

Additional codes were developed based on the summary ethnographic informant interviews' common cultural fitness themes, as identified in Figure 3.

Theme 1: Physical fitness in terms of stamina is important for the job
Theme 2: Physical fitness is a recent phenomenon in the fire service
Theme 3: The responsibility of physically fitness program adherence lies with the individual
Theme 4: Unfit firefighters on the response scene are handled in different ways
Theme 5: The crew and crew captain exercise some influence on the individual's fitness program adherence
Theme 6: Firefighters feel management has contradictory expectations for adherence
Theme 7: Organizational reasons for lack of fitness program adherence abound
Theme 8: Heart attack risk is more salient to the old than the young in the fire service
Theme 9: Sleep patterns in the fire service is perceived to be related to heart attack risk on the job

Figure 3. Ethnographic Informant Interview Common Cultural Fitness Themes

These themes strengthened the construct validity of codes identified from the cultural domains identified earlier, and also directed me to again investigate specific aspects of the fitness and adherence literature, with focus on factors identified in firefighter fitness research.

Codes selected from the physical fitness and adherence literature were also stratified by the intrapersonal, interpersonal, and organizational levels of the social ecological framework, including intrapersonal factors such as self-efficacy (Bandura, 1977; Prodaniuk TR, Plotnikoff RC, et al, 2004), age (NHBLI, 2007), and coronary heart disease/heart attack knowledge (Kay, Lund et al, 2001); interpersonal factors including peer influence (Hilyer,Brown, et al., 1990; Elliot, Goldberg, et al., 2004), and social cohesiveness (Carron, 1982; Estabrooks, 2000); and organizational level influences such as perceived management social support (Hallam and Petosa, 2004), and participation strategies (Dishman, Oldenburg et al, 1998). It should be noted that some codes, such as motivation (personal/individual) while identified during the ethnographic phase of the study, are also supported by existing literature, as described in the literature review of chapter one of the dissertation. Finally, codes were also determined through inductive exploration of emergent themes (axial coding)

regarding physical fitness. This is an important step in the development of a thorough coding guide, as it allows the reviewer to capture codes not considered *a priori* to the study, that codes can be identified based on culturally relevant semantic relationships for a term or phrase used in firefighter language. In this scenario, example codes include "teasing for lack of fitness, "teasing/discouragement for participating in PT or fitness, and "team sports", which was an in-vivo code capturing mention of team oriented sports as a means to improve firefighter physical fitness level and/or PT adherence.

The analytic process was closely by the dissertation committee to ensure that code instrumentation was valid. Additionally, to ensure the reliability of the findings, a second coder was used as a check of inter-coder reliability. Prior to the second coder's work, the investigator reviewed the intent of the focus groups and the accompanying coding guide with the second coder, to ensure understanding of its complex design. The coding guide is set up in terms of levels of the social ecological framework, with codes by the intrapersonal, interpersonal, and organizational levels of influence. A definition is provided for each code, how it was specifically operationalized within the context of the study, and example quotes of the code from the transcripts. The final coding guide is found in Appendix G.

Prior to coding of transcripts, the second coder was instructed to code a portion of one transcript, and then we compared and discussed our findings to decrease any ambiguity in understanding of coding constructs, and to prevent discrepancies in the final analysis. Following coding preparation, select transcripts were randomly selected and coded by the second coder to determine the inter-coder reliability of the findings. Again, the coding guide was framed within the study's social ecological model, with codes grouped by intrapersonal, interpersonal, and organizational levels of influence. As mentioned earlier, I applied the

adapted pattern matching logic to explore whether similar types of firefighters produced similar findings (*e.g.*, by comparing focus groups with similar self-reported physical fitness levels) and whether different firefighters produced similar results for theoretically understandable reasons (*e.g.*, comparing firefighters of self-reported "low" fitness level to firefighters of self-reported "high" fitness level). Simple descriptive statistics were computed for the participants' initial focus group screener found in Table 1. The findings from the focus group session analyses were then used to inform question design and vernacular wording for testing survey items in the phase three quantitative firefighter survey, in which hypotheses derived from the focus group discussions regarding socio-cultural factors and normative expectations for physical fitness were tested.

3. 3. Results

3. 3. 1. Sample Description

Six focus groups were conducted with the assistance of the fitness representatives from the study's four fire departments. Due to reasons mentioned earlier, the selection process was modified from the original volunteer participation design in which firefighters would be paid a cash incentive for participation on their day off, to convenience groups of firefighters currently on duty at their respective fire departments. Similar to the ethnographic interviews, the fitness committee representatives from each department assisted me in selecting participants who met the acculturation requirement of at least one year on duty at their respective fire department. Focus group participants were those having detailed knowledge of departmental traditions, practices, and values, to ensure cultural themes and normative expectations for fitness and exercise could be fully explored. The six focus groups were comprised of two groups from the City of Raleigh Fire Department, two from the Town

of Chapel Hill Fire Department, one from the Town of Cary Fire Department, and one group from the City of Durham Fire Department. The groups ranged in number from 9 to14 participants, with a total of 63 firefighters participating in this phase of the study. Of the 63 participants, the average age was 34 years, and 5% were female. Eighty-one percent of the sample was white, 11% African-American, 3% Hispanic, 2% American Indian or Alaskan Native, and 3% were unknown, due to incomplete reporting on the pre-focus group screener.

On average, firefighters worked at their respective departments 3.3 years, though many had worked at other departments and/or worked as a volunteer in their own home districts. At the beginning of employment at their respective departments on a scale of 1 to 5, with 1 the lowest physical fitness level, and 5 the highest, the sample reported an average physical fitness level of 3.5; at year of service this went slightly up to 3.9, but at the time of the focus groups the average physical fitness level dropped to 3.2 (see Table 2).

Table 2. Descriptive Statistics (by focus group)

	Group 1 Raleigh FD	Group 2 Raleigh FD	Group 3 Cary FD	Group 4 Durham FD	Group 5 Chapel Hill FD	Group 6 Chapel Hill FD*
Total #/ group	**9**	**10**	**12**	**10**	**14**	**9**
Initial Fitness Level (mean)	3.5	3.8	3.2	3.9	4.1	3.4
Fitness Level at 1 year as FF (mean)	3.6	3.5	3.8	4.2	4.1	3.9
Present Fitness Level (mean)	2.9	2.8	3.5	4.1	3.5	3.1
Days PT/week (mean)	2.3	2.1	3.5	3.6	3.4	2.9
Age (mean)	35.6	32.0	33.6	31.1	34.5	38.6
Male (%)	100	100	92	100	86	100
Race (% white)	100	90	92	90	71	57
Years FF	4.1	3.0	3.1	2.5	3.6	3.9
Never Smoked (%)	50	70	58	50	62**	57
Education (% college grad or higher)	13	10	33	30	29	29
Salary (% greater 40,000/year)	56	40	50	10	29	43

*All descriptive statistics for focus group 6 are based on 7 of the 9 participants, except gender, as two did not complete the pre-focus group screener. **62% never smoked is based on 13 participants, as one did not answer the question.

3. 3. 2. Findings

The broader purpose of the study was to determine how socio-cultural factors affect physical fitness within the fire service, as well as identify other factors that should be targeted to assist departments in cultivating a culture that promotes workplace fitness. Within this goal, three specific aims were addressed; including 1) determination of the cultural (shared) meaning of physical fitness, worksite fitness program adherence, and coronary health issues from the perspective of the professional firefighter, 2) identification of any fitness norms existing among professional firefighters, and 3) identifying the barriers and facilitators to firefighter physical fitness via worksite fitness programs. Ethnographic key informant interviews were utilized to provide insight into the cultural meaning of physical fitness within the firefighter workplace, as this qualitative method is well suited to elucidate cultural meaning. Building upon the ethnographic results of the phase one key informant interviews, commonly held cultural themes regarding physical fitness, fitness program adherence, and coronary health issues were used as a starting point to develop the semi-structured question guide for the focus group discussions. The focus groups were used as the primary means to identify if any fitness norms exist among professional firefighters, and what barriers and facilitators contribute to maintaining adequate physical fitness levels for the job, via applicable worksite fitness or "PT" programs. A sample of focus group questions is found in Figure 4.

To accomplish this objective, several steps were taken. First, all transcripts were initially read through several times to gain a sense of the content and overall context of the discussions. Then, each transcript was coded via a dynamic coding guide that was modified several times as the study progressed, based on a combination of emergent factors, such as 1)

the physical fitness domains identified in the ethnographic informant interviews, 2) existing physical fitness and fitness adherence literature, and 3) the emergent socio-cultural factors via axial or 'in-vivo' coding of focus group transcripts.

When you hear the word physical fitness what comes to mind?
Probes:

- When you think about physical fitness what does it mean to you?
- Are there other things that come to mind when you think of physical fitness?
- Can you give me some examples of physical fitness that are important to you?

Are there things that make it more difficult or harder, if at all, to maintain your physical fitness level?

Similarly, are there things that make it easier, if at all, to maintain your physical fitness level?

When you think of a person who is physically fit, what characteristics would you apply to that person? **Probe:**

- When you think of a physical fit firefighter, what characteristics would you apply to that person?

Figure 4. Sample questions from the focus group question guide

Additionally, I wrote memos throughout the coding process as I updated the coding book, and incorporated these changes and subsequent statements into the Atlas.ti program software, which allowed me to assess the progress of transcript review and code book development simultaneously, and if I thought certain statements or phrases were interesting and/or merited further investigation. Additionally I wrote memos for portions of transcripts if I did not understand the full context or meaning, or if I thought this segment merited coding but was uncertain at that time as to the best coding construct. The memos were important not only to the coding process, but to understanding the overall context of physical fitness within the fire service, as noted in Figure 5 below.

After the final version of the coding guide was developed, found in Appendix G, I thoroughly coded all six transcripts, with codes grouped by the intrapersonal, interpersonal, and organizational levels of the study's social ecological framework, to allow ease of coding and to provide comprehensive insight into the study's second and third aims: 2) to identify if

any normative expectations for physical fitness exist in the fire service, and 3) to determine the barriers and facilitators to physical fitness and fitness program "PT" adherence. Table 3 provides a frequency chart with the rankings of the top four codes from each focus group, per the intrapersonal, interpersonal, and organizational levels of the study's guiding social ecological framework.

The facilitator asks the group to think about physical fitness and what it means to their shift, and the group response makes me think about job tasks and activities in another light, that the moving of firefighters to different shifts with unknown crew members, regardless if due to another's sickness or injury, expands the use of the code "job tasks or activities" to more than actual response or daily activities that take away time from PT and the opportunity to improve their fitness level:

While I coded this as job tasks that take away from time to engage in PT or exercise, in which the firefighters talk about how firefighters who are not fit and out sick a lot leads to shifting around of crew members from other stations, and (a crew*) could be stuck with another FF who is even less fit or whose fitness level is unknown, and this endangers the team. It leads them (the firefighters) to the notion of the need to be even more physically fit to handle their own 'less' fit crew members. In coding this as Job tasks/activities, it is an interesting perspective* (from the firefighter responses) *how these unfit firefighters can make the job take longer and prevent them from working out, or worse lead them not to workout when one member of the team* (the new/temporary member) *does not want to participate. It can also affect the safety of the crew.*

Or in another example, in which I am coding the passage as "stress", defined as "a factor affecting physical fitness level, or getting in your work out time or exercise, or as a reason to engage in physical fitness/exercise" I note a different perspective of 'stress' though from one firefighter:

I coded this segment as stress, but not stress as a barrier or facilitator but exercise as a stressor itself, in terms of the pressure the respondent feels from the department to do it, but at the same time the workload reduces time to get your PT in during the day.

Figure 5. Example coder memos from coded transcripts

As noted in Table 3, the focus group having the highest rank or total number of coded passages per the coding guide of factors influencing physical fitness was group five from the Chapel Hill Fire Department, with participants averaging 34.5 years of age and having 5 to 15 years experience as a professional firefighter. This group also reported a physical fitness

level rating of 3.5, or a rating of "Average" to "Good" on a scale of 1 to 5, with 1 equaling a "Poor" level of physical fitness today, and 5 an "Excellent" level of physical fitness today.

Table 3. Final Coding Frequencies of the Top Four codes for Each Focus Group, per Levels of the Social Ecological Framework*

	Group 1 RFD	**Group 2 RFD**	**Group 3 CFD**	**Group 4 DFD**	**Group 5 CHFD**	**Group 6 CHFD**	**Total (Rank)**
Intrapersonal							
Motivation	9	3	5	5	6	5	**33 (3)**
Nutrition/Diet	3	11	4	5	5	3	**31 (T4)**
Physical Fitness Belief	3	2	1	1	11	2	**20 (8)**
Coronary Heart Disease/Heart Attack Knowledge	3	5	4	2	3	2	**19 (9)**
Interpersonal							
(Crew) Dependability	5	5	6	7	7	1	**31 (T4)**
Social Cohesiveness	0	4	4	5	5	3	**21 (T7)**
Social (fitness) norm- crew	3	3	3	6	4	2	**21 (T7)**
Social (fitness) norm- captain	2	2	6	2	2	4	**18 (10)**
Organizational							
Participation Strategies	15	10	9	8	9	10	**61 (1)**
Work Environment Factors	10	6	4	12	5	5	**42 (2)**
Perceived Management Support/Lack of Support	3	1	8	4	8	4	**28 (5)**
Social (fitness) norm- management level	1	2	7	2	7	7	**26 (6)**
Total (Rank)	**57 (4)**	**54 (5)**	**61 (2)**	**59 (3)**	**72 (1)**	**48 (6)**	**351**

*Total row and column counts are given in the last row and column respectively. The column total also has each code ranked by total number of coded passages, and the row total provides the rank by group of the toal number of top coded passages. The total number of participants in each focus group is: Group 1 Raleigh FD= 8; Group 2 Raleigh FD=10; Group 3 Cary FD= 12; Group 4 Durham FD= 10; Group 5 Chapel Hill FD= 14; Group 6 Chapel Hill FD= 9.

In terms of the most frequently applied codes across all focus group discussions (note right side of the table), the highest ranked coding construct was "participation strategies", as

it was the most frequently discussed construct by firefighters regarding activities that impact all facets of firefighter physical fitness.

Participation strategies are organizational level initiatives such as workplace exercise programs to encourage PT participation and improve fitness, health and overall wellness.

Strategies include the department PT period (usually one hour to one and one half hours in the morning), the candidate physical agility test (CPAT), used as a method to measure overall fitness of rookies for new employment, annual physical fitness testing of regular response level firefighters, the rookie academy PT program, consisting of mandatory daily exercise, job-related training that promotes fitness, such as pulling hose line, running flights of stairs in full turn out gear, and the provision of fitness trainers or equipment specific training for use.

In terms of the social ecological level factors in the study, “motivation” was the highest rated intrapersonal or individual level indicator of physical fitness, as well as both barrier and/or facilitator to physical fitness and adherence with the organizational PT period. In terms of the interpersonal level, the most frequently cited factor was “crew level dependability”, which captured mention of either the ability to depend on crew members, or the crew’s ability to depend on firefighters as a reason to engage in, change/improve, or maintain adherence to PT fitness activities and physical fitness level. Essentially, crew dependability equates with crew members ‘pulling their own weight’, a term conveying the cultural meaning of physical fitness identified in the ethnographic key informant interviews. On the organizational level, the factor most influencing physical fitness was department participation strategies to spur adherence to the PT program, so as to improve or sustain appropriate levels of physical fitness for the job.

Table 3 is used to illustrate the variety and frequency of the highest rated constructs coded in the focus group transcripts, but this does not imply that other factors normally associated with physical fitness and adherence were not prevalent. On the contrary, factors such as “age”, “second or part time jobs”, “personal stress”, “social support”, “team sports”, and other factors were frequently mentioned during focus group discussions. The preceding table is provided to establish a background on frequently discussed topics to act as an introduction to the in depth findings in terms of addressing the two specific aims of this phase of the study, in identifying any fitness norms among professional firefighters, and what barriers and facilitators act to deter or promote firefighter physical fitness via worksite (PT) fitness programs.

3. 3. 2. A. The normative expectations for physical fitness among professional firefighters

In general, the fire service is an intensely social, tight knit group when compared to traditional occupations, especially when considering the firefighters that make up individual crews or shifts. The very nature of stressful, life threatening emergencies that firefighters encounter reinforces group bonds and the need for dependability among crew members, both for the public and members of the crew. This is turn leads to an extended second family, one that may at times give the appearance of having stronger bonds than that of the firefighter’s immediate family. Fire service culture also has a clearly defined, strong safety ethos based on the crew unit, one that is never based on the individual ‘hero’. But do these strong interpersonal bonds that support the team safety culture lead to any normative expectation for physical fitness within the fire service? This is a complex question, as all firefighters know they ‘should’ be physically fit, not only for their personal health, but also to support their crew, station, and department during an emergency response event.

As noted in Appendix G, a fitness norm is operationalized in this study as the crew, captain, or higher management level's shared expectation, standard, or rule of what firefighters will engage in; it is the 'right' action in terms of physical fitness behavior, such as participating in fitness related activities during the PT period, and is considered to typically unspoken. When considering a social fitness norm within firefighting, as noted in this specific focus group discussion when asked by the moderator what physical fitness means to their crew, we see consistency in activity, in which every firefighter is expected to show up and exercise or do some type of physical activity during PT, and is regularly an unspoken expectation:

M: When you think about fitness what does it mean to your crew? …From the stand point of what we want to see, we try to get our crews, we understand the fitness aspect. So we get out there and move. And what I've found because there are different levels of fitness, you know as long as we keep the opportunity or provide the opportunity (to PT)*, like on our crew XXX is going to run and lift, and XXX is going to walk, and I am going to walk so everybody's* (participating)*, but as long as they're doing something you know it still improves the level of your fitness of your crew.*

And in this group, this point of view is reflected in terms of the crew influence; crew members engaged in PT leads to others wanting to workout as well, as noted when asked what physical fitness means to their crew:

M: Physical fitness and what it means to your crew? …I mean kind of with that, if you have people on your engine that's willing to work out that motivates you, you're gonna want to work out too. Instead of being on an engine with nobody it's why are you doing that for? That's stupid. Pretty much people backing you up telling you to do it you'll pretty much want to do it. More than somebody's knocking you down saying that you don't need to do it or whatever.

From the preceding passage the firefighter indicates that when crew members are working out it motivates both him and his crew members, that essentially all want to work out, and likewise, when on a crew with no expectation, they may look at the firefighter who wants to PT as an oddity: "why are you doing that for? That's stupid". In this scenario it portrays the

crew member wanting to work out because of the unspoken expectation, versus the crew that attempts to sanction a firefighter when he/she does not comply with its normative expectation for crew fitness, or rather, crew non-fitness.

Additionally, this expectation for physical fitness is, as some firefighters note, rapidly changing with the influx of new firefighters who bring the strong expectation of physical fitness from the rookie academy. Once on the job, the younger and more physically fit members of the crew, though not exercising expectations in terms of seniority or years of service still influence older crew members with their unified expectation for physical fitness, including nutrition. This is noted by an experienced firefighter when asked what the high on duty death rate due to heart attack brings to mind:

M: … I'm going to read a statistic to you and just want you to respond with your general impressions or thoughts. Um, over fifty percent of firefighters on duty deaths occur from coronary heart disease or as the result of a heart attack. What does that statistic bring to mind for you? *I would say it brings up change just toward just eating. One thing used to when I came here you would have Salisbury steak with a bunch of mashed potatoes and grease cooking and stuff. We had that last night, but you'll find more people that are eating chicken three nights in a row you know and sweet potatoes and stuff like that.* M: Okay. *So a lot of attitudes towards just if eating habits are changed, plus...this department is getting younger so a lot of people are into working out now that weren't before. And I think that with the younger people coming on that it's going to put some influences on people that are older.* M: Okay. *Because of them and if there's four of us here on a truck and my three guys are working out all the time I'm gonna look doggone fool.* M: Sure.*These guys work out all the time. I might need to do a little bit of something. Next thing you know you're doing something and your endorphins are starting to you know you start feeling a little bit better and…getting a better attitude about stuff and the next thing you know we're all working out.*

The expectations for physical fitness and PT also move beyond the immediate crew members, where there can be an even more powerful, though variable, expectation for physical fitness on the captain level. In the fire service, the captain is the immediate officer in charge of a crew but is also an intimate member of the crew shift. The variability in fitness expectations differ from one crew captain to the next, as discussed in this passage

when firefighters are presented a scenario in which they are given unlimited resources to start a station with new firefighters, and indicate what they envision to create a physically fit group of firefighters:

M: Now changing gears a little bit, thinking about your ideal world, money is no object. New firefighters are coming into the station, what advice would you have for your vision of a physically fit group of firefighters or fire house? It's an ideal world; you can do anything that you want. …Yeah, we started off with the staff making the workout time period sacred which they have an issue with, and it's a valid issue. It's that, well, we give you the time and then we have crews that don't do anything ever and they just sit around because the officers (captains) *aren't making them workout. And there's some truth in that. I would say by and large from my perspective since we quit doing team sports which has been what, five years ago now maybe even more than that. We got in worse shape for a while but over time crews have figured out ways you know if the officer wasn't somebody who automatically thinks of or is really oriented toward fitness he might be smart enough to find somebody on the crew that is. And let that firefighter or driver help motivate him and the rest of the crew to workout.*

While this firefighter begins his answer with his perfect scenario of uninterrupted time to exercise during the PT period, a policy he indicates that was actually attempted at one time in his department, he quickly moves to the underlying issue of variability occurring in physical fitness and PT adherence norms on the officer (captain) level, variability that directly influences the crew expectations for physical fitness, despite having the allotted PT period to exercise. And similarly, when another group is asked to consider exercise and what it means to their own crew, their response moves once again to the normative expectation of the captain:

M: That's alright. Well, so ah, thinking of exercise and firefighting. What does exercise mean to your crew?
What about what Capt (XXX) says. Your exercise is basically what your captain kind of will allow. Because if he's got a thousand things to do and you're at a station that doesn't have any work out equipment then obviously it doesn't mean anything because you're not going to go to a gym anywhere. Because one he doesn't want to go and two he's got so much stuff he already has to do. …gotcha and you're just kind of SOL.

The underlying issue here is that normative expectations for physical fitness, though present, vary greatly in terms of captain consensus, and this can affect the entire shift's fitness perspective. As stated earlier, the official organizational position of most fire departments is one where physical fitness is critically important and firefighters are expected to work out during the PT period, or at a minimum will attempt to make up the time if missed due to job activities or an emergency response. But the cultural expectation is one based on physical fitness essentially defined as the ability to do the job, and if a firefighter can do what is deemed 'appropriate' for the rigors of the job, he/she is termed a 'fit' firefighter, regardless of the actual physical state of that person. Contrast this functional meaning of PT adherence with other conceptual meanings of PT adherence and overall physical fitness, defined in traditional terms of exercises such as running, walking, lifting weights, and non-traditional activities, e.g., "doing training", "doing overhaul" (bringing down walls and other materials to prevent spread of a fire), as well as the research definition of physical fitness that includes the myriad of physiological indicators of fitness and health. This contrast in meaning demonstrates how firefighters could become confused as to the expectations of the captain for being physical fit and adhering to the PT program, particularly if there are no real repercussions or sanctions for non-adherence.

As this next firefighter notes when asked what firefighters say when other firefighters do not exercise during the PT period, we find that once again, captains predominately dictate the expectations and any sanctions for non-adherence, and some captains clearly do not "walk the walk":

M: So then thinking about that, there's not really any consequences or they might vary a little bit then what, then if guys, what might have been heard then if guys aren't exercising during the PT period?
The situation, as captains we are required and responsible for our crews. And we are

directed to engage in a fitness activity everyday. What the situation is, you know some captains do it and some captains don't. And when I say there's no consequence it's kind of an unfair situation. My crew basically works out. We've got some captains they workout everyday and then we have some captains that don't workout any day. But there's no mechanism, it would be difficult for me to write my crew up for not exercising when there's not captains making up (missed PT) you know what I'm saying? Even though it's supposed to be mandatory there's no consequence, you know no enforcement portion, the enforcement portion of it to make it happen. So basically you have to do it, lead by example because it's kind of difficult if we go to the track and you know you got to get out there and move anyway you just can't sit and stand but some captains don't even make the effort. M: Okay. That's where the inconsistency comes in at.

So through the course of analyzing the focus groups, fitness expectations are shown to be culturally equated with being physical fit on the captain level, yet this is variable at times to firefighters. And in some cases, the higher levels of management such as the battalion chief and deputy chief levels, occasionally including the department chief also demonstrate variable expectations, where there is a strong normative expectation for physical fitness for a period of time, but then diminishes and shifts to other topics on management's radar. For example, when asked what fitness means to their department, this group of firefighters indicates that this is the exact case with management expectations:

M… let's bump it up to the top level. What does fitness mean then to your department? To the department itself? I am not sure. They don't put a whole lot of time and effort into it. Right, it depends on the attitude of that chief that month. M: Really?
They go to a meeting where they talk about physical fitness the whole time. Well then he comes back this next month and says alright, we're going to base this whole entire, we're going to start doing physical fitness. That will last about a month in a half and its over with. It's gone. It's like it trickles out. And then you know then the crews get the trickle out effect. You know they'll workout for that month. They may workout a month longer than that because they, you now feel like they're doing better and they feel better and then all of a sudden it starts trickling back down. And say winter time we start running a whole lot of calls again and you know you just get out of that sync. And all it takes is a couple of training sessions, meetings, calls and you're out of sync. Because you stretch and you go out there to workout and get a call in ten minutes after you start you come back you don't feel like going back and working out.

So it appears that fitness expectations fluctuate with the current administrative focus, where "it depends on the attitude of the chief that month". And this assumption is supported by

firefighters through my informal discussions about physical fitness in the fire service, where expectations change for a period of time after the announcement of a firefighter's death due to heart attack, or when several occupational injuries occur. But in general, the expectation for physical fitness within the fire service is expected by department management:

M: And then kind of getting up at the top, when you think about physical fitness what does it mean to your department? What does it mean to (XXX) as an entire department? I think the (XXX) Fire Department finds it to be beneficial obviously. Or else they wouldn't have developed a two hour block every morning for every shift, every, you know group that comes on (shift). *Not to mention during that two hour block there actually is a designed work out plan so you know they put a lot of credence into it so. If they are going to go through that kind of trouble scheduling it and uh organizing it then it must obviously be important to them and plus you know, as a business which it is as well, you know you don't spend as much money when you don't have to spend on people. Because people aren't going to be out sick, on disability or workers comp or that kind of stuff. It's an image thing also, I mean, you know if you're fit it makes the department good.*

The issue with this general physical fitness expectation on the management level is that firefighter perceive it not to be consistently "from the top down", similar to what is noted with captains. Management is perceived not to follow its own 'stated' expectation for their departments, and this inconsistency is a double standard to many firefighters. This is seen in this extended focus group segment when a group is presented the scenario of new firefighters coming into a station, and are asked what activities and advice they would recommend for a physically fit department:

M: …Let's think now, think of your ideal world money is no object. New firefighters coming in but they're like if it's new firefighters, what activities would you, what advice would you have for your vision of a physically fit or physically ready department with new firefighters.
Our department would present an image to these people before they even get here. When they walk in the door they look from the top down. They don't see one of our bosses standing in the doorway with his gut out to here, smoking going you need to be doing fitness. M: Yeah. They wouldn't see things like that. They'd see the whole department physically fit. They'd see us with the opportunity to be physically fit. Somewhere to do our fitness, they'd see you know fitness to be a priority…

To the department and it's not from the top down. It's not. Yeah. I think that's the problem. That is the ideal world. I think if you ask anybody they'd say yeah, I want to be in shape for myself and for my crew because it's going to benefit me all around. Ideally, I think anybody would say that and that's probably crazy if they wouldn't. But the fact of the matter is like I used to workout five, six times a week like all the time it didn't matter. But eventually this schedule wears on you. I don't care who you are and it doesn't matter how dedicated you are, eventually this catches up and you slow down. Because you don't have any choice. You can't keep up. You can't operate on more lower than average levels of sleep, added stress on top of second jobs and families and all that stuff. You just can't do it.

M: It wears you down over time?
Yeah, no matter who you are at some point in your career you're going to bottom out. You're not going to be able to keep up that pace. Because the motivation is not there though. If you feel like everyday that you came to work and that was the expectation and everybody above you was doing it, it would be less of a problem.

Furthermore, variable expectations for physical fitness place firefighters in the uncomfortable position of trying to meet a mixed hierarchy of job expectations; firefighters may be tasked with several job activities and training, while concurrently being expected to adhere with management expectation that "you will PT". Management may schedule a job task such ass a training exercise during their expected exercise during the allotted PT period, and from the firefighter's perspective, this sets the double standard, causing confusion and at times resentment. As this group describes when asked how the department encourages PT adherence, we see this issue necessitating a clear expectation and sustained commitment from management, without worry of negative incentives or sanctions, as noted in this extended segment on department PT encouragement for PT adherence:

M: …how does the department or whether it's the crew or department, how do they encourage firefighters to adhere to this exercise program? You've talked about needing a personal commitment…

Threats. M: Say that again. Consequences and repercussions. M: Consequences. You know they have been trying to figure out a way to tie it in to our money and to me that just doesn't do anything for me. That doesn't motivate me. Um, making it show on your evaluation and stuff like that. That's kind of rather (negative) *than providing positive reinforcement I guess you'd say by saying okay we're going to get you some more equipment we're going to provide ah, rather than providing positive reinforcement it's been kind of a negative edge put*

on things. We're gonna let it affect your evaluation or you're not going to get a raise this time or we're gonna do this or do that. And it would be a better approach I think to say okay here's what we're going to do let's let you go out and get your gym membership, let's get you more equipment whatever we need to do to provide more opportunities. Don't give me the negative stuff. Don't offer repercussions and consequences, I don't want to hear them. And that's a proven thing the last day we worked, the well done approach how you train killer whales. And you can't pop a killer whale on the nose because he will throw you out of the water or eat you. And that's kind of the way it is here.

I mean that's exactly right kind of the way it is here. If I pop (XXX) on the nose and I say you're not going to get a raise this time…He'll pop you back. …Morale just goes down and everybody like well why are they treating us like you know two year olds when we're all grown men here you know.

And it goes back to that personal, personal choice if (XXX) don't want to be physically fit, he knows he needs to be physically fit. But he you know… That's not going to motivate me. That's not going to motivate him. All we can do is provide opportunity, provide the positive reinforcement by setting aside time, giving them the equipment, providing opportunity for us to do it, putting the leadership into place that will lead the way. Lead by example. Lead by example and hopefully it pays off. And I really think the negative reinforcement does the exact opposite.

Ultimately, this can result in firefighters having an unclear perception of long term physical fitness goals, a consequence that can be a strong barrier to physical fitness change.

3. 3. 2. B. The barriers and facilitators to firefighter physical fitness via worksite (PT) fitness programs

As noted earlier in Table 3, coded constructs were ordered by three levels of influence of the social ecological framework. "Motivation" was the highest rated intrapersonal or individual level indicator of physical fitness, acting as both barrier and facilitator to physical fitness and PT adherence, crew level "dependability" the most frequent interpersonal level code, and "participation strategies" the most frequent organizational level code, as well as most frequently coded construct influencing physical fitness and PT program adherence on all levels.

As mentioned with some code constructs, they can be barriers or facilitators to firefighter physical fitness and PT adherence, depending on the context and perspective of

the discussion within a specific passage of transcript from the group queried. For example, "motivation", an intrapersonal level factor, was often mentioned as a reason or barrier to maintaining physical fitness:

M…Are there things that make it harder or more difficult to maintain physical fitness?
…Sometimes you get into a routine of doing it at a certain time and if you have calls or something like that throw it off you're kind of not really as interested in doing it. You know, you kind of. You might have had like a busy call or something like that, come back and you know I really don't feel like doing it now.

And as a facilitator:

The bottom line is it's got to be that not a want to but a decision to do and it's own each person's responsibility for their own physical well being. They have to have an inborn not only desire but an effort to meet that desire to be physically fit.

It is important to note that given the dichotomy of some codes, the perspective and context can provide insights as to a factor being a barrier or facilitator to physical fitness. With that said, the following provides examples of the most frequently coded barriers and facilitators, stratified by the intrapersonal, interpersonal, and organizational levels of the social ecological framework.

3. 3. 2. B1. Intrapersonal level barriers and facilitators to physical fitness and PT adherence

Motivation: From the individual perspective, personal motivation factors prominently in a firefighter's fitness level and PT adherence. This comes as no surprise though, as the ethnographic phase of the study clearly identified a common cultural theme being that fitness is primarily the responsibility of the individual, and his/her own motivation. And across all focus groups, motivation acted as both a key barrier and facilitator to fitness, even when numerous other factors came into play, be they normative expectation for fitness, or other socio-cultural influences:

M: Okay, any other things that make it easier though (to exercise), thinking about that? Make it a little bit easier for you, anything at all?
The bottom line is it's got to be that not a want to but a decision to do and it's own each person's responsibility for their own physical well being. They have to have an inborn not only desire but an effort to meet that desire to be physically fit.
M: So really its personal desire?
Because nobody is going to wish that you be fit and you be fit. I can't want (XXX) down the street to be healthy and him all of a sudden be healthy. He's got to want to do it and he actually has to do it. So no matter you know, I don't know it just really incumbent on each person to take responsibility for their own fitness level in their own hands and do it.

(Another firefighter asks) *How would you make somebody want to do that though?*
You have to make the environment conducive to doing it. You've got to make it fun. We're not going to make anybody physically fit in ten days a month. They've got to make that commitment throughout the month themselves. You know when they're home they've got to eat right and try to find time to walk or you know stuff like that. We can encourage it here and provide them with the necessary education and the equipment and the flexibility to get those things done and that will greatly help especially when they're here. But they, as soon as they're in here it's still on them to get it done if they want to be physically fit. It's their responsibility.

Nutrition/Diet**:** It is acknowledged that some firefighters try to eat healthier than in the past, with selection of leaner cuts of meat and vegetables, and the normative expectation of eating together as a group during lunch and/or dinner generally still exists. And if the expectation is strong for the group meal, this is an important time for influencing the nutritional value of what firefighters eat. As a result, nutrition factors prominently as a potential barrier to physical fitness, both on and off the job. This was common across the focus groups, with nutrition frequently cited in the following manner when considering what firefighters do to maintain adequate physical fitness levels, as well as prevent coronary health issues:

M: What activities do you feel are important for you personally to do to maintain physical fitness?

…Eat better. M: Eating better? We are notorious for eating stuff we shouldn't. Yes, yes and eating a whole lot of it. We don't like the healthy food. We hate letting it going to waste so we've got to eat it.

M: I had asked just for general thoughts about um, the fifty percent, the statistic that fifty percent of on duty deaths are due to, in firefighters, are due to heart disease or heart attack and just what does that statistic bring to mind for you? What comes to mind?
It happens all the time. But some of it comes back to the hereditary thing but a lot, some of it comes back to not doing anything. You know I mean if you sit around and eat fried foods…M: Yeah. Basically consume a salt block a day you're gonna have a heart attack eventually.

M: …I know you've mentioned leadership and a variety of activities (to influence fitness). What activities are important to the station to do?
…I think we've talked about meals before, I think the food aspect of it is important also. And with that fitness as a station group um, we've got some folks that'll eat gravy every night you know. (Laughing) But you've got some folks, I think that the meal, the meal choice at the station, we don't all eat together a lot. I mean it's our, our company right now is relegated to a station out in the sticks from eight to five so by the time we get back here it's just kind of a logistical thing. But as a station you know if, if the folks were to eat together more, I think they would eat healthier and make better choices. And that too is contingent upon who is in the station. You've got some folks who are picky about what they eat. They won't eat anything green.

M: You say they won't?
They won't. But ah, I think the food plays a lot in that station physical fitness. Not just the activities that we do but what we eat throughout the day.

M: Okay. It's definitely eating, nutrition.
Being that close to Goodberry's doesn't help. Dunkin Donuts. Yeah. Chick-fil-a.

So by and large, though firefighters did recognize the value of "cooking healthy food", "putting down the biscuits", and the need to "stop eating gravy every night", nutrition and diet was viewed by all groups primarily as a significant barrier to physical fitness within the fire service, as well as a significant contributor to underlying coronary heart disease and the high rate of heart attack in the fire service.

Physical Fitness Beliefs: Fitness beliefs, in terms of activities believed to improve, decrease, or result in no change physical fitness level, were frequently mentioned in the focus group discussions. Physical fitness beliefs was developed as a code after informal discussion with firefighters provided insights into common practices and beliefs to promote fitness or

improve job performance, some of which were proved ineffective after investigation with cardiology and fitness research experts. A prominent and commonly held physical fitness belief was the practice of "controlled breathing":

M: Alright. So think about physical fitness and its relationship to firefighting, what comes to mind?
…You've got to be able to maximize that amount of air you've got in your bottle. A lot of us will suck that bottle out before it's rated to go out.
M: Okay. And how would you go about doing that? What is there a rule or trick? Controlled breathing. Controlled breathing but you know if you're not in shape you can't control your breathing. You can take somebody that's out of shape built and they can take down a bottle in a matter of a few minutes.

Although firefighters may attempt to slow their breathing when over-stimulated, such as in a psychologically intense response event, in order to reduce their air use and remain on the response for a longer period of time, experts quickly point out that if a firefighter is involved in a physically strenuous event such as fire suppression, it will requires a high degree of aerobic activity and a firefighter will not be able to control his/her breathing, as it is not physically possible. But as noted in the focus groups, as well as during informal discussions with firefighters, attempting the act of controlled breathing, though not technically possible, is considered to reflect a physical fitness level appropriate for the rigors of fire suppression.

In terms of physical fitness beliefs though, the majority do have merit and tie in with other factors considered both barriers and facilitators to physical fitness, as noted by this firefighter considering the statistic of heart attacks in the fire service:

M: …Over fifty percent of firefighters on duty deaths occur to coronary heart disease or heart attack. What does that bring to mind for you when you hear that stat?
Heart attack alley. M: Heart attack alley. Your diet. M: What do you mean by that? Being 40 to 55. M: 40 to 55 years old, okay. Firefighters in that age group die from heart attacks. To me I say it like this, I've done seen some stuff. I've done seen some young people die from heart attacks. So like XXX is having problems with his heart and he's what, 21 years old and in good shape. I say then again it could play diet then it could play something that's in your family. There's a lot of other variables but more than likely if you know you go back and you

start looking at age and then other factors you know it still it's less likely if you're in shape than you are if you're out of shape.

As noted above, firefighters generally associate heart attack with the 40-55 year age group in "heart attack alley", but there is a belief that poor diet also plays a role as a barrier to physical fitness, and can increase the risk of heart attack in younger firefighters.

In general though, the focus group participants' physical fitness beliefs were often associated with factors facilitating physical fitness, as in the following example when a group was asked to provide examples of physical fitness:

M: Can you give me some examples of physical fitness that are important to you? What are some examples of physical fitness?
…Ah, eating well. Flexibility. M: Flexibility and eating well, okay. Not eating fire house food. Drinking more water. M: Drinking water, alright. So, ya'll have brought up diet. Do you consider sleep a part of physical fitness (mentioned as a factor in an earlier question)? Yes. More so than I used too. M: More so than you used too in what way?
It's just become more prevalent in what you see in the news and uh health related topics. They talk more about sleep being one of the keys to wellness.

As these older firefighters indicated, physical fitness includes proper diet, keeping adequately hydrated, and getting enough sleep, though this is not the typical cultural definition of fitness by most firefighters. Generally speaking though, firefighter physical fitness beliefs do include factors such as quality of life and recovery time on the job, which as indicated in the ethnographic results, is culturally equated with good physical fitness:

M: Are there other things that come to mind when you think about physical fitness? To me it's just about being healthy and having a new quality of life where you can be active and not be sore. You have the energy. You don't want to just lay around. You want to go play so you play. Be able to move. M: Okay, so good quality of life. You want to enjoy life, okay that's good. Still thinking along these lines when you think about physical fitness just um, any examples of physical fitness that are important to you personally with ah, like quality of life but also doing the job as well for recovery time. Any other thoughts? It's a good stress reliever. M: Good stress reliever, absolutely, okay. I think it's got to be enjoyable to or you're not going to want to do it.

Coronary Heart Disease (CHD)/Heart Attack Knowledge: As identified in the ethnographic key informant interviews, coronary heart disease and heart attack was most salient to older firefighters, and their knowledge included proper diet and cardiovascular exercise to reduce risk. Similarly, the results of the focus groups show that intrapersonal level CHD/Heart Attack Knowledge is a physical fitness facilitator in terms of diet and exercise as well, as noted when two groups are asked about activities to maintain physical fitness:

M: …What activities do you feel are important for you personally to do to maintain physical fitness?
I think like (XXX) said earlier, it mostly with this job is a lot about heart health. M: Heart health. Just keeping that cardio. M: Cardio, okay. Eat better.

And similarly, when asked about physical fitness and its meaning to the crew:

M:…when you're thinking of this thing, physical fitness, what does it mean to your crew? *It's not just these folks here relying on me to be, maintain a certain level of physical fitness it's folks at my home too, my family. You know the job is inherently dangerous. If we don't maintain a certain level of fitness we run the potential of heart attack. That's the bigger killer of firefighters. And my folks at home depend on me that I don't have a heart attack and that's always in the back of my mind. That's kind of my motivator.*
M: So family life is the motivator?
Yeah. I remember correctly, one of the components of physical fitness is body composition. So what we eat a lot of it has to do with it as well because the fatter we are the more prone we are to heart attacks.

The reader should note that CHD/Heart Attack Knowledge was also found to be a physical fitness barrier, but not in terms of lack of knowledge as it correlates with poor fitness. More interestingly, older firefighters as a group noted the significant impact of poor sleep patterns, combined with the emergency alert system and the stress of a call, a barrier to good physical fitness and contributing to the high rate of on duty death due to heart attack. In this extended segment, several firefighters discuss this pressing issue with regards to the heart attack statistic and risk in firefighters:

M: …I'm going to read you a statistic and I want to have you respond with your general impressions to this and opinion. Over fifty percent of firefighters on duty

deaths occur from coronary heart disease or as a result of a heart attack. What does this statistic bring to mind to you?
How bad we eat. We're out of shape. M: How bad you eat? Okay. And we're out of shape.

How strenuous, how strenuous this job is. I've always been told is that your heart is like a car you know. If you, if you get up like when we'll be sleeping in the middle of the night, the buzzer goes out you're going bam from a dead sleep to ninety miles an hour.

If you get in your car and just take off without letting it warm up you're going to damage it. So over time your heart is going to be damaged anyway from that type of dead sleep to ninety miles an hour. It's going to happen and we've all been told that. That heart attack is the leading cause of firefighter deaths and that's just part of the job that's strenuous and that in itself.

And I feel the same way because it's not, it's not necessarily the job as it is just like what he's talking about you wake up you know if you're asleep and that buzzer goes off. It don't just gradually wake you up, let you wake up easy I mean it's like beep, right now.

Scars your heart. Scars your heart. And you go from sixty beats a minute to one hundred plus in seconds. M: In seconds. *It scars your heart literally, I mean.*

Some of the healthiest people in the world have died from heart attacks. So what does that mean? You know, they aren't firefighters and they're not unhealthy you know it's certain things that's happened to them but...

Stress. Stress and but them doggone, them buzzers I despise, but I mean it's in the middle of the day too. If you're studying or whatever and you go from like he said from a dead stop to wide open you know.

M: Okay.
And especially if it's a ah, structure fire or something that you know you're going to be working on your heart tends to race a little faster. Or if a child's involved, no matter what it is you know I don't care who it is your, your heart rate going to go a whole lot higher you know even though you haven't done anything. All you did was get on the truck.

M: But you know what you're going to?
You know what you're going too and I guarantee you my heart rate goes from sixty to a hundred and twenty just like that.

M: Okay.
And if you feel, and even when I was in better shape you know when I was younger you know you could still feel that doggone hurt when that buzzer hits.

With regards to CHD/heart attack knowledge, it was not cited as frequently as the top three intrapersonal barriers and facilitators to physical fitness and PT adherence, yet was

firmly established as a key factor indicating firefighter knowledge regarding the interplay of components of physical fitness and coronary heart health. Last, it should be noted that other intrapersonal factors not mentioned here were discussed in the group discussions, though not as frequently as the top four factors. These include significant intrapersonal influences such as "age", "lack of personal time', "stress", and "family life".

3. 3. 2. B2. Interpersonal level barriers and facilitators to physical fitness and PT adherence

Dependability: operationalized to capture mention of being able to depend on a member of the crew, or the crew being able to depend on a firefighter, as a reason to engage in, change/improve, or maintain physical fitness level or current activities during the PT period, was the most frequently cited code on the interpersonal level. The recurrent mention of dependability, most often on the crew or shift level, is reflective of the cultural meaning of physical fitness noted in the ethnographic key informant interviews as being a dependable member of your crew, and having confidence in your crew members' ability to do the job, which was equated with being a fit firefighter.

Dependability was a strong facilitator for sustaining or improving physical level through PT program adherence, as noted in its repeated co-occurrence with physical fitness facilitators in the transcript coding process. As the following passage illustrates, dependability is critical to the success of response in an emergency event:

M: When you think about physical fitness, what does it mean specifically to your crew? Think about your crew, what does it mean to your crew?
Being able to count on each other. Yeah. M: Count on each other? I see nods in agreement all the way around. *Working beside someone who can take care of you as well as you can take care of them if something does happen. Just barely getting by just don't cut it.*

The reality of a fire or another emergency event is crew members always go into the scene in pairs, to guarantee the safety of a partner in case he/she becomes impaired. If a firefighter is

not physically fit, which equates with not exercising enough during PT to handle the rigors of the job, he/she becomes a potential liability to his/her two-person team, the crew, and the entire response, and is undependable:

M: … what do you think exercise means to your crew, if anything.
Well, the more physically fit you are the easier this job is going to be. We all depend on each other and if (XXX) and I go inside and I'm not able to keep up with (XXX) or do my share of the job then that's going to slow him down and he's not going to be able to perform his job as well as he needs to and that's just a fact. So that's what it is, we all depend on each other to be able to do what we need to do. Because what we do is very physically demanding in a very unstable environment that's changing constantly and we have to do things fast and we have to get it done quick. We don't have the benefit of stopping and stretching and warming up and all the other kinds of stuff. It's just you know being in shape and being able to do your job, everybody is depending on everybody to get that done.

M: Right, okay, so dependability.
One person's not going to roll up and take that hose inside and go take it up to the attic and do all that stuff. It's just not, it's a team effort. If there's three people on the hose line and one of them runs out of air he doesn't go out by himself, that whole crews got to back out. … That's why it's important if there's a weak link in the chain, the chain is going to break.

Similarly, the discussion in the next group mentions the entire group effort, and how dependability (or lack thereof) can be a barrier to a response, as the inability of a firefighter to do a job can result in pulling manpower from other locations, affecting the resources of other stations and jurisdictions if an event were to occur in that location:

M: Okay. Bump it up a level, think about, when you think about physical fitness what does it mean to your shift? Like, you know, in a multi-crew company. When you think about physical fitness.
Well the more physically fit you are as a group the less people it's going to take to do a job. If we go to a house fire right now and we've got a room full of people who are not very physically fit and get wore out in the first ten minutes then you're gonna have to call a lot more resources in…To assist us to do the job.

M: And is that something that is a problem frequently or does that just kind of come up?
I mean its potential. Everybody's at different levels. And we have set response for different kinds of calls and we're going to have extra help there but um, if it's going to be a call that's long, you know drawn out call then we have to have, the less physically fit we are the more resources we've got to have to help us out.

And pulling additional resources not only impacts others' resources, but the ability of these resources may be unknown and can potentially affect both the confidence and compatibility of the crews, as this passage continues:

M: And that's pulling firefighters from other stations?
Other stations, other jurisdictions. I think becomes a dependability issue too. If somebody's not very fit then there lots more likely to be out sick a lot. And every time someone is out sick from work it affects everybody else, moving people around you know adhesion with your own crew. You get used to working with certain people and if they're not there all the time it just kind of makes things difficult.

In the end though, firefighters who note the ineffectiveness of a firefighter who appears unfit, e.g., being obese, can ultimately become a motivating facilitator for the crew member to improve his/her own fitness level to fill the perceived fitness and dependability gap, as noted at the end of the passage :

I know when I first got on and I saw some of the people that are on shift, they are very big and overweight. You know it was in the back of my mind if that person goes down you know it's going to be tough to get them out. You know, so you almost have to make your physical fitness above and beyond just so you can get somebody who's not as physically fit out because they are so much bigger and not capable. So and it goes in the back of your head, like you know, they could easily go down you know because of heart attack or whatever because they're not physically in shape.

At the end of the job day, dependability acts as a significant facilitator as a significant motivator to physical fitness and PT adherence:

You know it's depending on everybody being able to do their job and carry their weight um, just the other night we ran a call we had to move a sick three hundred pound man out of house. It's knowing that everybody there when you put somebody on the other side of the stretcher that they're going to hold their end and they're going to take him down the steps and not they're not going to drop what they've got. I mean everybody is depending on everybody as a group and a team to be able to do their part of the task. Not pull a muscle or maybe do that in the middle of the night get up at one o'clock in the morning, you've been sleeping, you're muscles are cold, they're not stretched out and you have to go out and pick this heavy person up. Nobody strains a muscle, nobody has to go to the doctor, no workman's comp you know because everybody's in a fit condition so they can do their job.

And dependability at the end of the job can also be equated with being able to support his/her immediate, 'outside' family members. As this firefighter notes, dependability goes much further than just the job:

M: …when you're thinking of this thing, physical fitness, what does it mean to your crew?
…Um, the more physically fit you become the longer you can do your job effectively and safely as well.

M: Okay. So it goes back to endurance (stated in an earlier passge). Being able to do the job longer and safer, okay.
No, I mean like not so much in the time short time frame, I mean career wise longer.

M: Okay, career, okay.
It's not just these folks here relying on me to be, maintain a certain level of physical fitness it's folks at my home too, my family. You know the job is inherently dangerous. If we don't maintain a certain level of fitness we run the potential of heart attack. That's the bigger killer of firefighters. And my folks at home depend on me that I don't have a heart attack and that's always in the back of my mind. That's kind of my motivator.

Social Cohesiveness: The close knit ties and cohesion that develops among firefighters is a well known occurrence, as firefighters, whether volunteer or paid professional across jurisdictions, states, and other countries, consider themselves "brothers". This comes as no surprise considering that firefighters spend much of their time away from their immediate families, living with other firefighters in close quarters for long hours, and working through extreme psychological and physiological stressful emergency events. This results in strong interpersonal bonds among firefighters, especially among immediate crews and shifts. And though research from the physical fitness literature demonstrates that on average, social cohesion is not as significant a facilitator of fitness program adherence in males as it is females, the unique nature of the firefighter occupation creates a cohesiveness that is a strong facilitator of physical fitness and PT adherence in the fire service (Elliot, Goldberg, et al.,

2004). This was clearly noted in several passages from the focus group transcripts, as noted in this example of cohesiveness and camaraderie:

M…What does exercise mean to the shift?

Everybody gets the job done. M: Gets the job done. Yeah. Camaraderie you know when you're working out your kind of talking and messing around with each other and you just, yeah…Camaraderie

And cohesiveness and competition:

M: …So when we left off I was asking you what physical fitness meant to your going a little bit larger than your crew, your shift. What does it mean to your shift?
…Maybe it's a little friendly competition within the departments where as if you have a fire you're on the second bottle and somebody else is still on their first bottle and that makes your crew a little bit better.

And social cohesiveness is also closely tied with the social support mechanisms of fellow crew members, which also facilitates physical fitness to a greater degree. More importantly, it provides insights into crew members' specific strengths for job tasks on a response scene, which as described in this segment, provides multiple insights into how social cohesiveness acts to significantly facilitate physical fitness of firefighters:

M: Okay. So, let's bump it up, kind of go up the chain a little bit there. Activities that are important for the crew to do to maintain the crew's fitness.
Communication. Communicating and building team work. …It's like XXX said, knowing your limitations and your crew knowing your limitations and using that to intermingle the crew's abilities to accomplish the overall goal.

M: So it's more, more than activities, its communications.
It's more than lifting weights and walking around the bay and doing all those things that people do when they call it fitness. I mean it's camaraderie, it's sitting down talking discussing what's going on, talking about how bad you feel today and that you know you've taken 800mg of Ibuprofen on the way to work this morning kind of thing. Those types of things so that everybody in the crew knows…That today you're a little bit lax. So I need to pick it up. M: Okay. *Well, if you get more specific with what XXX said one of the things that's been helpful and that I've found in the past, if, if each person in my crew knows what the things are that they need to work on and we all have a plan that's fit one for me, one for you, one for XXX. But we have the time and space to work on our plans together so that we're encouraging each other and have the equipment to do that. Because encouraging each other working together is very helpful for the most part. You know doing it together but then*

knowing that I need to work on bench presses and XXX needs to work on his cardio work and you know we swap off and do that together. It's very helpful for the crew.

Similarly, another focus group paints the same picture: cohesiveness and camaraderie not only facilitates PT adherence, but provides key insights into a firefighter's abilities for the job:

M: …What does exercise mean for the station?
It would help develop the camaraderie. …(and) if everyone participates in exercising everyone would know each individuals weaknesses. I mean because we're not all built the same and we're not all gonna have the same strength or cardio. M: Okay. *Some are better than others. Some are stronger than others. And if you worked out together you could see then who has what and who can do what. So for example, I go in with you know (XXX) or something to a fire, (XXX) may be a little stronger than me you know we'll say he's got a little more power he's gonna go ahead and do that part you know or vice versa.*

Social cohesiveness also acts as a strong facilitator when combined with team sports, as the competition facilitates a higher level of physical fitness and PT adherence, as the same group continues:

…and getting back to, you got to want to do it you know like (XXX) said. You know if you want to lift weights, if that's what you like to do then you know that's fine. But most people want to play team sports as far as you know as a team atmosphere that everybody's together. Well, it makes exercise fun…

Without thinking about exercising because you're competing, you're out there with your friends. When we were playing basketball, everybody was getting along great. Everybody was happy all day long. They, they after we were done playing they'd still kid around with each other throughout the entire day. People were losing weight. They felt good. They were sleeping better. They were eating better. They weren't eating junk all day long. And they were visibly, it's like we had our own experiment and everybody was healthy and getting healthy. And it stopped and guess what, it all kind of went back to eventually the way it was.

But group sports make it where it's not work. You're not doing something you don't like to do and even if you don't want to play because it is play once you get involved in it. …Getting on that weight bench back there is work for me. I have to make an active effort. And to stomp somebody's ass in basketball is a whole lot more fun for me.

<u>Social (fitness) norms on the crew and captain levels</u>: As I described in the section on the normative expectations for physical fitness among professional firefighters, the focus group

discussions provided clear evidence that norms do exist on both the crew and captain levels, with the captain's expectations exerting more influence on firefighter PT adherence. Yet this can be variable, even on the crew level from one shift to the next. To provide background, a fire department has three shifts- A, B, and C, with 2-4 crews working shifts at each fire station. Firefighters frequently indicated to me that different shifts seldom talk to each other; sometimes having what was described as "family grudges". It was not uncommon to see shifts with their own refrigerators and food storage areas, keeping them under lock and key only for the crew on that shift. And as noted across informal observation, crew ride-alongs, discussion with different shifts, and the focus groups, captains have a wide range of normative expectation for fitness, from zero expectation, to "walk the walk as I do".

Though I do not provide additional passages in this section, as most are duplicate passages from the earlier segment on crew, captain, and management level fitness norms, I did find that fitness norms act as both strong barriers and facilitators to physical fitness and PT adherence, and will be studied further in the final phase of this study to identify the specific structural characteristics of physical fitness norms in the fire service. Finally, as indicated in the discussion of social cohesiveness, the norm constructs are closely related to other social constructs that affect physical fitness and PT adherence, such as peer influence, and social support.

3. 3. 2. B3. Organizational level barriers and facilitators to physical fitness and PT adherence

Across the study's social ecological framework, organizational level influences were the most frequently cited factors impacting physical fitness in the fire service, acting as multiple barriers and facilitators to overall PT adherence. Organizational factors influence from both ends of the fitness spectrum, with firefighters describing a no accountability side

of fitness, where firefighters essentially say “so screw it” to PT adherence, to the “extreme” or “threatening” end of the PT program that requires adherence similar to the military’s mandatory requirements for physical fitness, or you are fired.

The four most frequent factors on the organizational level were “participation strategies” designed by the administration, “work environment factors”, in terms of amount of PT space and equipment, the “perceived level of management support or lack of support”, and ‘management level normative expectations” for physical fitness and PT adherence. Participation Strategies**:** include the myriad of methods instituted or made available by the fire department to encourage PT participation and good physical fitness both on and off the job. Methods include the allotted PT period, the candidate physical agility test (CPAT) required of new recruits before becoming a firefighter, per the International Association of Firefighters “Wellness-Fitness” Initiative (IAFF, 1999), annual physical fitness testing of response level firefighters, rookie academy PT, and job-related training that is fitness inducing, e.g., a hazardous material (HAZMAT) response drill in full turn out gear. Of all constructs used in the focus group coding phase, “participation strategies” was the most frequently cited code, with over 60 references in the focus group transcripts. This would come as no surprise to firefighters though, due to the recent focus on physical fitness as a result of media attention regarding the high prevalence of firefighter coronary heart disease and subsequent heart attack, as well as national initiatives such as the Wellness-Fitness Initiative. And the most prevalent strategy to date in terms of the fitness phenomenon is the dedicated time period for PT. But most firefighters note that the ‘dedicated’ period takes a frequent backseat to acceptable response activities, but also to conflicting organizational expectations such as continuing education, public relations events, and daily job tasks that

are scheduled by the organization during the departments committed time for exercise. Yet through reviewing the coded transcripts, it is evident that participation strategies are generally viewed more as a facilitator than barrier to fitness. More often than not, participation strategies are perceived as barriers in terms of fitness initiatives such as the annual physical fitness test. The test is offered as a way to detect acute and chronic disease, with specific attention to coronary heart disease, but typically the perception as barrier comes from firefighters' complaints that the test does not provide any real useful health information, given the present emphasis on heart attack prevention:

Over fifty percent of firefighters on duty deaths occur from coronary heart disease or as a result of a heart attack. What does this statistic bring to mind to you?
…one thing you know part of all this to is you know we all complain about the physicals. You know the doctor's physicals that we get or don't get every year. So I mean I think that's a big part of the health and fitness, health and ah, fitness program is you know somehow or another relate that to it. Getting a real physical instead of Dr. (XXX) you are fine?

Correspondingly, this focus group has similar complaints regarding fitness test's usefulness, when discussing general points at the end of the group discussion:

I think one of the big points that (XXX) hit on it is we, we go get a physical you get your blood work done. But you really don't have a good picture of what your overall physical is. They never tell you about your heart. What condition your heart is. We had guys that got Dr. (XXX) God Bless You, go home and they fall out and they get quadruple, what is it quadruple bypass surgery? (XXX)? Yeah. He had quadruple bypass surgery and Dr. (XXX) said he was fine. M: Okay. So you, you have no, you really have no clue what kind of shape you're in from the physicals that we get. You have no real starting point of hey, you know you're heart is in bad shape or anything along that line. Because you know you get a little blood taken and you're done.

In general though, participation strategies were viewed favorably by firefighters across all groups, and the allotted PT time was seen as a positive effort by management to improve the fitness and health of firefighters:

M: What are some of the ways that the crew, the captain, duty or battalion chief encourages physical fitness for you?

I think it's better than it's ever been because you can tell that they're making strides to truly have a concern about it. Instead of just designating the time for like years and years it's like here's forty five now ya'll have got to PT. And we'd say with what and you know it was well you've just got to PT. M: Okay. But now they're allowing us to dual times to choose from. They've gotten us equipment and…They got us some real good stuff. All the equipment. Yeah, there's no excuses. Yeah, now what is everybody's excuses?

M: So the equipment coming in was a big step forward.
Yeah, I mean just for administration showing that they care or realizing it is an issue…

Additionally, continuing this vein of discussion with the same group, the allotted PT time, though generally viewed as a facilitator, is seen as only the first step of many on the organization's part to improve firefighter physical fitness, and firefighter's need their respective department's help to achieve this goal:

I was going to say this might just apply to a lot of things is it might apply to some of your questions before is to come up with a physical fitness program or plan of what to do and what not to do. What's good for you, what's bad for you? And just I know that going out there and doing something is better than nothing but I mean you know come up and say hey you know lift this or run this far or you know do certain things that are ah, beneficial.

Um, I mean that's my biggest thing with the program. I mean you are exactly right I mean they've given us a lot of equipment and stuff and pretty much up until now it's just here it is go do and I'll be honest with you I mean I don't really know what to do. I mean I go out there and do something but ah, I would like to see a plan to say you know this is what you should do. M: Okay. Or this is the certain level you should be at in six months or a year or whatever so.

Generally speaking, the PT period strategy was only viewed as a direct barrier to physical fitness when job tasks and activities took precedence. Most firefighters felt that it should be logistically possible to allow firefighter to go offline (no longer on active fire suppression duty) long enough to exercise:

M: …flip that around what are some things that make it easier for you to maintain your fitness level do you think?
...I think it would make it easier if like for example with the police department they actually go out of service when they workout. I think if we did something like that in the mornings it would make it easier because especially depending on what unit you're riding. You know if you've had a busy day and all of a sudden it's seven o'clock, you just ate dinner, you cleaned the station up you going to workout? Probably not, because odds are you've still got a long

night ahead of you. And you know after you've eaten dinner and all that stuff you really want out and exert yourself I mean knowing full well that you're probably not going to get a good nights sleep anyway. So if you do it first thing in the morning it's almost like it's okay check that off the list. It's done and then you go about carrying on the rest of the day. But I think the more the day goes on even though you definitely have time to fit it in whether or not you get actually motivated to do it…

Other participation strategies, such as the CPAT for new recruits, is also viewed as a facilitator to physical fitness:

I think the CPAT program…I'm not sure we got any. They are making them do, to perform to get hired. And starting a base line and once they get it implemented to where we're going to be tested once you're online you're going to be tested to the criteria of the CPAT. I don't know what the frequency of that is going to be but I think that's going to establish what the ideal candidate should be or firefighter what standard they should be at. I think the CPAT is the right direction.

And it's, it's apparently it's going to start at the beginning and it's going to continue on through your career. M: Benchmarks? Yeah, yeah but I mean it's a way of um ensuring that the firefighter stays in shape throughout the course of their career.

M: Okay, alright. And it's a new program that's coming online. Okay.
Right now, once you're hired that's it. You know, you can gain two hundred pounds once you're hired and who cares. They're talking about doing a yearly physical test for everybody, and that would be the best thing in the world. If you knew every year you had to reach or had to perform at such a level, you'd have to stay in shape.

Firefighters also think that participation strategies should be expanded to include other components of physical fitness, such as proper nutrition and fitness education, both of which are typically not offered as part of firefighter continuing education. When given the scenario of their ideal world, firefighters envision several improvements:

M: In your ideal world where money is no object, you could have all the money you want. What activities would you, your crew and everybody else do to maintain a physically fit, physically ready stance?
In an ideal world I would love to have a physical fitness trainer come in and help us eat. Tell us how to eat healthy and work out with us and show us how to properly work out. I mean I would be all on that. Absolutely. Right. Mmmhmm. M: I see nods all around. Yeah, the training I mean that's how the stars do it. They have trainers come in there and chef's come in and cook for them.

A final strategy deserving mention is task oriented training, as firefighters frequently mentioned this type of activity had two components facilitating physical fitness: 1) training activities are perceived to be more fun and entertaining than traditional exercise, yet you often get a higher level of aerobic exercise necessary for the rigors of the job, and 2) the training process provides you valuable and frequent hands on training that prepare the firefighter for a live event, coined "train like you work, and work like you train to live". This is seen here when considering activities on the station level:

M: Likewise, when thinking about what activities do you think are important for the station to be doing?
Training. M: Training. Scenario drill. The scenario was a car was on fire on the third floor of a parking deck and we went up stairs and dropped down rope, pulled up a hose. M: Interesting. That's a workout right there. M: And the entire station goes through that training? It's the whole station.

Work Environment Factors (WEFs): this code captures mention of any factors in the work environment regarding physical space, temperature, and equipment affecting the firefighter's ability to change or improve his/her or others' physical fitness level. This also includes the buzzer/alarm system used to notify and/or wake firefighters in an emergency, and has been perceived to impact physical fitness and health of firefighters.

In terms of WEFs, these organizational influences are considered the most easy to correct from a logistical standpoint, provided there are appropriate levels of funding available, though typically not the case. Over the course of the study, firefighters have indicated that stations usually have a minimal amount of exercise equipment: a bike and/or treadmill, and a rack of free weights for strength training. But they are quick to point out that a significant barrier to physical fitness and PT adherence is also the lack of job specific and quality conditioned equipment that increases strength and stamina. Ultimately, many firefighters bring exercise equipment from home, yard sales, or off the side walk left for trash

pickup to supplement existing equipment . Additionally, though stations may have what is considered the minimally acceptable level of equipment, the number of firefighters on duty at a station often precludes everyone on shift from exercising during the PT period, although they are technically expected to do so. Workout areas are often in truck bays of the station, with frequent complaints of odors and truck fumes, uncomfortable temperatures, and sheer lack of space. Given this scenario, it is not surprising that WEFs were frequently coded an organization level barrier to fitness:

M: Any other things that make it difficult or hard for you to maintain a physical fitness level?
Lack of equipment or lack of proper facility. M: Lack of proper facility. I think it's easier to go to a gym that has multiple pieces of equipment and do different things. Because sometimes you may not want to work out with free weights but you'd like to work out on a machine that you could do the same exercise on. And it's nice when you have choices. Cardio and choices for weights, you can mix it up and make them more interesting. M: And is equipment, is that an issue here at work? Yes. All we have is a bike, weight bench and free weights. And we have jump ropes and stuff like that.

M: And does each station have a minimum amount of equipment, or…
Every station has got a weight bench and a bike pretty much. Some people have brought in other stuff. We've had some stuff donated to us by apartment complexes and stuff. So you know you go to one station and they might have a universal machine and another one might have a tread mill that somebody has gotten, bought at a yard sale, whatever and brought into the fire station. But the town or the department has provided a bench and a bike. And a jump rope. That's about it.

In addition to the preceding barriers, an associated organizational barrier is the recent policy that most departments no longer allow team sports during working hours. Though considered a significant means to improve and sustain firefighter physical fitness, PT adherence, and social cohesiveness from the firefighter perspective, many departments removed team sports to reduce the perceived elevation in injuries and subsequent worker's compensation claims, as noted when asked earlier in the passage about activities firefighters like to do to improve physical fitness:

That's what's the best about team sports, because like he said you might have one person that really doesn't want to lift weights, especially some of the older guys that have been here for a while. They're not going to get out here and lift weights but they'd be happy to play basketball or play volleyball or something. You know, that's a little more fun, it's a little bit more team oriented. I've seen that a lot. A lot of the older guys that have been here for twenty, twenty five years willing to compete and stuff with the team sports but they really don't want to get out here and step on a box and try to do you know box work.

M: …Think about your ideal world. Ideal world in firefighting, if new firefighters come into a station or department as a whole, what advice would you have for your vision of that perfectly physically fit or physically ready firefighters?
…Yeah. We need to, we need cardio equipment, you know, the weights are great. And we need some weights too. Cardio equipment and the ability to play team sports. The ones that are easily played by setting up a basketball goal or going down here to the park where they've got basketball goals already and playing in the team sport aspect of it.

Yeah, we've got sand volleyball courts down here. Yeah. Which is you know very low impact and you know it's not a whole lot of risk of injury and that's not very well supported either. We've been told we could go after five but not to do it in our PT period. What's the wording in team sports or for you know. Five o'clock. But most people after five o'clock they are mentally tired. You've been going all day. And the team sports is where you get your best work out, I mean it really is.

It should be noted that team sports was originally coded as a participation strategy, and though technically an organizational strategy, I separated this code due to the frequent mention of the utility and need to return to team sports as perceived by firefighters. This last passage, though lengthy, sums up firefighters thoughts on this strategy to improve physical fitness and PT adherence:

M: … what are the activities that you feel are important to maintain your physical fitness personally?
I think team sports. M: Team sports. *Even more so than doing the rotation and on that single weight machine we've got back there. We, we were in a period where we went to the YMCA and we played basketball everyday. And we'd play basketball for two hours, full court basketball. And that was the best shape we were in for a while. And then we were told you know you're not supposed to be playing basketball.* M: Okay. *And that put an end to it. I think the team sport thing is really particularly with the cardiovascular aspect of it that's ah, that's the way we need to go.*

M: And was that from the, probably because of the injuries that…

Yeah, we've had some previous, previous injuries. People tripping over curbs playing basketball breaking ankles you know. The thing is if you are participating in a fitness program you're gonna get injured. You're gonna get hurt.

…hopefully the result of participating in that program, that team sport, you're gonna prevent future injuries. You're gonna incur some injuries obviously but you're gonna prevent future injuries by getting yourself more physically fit.

M: And generally speaking if the department was allowed to play more team sports you think guys would be more physically fit overall as a department?
Without a doubt. Overall, we've had a significant increase in participants. Yes, sir.
M: We've got a lot of nods. *When we had the injuries, just to kind of put it in perspective, when we talk about all the injuries we had basketball goals at all the fire stations. Those goals were set in the parking lot at the curb. So as you played basketball if you had to play up close to the goal the pole and the goal was set at the curb. So if somebody was driving along the edge or something they would actually physically step on the curb and twist their ankles that kind of stuff. So we had a lot of injuries based around the way the goals were put up. I mean instead of playing in a basketball court environment where there's nothing for you to run into you know and it's wide open court and it's kind of made for that. We were playing kind of make shift parking lots and it caused a lot of problems. I've seen just as many people get hurt and blow out their stomach and get a hernia out here on this weight bench as they do out jamming their finger on the basketball court.*

Perceived Management Support/Lack of Support Social: This code captures mention of the perceived level of the battalion chief's (or higher) support or favorable attitude towards efforts to change or improve physical fitness level, or engage in physical fitness activities on the job by firefighters. The code also captures the reverse, in terms of mention of the battalion chief's (or higher) perceived lack of support or negative attitude towards efforts to change or improve physical fitness level, or engage in physical fitness activities on the job by firefighters. Not surprisingly, perceived management support was a moderately strong facilitator of physical fitness and PT adherence; conversely, perceived management lack of support was a strong barrier to physical fitness and PT adherence. In terms of perceived management support, firefighter tend to view commitment to responder level firefighters as mixed, that administration does not do enough to support them, as noted in this passage:

M: So when thinking about physical fitness like trying to maintain your physical fitness level, are there things that make it more difficult at all to maintain your physical fitness level?
…(citizens) see the fire trucks sitting outside the gym and think we hang out when we go to the grocery store they complain about that too. They complain about us getting food. They think the city buys our food. It's a misperception. M: Okay. Basically, the city just gives us a building to stay in.

Everything else we've got to get. I think there needs to be more of an effort from a city stand point, administration, to inform the public why we're doing it and what kind of money it saves the city by us doing it... As far as people not being out of work, less injuries that kind of thing. It's a proven fact.

There's a commitment as far as okay, we'll give you an hour to work out. But there's not much of a commitment as far as equipment, or facilities or anything else for that matter or informing the public.

Though this group feels that their department is on the right track, the support is not fully there, and thus is a barrier. For example, the fire departments in my study conduct annual fitness tests, but management does not support the intent to improve physical fitness via annual fitness testing, as perceived in this passage:

M:…What does physical fitness mean to your department? To (XXX) Fire Department?
I think it's very important to the XXX Fire Department. …I think they're on the right track but they don't support it as much as it needs to be supported. Exactly with the equipment. They'll test us with this treadmill test and this small level of physical fitness test that they do every year but yet you know like the last test that you do is the treadmill test you know and elevations and stuff.

There's not a treadmill in any one of these departments, I mean any one of these stations unless somebody brought it in from their house. Or you'll have one, if it's in the station that won't go as high (as) that one (used in the test). Yeah, so it's like…You're testing us on something that we don't even have access to.

Additionally, physical fitness is perceived to be best achieved through holistic fitness programs, versus limited programs and equipment appearing as a partial commitment to firefighters and thus a barrier to physical fitness:

M: Anything else that we should ah, help us think about to understand physical fitness and exercise in the fire service?

Look at other fire departments programs. I mean like look at the City of Phoenix or whatever, I mean they have nutritionist that come in and plan meals for people and I mean you know…

No tobacco policies. It's obvious, it's obvious it's important in some places but it's a priority in others. And there's a huge difference in between. So like here it's important but it's not made a priority. You know, if we had a little more stuff available to us like Phoenix and other you know…Because Phoenix is a large city, don't get me wrong.
M: Sure. *But there should be no difference between number or population size of the department and to where that priority lies within you leadership. So, I mean I would have to agree with (XXX) I mean I think it starts and should start and go a lot further than just you know what kind of exercise are you going to do today? I mean it's the total package.*

M: Total package, okay. And you mentioned a nutritionist so someone helping plan the meals would go a long way?
Well, I mean and it doesn't have to go to that extreme. I mean it could be nothing more than you know once a month have somebody come in and give us ideas and talk to us and tell us and explain the benefits of certain foods and I mean if it's going to be a priority let's take it a step further and, and go through the whole process. Don't just say here's a aerodyne bike good luck.

Additional factors were noted that indicate a perceived level of management support, such as incentives for improving and/or sustaining physical fitness:

M: What other ways do any of the crew, captains, deputy or battalion chiefs encourage physical fitness?
…Recognition. M: Recognition, for? Some type of incentive program for the guys.
M: Okay. Some type of small rewards program. Whether it's just a plaque or a gym membership or something, some type of, some way for them to show they appreciate their accomplishments. Some people respond a lot really well to that.

Overall, the perception that management fully supports the firefighter is a key to physical fitness success from the firefighter's perspective, and as indicated earlier with participation strategies, to go "10-7" in an uninterrupted PT period, would be perceived as strong management support for physical fitness, and could facilitate full PT adherence:

M: Okay then last question on as far as exercise again going back to your ideal world, money is no object as far as activities what would you do? What would you have your crews do? Anything, anything, the sky is the limit. You can do whatever you want.
…The ability to go out of service. M: The ability to go out of service. Okay. It would be a lot easier on five of the people in this, in this on each shift if they knew they can basically cut the

radio off and ignore what's going on in the town. M: Right. And just concentrate on their crew and being together and working out. M: Okay. I see nods.

Because they can't, even though the guys can go and workout and the young folks probably more so than others but the drivers have had to act in the role where they are responsible. So they kind of get to and say oh, I've got to listen to the radio. I'm at work tomorrow so I've got to listen to the calls all day because they've got to make sure that they hear all of the calls.

The officers know they are responsible. And they know that they're responsible for what's going on there, what's going on, on the radio, whether or not somebody's calling them, whether they've got their inspections done, whether the station maintenance has been taken care of, whether their new person is getting the right training all of these things. So, they're out there working out but they're concentrating on everything they've got to do the rest of the day and not really working out.)Another firefighter says) I'm always thinking about that. (Another FF says) I know. We see that fire service does not make you fit. You have to work harder to stay fit in this business than you do away from it. And that, and that is something that even people who work in here forget. You were not always a fat boy and you're not as fat as a lot of people here now. But you are a big guy.

Management level social fitness norm: is the shared expectation, standard, or rule of the battalion chief, deputy chief, or chief that his/her firefighters will engage in physical fitness behaviors such as exercise during the PT period. On the subject of management fitness norms, this coding construct was also addressed in depth in my section on the normative expectations for physical fitness. As with crew and captain level norms, much variability exists in the normative expectation for fitness on the management level, resulting in confusion with regards to a uniform expectation from the organization, considering that official policy indicates fitness is a priority and PT adherence is expected, yet culturally speaking, expectations vary similar to those on the captain level.

For example, battalion chiefs are in similar positions to captains, but direct several crews in 2-5 stations of a designated district, with conformance expectations for physical fitness differing greatly similar to captain expectations. The following passage illustrates this issue when considering the 'ideal' fire service:

M: Let's think now, think of your ideal world money is no object. New firefighters coming in but they're like if it's new firefighters, what activities would you, what advice would you have for your vision of a physically fit or physically ready department with new firefighters.
Right. Our department would present an image to these people before they even get here. When they walk in the door they look from the top down. They don't see one of our bosses standing in the doorway with his gut out to here, smoking going you need to be doing fitness.

They wouldn't see things like that. They'd see the whole department physically fit. They'd see us with the opportunity to be physically fit. Somewhere to do our fitness, they'd see you know fitness to be a priority… To the department and it's not from the top down. It's not. Yeah. I think that's the problem. That is the ideal world.

…But eventually this schedule wears on you. I don't care who you are and it doesn't matter how dedicated you are eventually this catches up and you slow down. Because you don't have any choice. You can't keep up. You can't operate on more lower than average levels of sleep, added stress on top of second jobs and families and all that stuff. You just can't do it.

…no matter who you are at some point in your career you're going to bottom out. You're not going to be able to keep up that pace. Because the motivation is not there though. If you feel like everyday that you came to work and that was the expectation and everybody above you was doing it, it would be less of a problem.

3. 4. Discussion

As mentioned earlier, the intensely social and tight knit culture of firefighting is quite different from conventional occupations, and studies such as the Promoting Healthy Living: Assessing More Effects (PHLAME) demonstrate that firefighters can have commonly shared experiences concerning diet and exercise, resulting in significant increases in shift-related cohesion and coworker perception that team members were exercising more (Elliot, Goldberg, et al., 2004) , i.e., perception of a *normative environment* for fitness. The PHLAME study highlights that normative influences of the crew (team) have the potential to affect health behaviors within the firefighting organization. Yet this study and others demonstrate the need to further explore if and how, normative expectations for physical fitness influence health-related behaviors in stations with non-mandatory fitness programs, i.e., voluntary adherence.

Considering the focus group findings, it is clear that strong interpersonal bonds of firefighter crews, combined with positive social support and cohesiveness play a role in PT period adherence. Additionally, the 'shared, common belief' that participation in PT exercise activities is 'normal and acceptable' (the norm) within the fire service exists, but can vary by the captain and management levels. Additionally, firefighters indicated that though the expectation for PT adherence may be present, this is not always reflective of actual behavior, that most firefighters can choose to participate minimally during the PT period, or sometimes not at all, turning to activities such as checking email, reading the paper, drinking coffee, smoking, or eating breakfast. Additionally, barriers such as job tasks, continuing education, and response calls clash with the allotted time for fitness, often resulting in no PT activities during that day. Generally, it appears that any normative expectation for physical fitness falls within the crew unit of responder level firefighters and the lead officer, usually a captain.

Additionally, there seems to be a beak down in the expectation that firefighters will adhere to the PT program and sustain an appropriate physical fitness level that is required during the rookie academy where firefighters work out daily. Following the academy, there is the allotted PT period each morning during shift hours, and firefighters are expected, though not mandated, to workout during that time. However, there are few sanctions for non-participation during the PT time, typically nothing more than verbal teasing or pressure to perform (or not perform) at the crew level. Not that the crew level pressure has no effect, as it can lead to participation and group conformity. Focus group participants frequently indicated that some crews, especially those led by fitness minded captains and/or battalion chiefs who profess an expectation for participation through words and personal action, i.e.,

"walking the walk", can lead to adherence. Yet even in the case of stronger fitness norms, there still appears to be no real sanctions, whether negative job evaluations affecting salary, punitive actions for low scores on annual fitness tests, or positive reward incentives such as bonuses or recognition for 'good' fitness behaviors.

An interesting observation regarding fitness testing (an organizational participation strategy) is that the results from testing are seldom used to improve physical fitness, typically when an EKG, blood pressure, or physiological measurement is not within expected limits, or chronic disease factors are noted. For the most part, annual fitness tests are used to inform firefighters they may need to improve strength, stamina, flexibility, etc., essentially for personal use. This lack of any real sanctioning for poor physical fitness not non-adherence to PT seems to underlie the rather variable degree of descriptive normative expectation for fitness; that is, what firefighters *believe* is actually happening regarding physical fitness and/or PT adherence/non-adherence by firefighters.

In terms of the normative expectations firefighters perceive, on the individual level it is one of varying degrees of required participation, influenced by crews that enjoy participating as a group, specifically under the leadership of the captain. At the collective level it is more difficult to determine, as crews and shifts often differ on a variety of cultural points, e.g., nutrition, fitness, and job performance management. At first glance the collective department fitness norm is that participation is entirely at the discretion of the individual, with no real sanctions for non-compliance. As long as you can perform the job at a level conducive to meet the group's needs, you are 'fit' enough and PT participation is your personal responsibility.

Another thought for consideration is the moderating effect of factors that influence physical fitness norms in the fire service, as noted in the theory of normative social behavior (Rimal and Real, 2005). Considered within the context of firefighter fitness, factors such as department level norms, firefighter outcome expectations, group identity, and ego involvement could play a large role in firefighter culture, any of which might be targeted in a behavioral intervention.

In terms of department level norms, the normative literature makes note of a potential issue that could occur in firefighter culture. Individuals often misperceive the prevalence of a behavior, and this misperception is positively associated with interpersonal discussion of the topic. It is possible to hypothesize that firefighters incorrectly believe that firefighters do not engage in PT activities because of lack of sanctions for non-compliance. This information could be easily and quickly spread throughout crews, due to the close knit nature and social interaction among firefighter on shift. For example, firefighters may not see PT participation on a regular basis by other firefighters on his/her crew or shift, and think this is the way it is done (a descriptive norm), leading to a subsequent belief that participation is personal choice and not the purview of mandatory compliance measures (an injunctive norm). Similarly, firefighters may see only a few people choosing healthy food choices during the station meal time, i.e., a chicken breast and salad, and then view this behavior as deviant and counter to the expectation that the company eats the meal prepared for the crew, regardless of nutritional content. This deviance in turn could be met with a variety of sanctions to bring about compliance with group eating norms.

In terms of outcome expectations, this refers to the belief that enacting a particular behavior, i.e., PT participation, does lead to the benefits that one seeks (Bandura, 1986).

Placing Rimal and Real's belief about normative expectations within the context of firefighter fitness, if a fitness behavior has a high prevalence, such as crew or station wide PT participation, and this is combined with the belief that such participation leads to significant benefits, firefighters should be more likely to engage in the behavior. Following the review of focus group transcripts, firefighters indicated that fitness does play a big part on the job, and that peer dependability is a critical reason for exercising, as PT participation helps ensure that he/she/crew is ready to support his/her peers during a response. But if you do not engage in the fitness behavior you run the risk of letting your crew down, running counter to the strong expectation for crew safety mentioned earlier. This concern for a potentially poor fitness-related outcome in which they cannot support the team during a response, versus the expected outcome of a fit firefighter, and combined with the belief that a better outcome is attainable through sustained physical fitness activities, is an arena ripe for intervention. Normative research clearly shows that the threat of a potential loss is a great motivator to engage in a specific behavior versus the potential of gaining something of equal value, and this seems to fit with the results of my research. The focus groups indicate that consideration of preventive benefits of physical fitness to reduce on-duty coronary outcome risk does not does not factor high on firefighter's radars, which seems to mirror the challenge of changing low risk salience. But having firefighters consider this within the context of possibly of letting the crew down and encountering a serious adverse event could be a prime motivator for changing physical fitness habits in a fitness intervention.

Another factor for consideration is group identity. As mentioned earlier firefighters are a close knit social group, with crew interaction and peer networks playing a large part in the fire service family. It is reasonable to consider that the group's influence could play a

significant part in increasing physical fitness participation, as noted by the focus group's indication of the important influence of the crew on a variety of fitness activities, especially when led by a fitness conscious captain. Additionally, non-participation can be dealt with through non-formal yet mildly coercive sanctions, such as ridicule by crew members. As research has shown, cultures that emphasize the collective over the individual can exert more normative pressure to conform to desired behaviors (Hofstede, 1980).

The final factor, ego involvement, is also an interesting notion, to the extent that firefighter's self-concept is connected to their position on fitness related behaviors, which is a variable issue. Some firefighters see themselves as "professional athletes" in which physical fitness is central to their lives in and outside of firefighting, while others do not. This fitness related ego-involvement appears even more prevalent in firefighters just out of the rookie academy in which physical fitness related behaviors are linked to their self concept. While ego involvement is difficult to measure, it could play a factor moderating the effect of descriptive fitness norms.

In conclusion, the focus group research demonstrates that several intrapersonal, interpersonal, and organizational factors from the study's guiding social ecological framework influence physical fitness, acting as both barriers and facilitators to firefighter physical fitness and PT adherence. Considering many of the reasons discussed by firefighters were socio-cultural in nature, it makes sense to further explore the impact of these factors and closely related normative expectations for physical fitness in a larger group of firefighters. Additionally, it should be noted that while the most recurrent intrapersonal factors influencing physical fitness were somewhat reflective of the physical fitness literature, e.g., motivation (Dishman, Oldenburg et al, 1998), physical fitness beliefs

(Dishman, 1988), and coronary heart disease/heart attack knowledge (Kay, Lund, et al, 2001), less frequently mentioned factors such as age, self-efficacy, stress, and lack of time are still important to consider in a larger survey of firefighters. Overall, with common variables in the focus group passages such as firefighter fitness attitudes, normative beliefs, and control beliefs, an applicable theory such as Ajzen's Theory of Planned Behavior (Ajzen, 1985) might be useful for application and hypothesis testing in the larger group of firefighters.

3. 5. Limitations and Implications

Focus group discussions have several advantages over other methods that specifically suit the aims of this study. First, focus groups provide rich data from a larger group of participants than a few individual interviews, allowing the researcher to interact directly with the respondents, to clarify misconceptions and misinterpretations of data through the use of follow-up and probing questions. They also allow for data collected in the respondents own words, which in the case of this study, provides more insight into the cultural meaning and expectations for physical fitness and PT adherence among firefighters. In this case, the interpersonal dialogue and camaraderie allowed for increased synergism, capturing deeper levels of meaning. And most importantly, they provide a "fast" way to obtain individual perspectives and local norms, with high face validity due in large part to the believability of comments from participants, in which people open up and share insights that may not be obtainable from interviews, surveys, or other sources (Kreuger, 1994).

Yet as Krueger (1994), and Stewart and Shamdasani (1990) note, focus groups must be interpreted with a degree of caution, due to inherent limitations with this method of inquiry. First, the focus group facilitator has less control in directing the question and

discussion flow than individual interviews and ethnographic key informant interviews. This can result in unexpected discussion detours and irrelevant issues, therefore the facilitator must be skilled in keeping the discussion focused. Second, the social environment, particularly the close interpersonal ties of the firefighters, can influence the comments of others, especially those in lower ranked positions and/or fewer years of service. Therefore, data must be analyzed with caution, carefully considering the context of the discussion. Additionally, the facilitator must be trained to recognize the flow of the discussion, knowing when to probe for further information, and when to move on to other questions. To avoid the common pitfalls of the untrained facilitator, I observed focus groups conducted by the researcher who assisted me in the first two focus groups as co-facilitator, where I learned the skills needed and common nuances and pitfalls to avoid, including how to carefully retrieve answers to the specified questions with biasing the answers. I also attended a focus group facilitator workshop, which gave me additional insights and a trial run as a facilitator with fellow students. Lastly, during the design phase, I conducted a mock focus group, asking questions from the final question guide to a cohort of students to observe the dynamics of discussion, and determine if the question line was coherent and easy to follow.

A final concern can be the variable nature of the groups themselves; groups can differ considerably, and though I planned to utilize a specific pattern matching logic in the original study design, I could not fully explore whether similar types of firefighters produced similar findings, *e.g.*, comparing focus groups with similar self-reported physical fitness levels, and if different firefighters produce similar results for theoretically understandable reasons, *e.g.*, comparing firefighters of self-reported "low" fitness level to firefighters of self-reported "high" fitness level. I was not able to match groups by age and self-reported physical fitness

level, as there was difficulty in recruiting enough volunteers to fulfill the pattern matching logic, including recruiting enough female firefighters to examine differences by gender. Therefore I used a convenience sample to comprise groups from similar departments, conducting the discussions in the participants' own stations, reducing anxiety and the inconvenience of another location. Additionally, I calculated descriptive statistics to determine the relative similarity of the participants, and required the participants to meet the same acculturation standards used in the ethnographic phase of study.

Still, I used several tactics to reduce the inherent limitations and potential bias issues of focus group methodology. As mentioned previously, the very nature of focus groups provide high face validity, due in large part to the believability of comments from participants. Also, the focus group discussions were one of three data collections methods used to obtain multiple sources of evidence, i.e., data triangulation, thereby reducing construct validity issues such as mono-methods, and mono-operations bias. An additional tactic to reduce construct validity bias was to use the dissertation and the firefighter fitness committees, in addition to subject matter experts, to reduce the possibility of inadequate preoperational explication of coding guide constructs. To safe guard internal validity, the dissertation committee and the experts at the Decision Support Laboratory, Chapel Hill, NC, reviewed the focus group discussion guides and coding of text. And to reduce conclusion validity concerns, I ensured the reliability of data collection through the strict acculturation protocol for participants, and utilized a second coder to ensure inter-coder reliability of the data.

As my research has revealed to date, PT participative behaviors and normative expectations for physical fitness are variable within the fire service, but the next phase of my

research should provide helpful insights into the relative effect of structural characteristics of normative expectations for fitness and nutrition, as well as the perceived barriers and facilitators to PT program adherence and overall firefighter physical fitness level. It should be equally fascinating to identify the effect of departmental differences across the four fire departments. In the final phase of my study, I will develop and administer a quantitative survey to all firefighters from the Raleigh, Durham, Cary, and Chapel Hill fire departments, in order to measure the correlation between socio-cultural factors and self-reported physical fitness level. Additionally, by measuring structural components of physical fitness norms through the methods of the Jackson Return Potential Model (1975), I hope to gain a better understanding of the potential feasibility of this method for use in behavioral interventions with professional firefighters.

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CHAPTER IV

Socio-cultural, Normative, and Organizational Level Influences on Firefighter Physical Fitness: A Physical Fitness Survey of Professional Firefighters From the Central Piedmont Region of North Carolina

4.1. Introduction

The following chapter provides a detailed description of the findings from the quantitative survey of professional firefighters in the final phase of my mixed methods firefighter fitness culture study, drawing upon the results of ethnographic key informant interviews, and focus group discussions with acculturated firefighters from the Cary, Chapel Hill, Durham, and Raleigh fire departments, all of which are professional fire departments from the central piedmont region of North Carolina. Utilizing the multiple sources of data provided a primer means b y which to reduce construct validity threats such as mono-methods and mono-operations bias (Cook and Campbell, 1979). As noted previously, all phases were guided by the study's social ecological framework, in which particular attention was given to the interpersonal and organizational levels, while still attentive to intrapersonal influences on physical fitness behavior. With this in mind, the three data collection methods were used to collectively inform the study's three specific aims: 1) determine the cultural meaning of physical fitness, worksite fitness program adherence, and coronary health, 2) identify if any fitness norms exist among professional firefighters, and 3) identify the barriers and facilitators to firefighter physical fitness via worksite fitness programs. The phase three

survey allowed testing of the hypotheses that emerged from the focus group discussions for emergent fitness and smoking norms, including the barriers and facilitators to physical fitness.

Building upon the physical fitness, worksite physical training (PT) program adherence, and coronary health factors identified in the ethnographic and focus group discussion data, a web based survey instrument was developed and administered to all firefighter levels, from baseline firefighter to chief, from the Cary, Chapel Hill, Durham, and Raleigh fire departments. The goal of administering the survey instrument was two-fold in terms of data collection: 1) to obtain information that would aid determination of norm structural characteristics and any correlation with physical fitness or smoking behaviors, and 2) to test the hypotheses regarding intrapersonal, interpersonal, and organizational influences on physical fitness level and PT program adherence.

An inductive position was initially taken during phases one and two of the study to fully explore firefighter fitness culture, in which no specific social or cultural theories guided prediction of physical fitness or PT program adherence; a deductive stance was taken during the quantitative phase of survey instrument design and implementation, in which emergent hypotheses regarding the influence of socio-cultural factors on physical fitness level and PT program adherence were tested, including factors such as dependability, social support, organizational participation strategies, and work environment factors, e.g., space and equipment, yet also key intrapersonal level variables such as age, self-efficacy, and personal motivation. Additionally, during the process of coding and analysis of the focus group data, firefighter attitude was an underlying factor mentioned to affect PT program adherence, in addition to normative expectations for PT adherence behavior in all firefighters, thereby

suggesting a useful theory to explain firefighter fitness behavior would be Ajzen's Theory of Planned Behavior (Ajzen 1988, 1991), as the theory's constructs- attitude, subjective norms, and perceived behavioral control might explain firefighter's intention to adhere to the program, which is an indirect, but strong proximal indicator of physical fitness behavior (Francis, Eccles et al, 2007).

Moreover, as noted earlier, the focus group results provide strong evidence of physical fitness norms on the crew, captain, and management level; therefore, Jackson's Return Potential Model (Jackson 1965, 1966) is a useful model to measure and analyze specific structural components of group level norms, i.e., fire department norms, and their subsequent influence on physical fitness and smoking behaviors.

4. 2. Design and Methods

4. 2. 1. Survey Design

The survey instrument was drafted primarily from the results of the ethnographic interviews and focus group findings identifying key intrapersonal, interpersonal, and organizational factors that informed hypotheses predicting firefighter physical fitness level and physical training (PT) program adherence, to be tested by survey in a larger group of professional firefighters. And though some factors such as age, self-efficacy (Bandura, 1977, 1986), and social support thought a priori to impact firefighter physical fitness had less influence than expected in the first two phases of the study, they were still included in the survey due to their prominence in the physical fitness and adherence literature. In terms of self-efficacy, this construct was operationalized to capture the firefighter's perception of his/her own skills and the ability to use (or not use/lacking) those skills effectively to change or improve physical fitness level. Social support was operationalized as the emotional

support or comfort, or a favorable attitude given by firefighters when he/she or others attempt, or do engage in, physical fitness activities on the job or outside the job setting to improve physical fitness level. Of specific note, self-efficacy has been extensively linked to worksite physical activity and fitness program participation (Prodaniuk, Plotnikoff, et al., 2004; Hallam and Petosa, 2004), and social support has been used to facilitate change in several health related behaviors, including self-regulation of exercise adherence in worksite exercise interventions (Hallam and Petosa, 2004), including being an essential factor in promoting health among employees in a study of Army reservists and active duty personnel (Wynd and Ryan-Wenger, 2004), an occupational group that is quite similar to professional firefighters.

Additionally, emergent hypotheses from analysis of the focus group discussions led to inclusion of the specific constructs of the Theory of Planned Behavior, a model predicting the occurrence of a specific behavior, e.g., PT program adherence behavior, provided the behavior is intentional (Ajzen, 1988, 1991). Model constructs include 'attitude', 'subjective norms', and 'perceived behavioral control' of the firefighter, that collectively act to predict intention to adhere to the PT program, which is an indirect, but strong proximal measure of behavior (Francis, Eccles, et al 2004).

In the Theory of Planned Behavior, a specific behavioral action, provided that it is intentional, is based on the three key variables predicting intention to perform the behavior such as the firefighter's intention to adhere to the PT period through exercise, and can be used as a proximal measure of behavior. This is especially advantageous if measurement of the actual behavior is unavailable. To predict if a firefighter intends to do the physical

fitness, or smoking related behavior, the following information is needed (Ajzen, 1991; Francis, Eccles, et al 2004):

- Whether the person is in favor of doing it- **'attitude'**
- How much the person feels social pressure to do it- **'subjective norm'**
- Whether the person feels in control of the action in question- **'perceived behavioral control'**

As was noted during my analysis of the focus group discussion data, firefighters mentioned PT program adherence could be influenced by personal attitude towards a specific exercise activity and/or the PT period itself. A firefighter's attitude, whether negative, e.g., "working out is unpleasant", or positive, e.g., "the PT period for me is fun" could certainly be a prominent factor in firefighter intention to adhere to the program. Additionally, the individual firefighter's subjective normative expectation, or perception of the social pressure to exercise from crew members and/or the captain comes into play as well, with two components interacting to affect the perceived subjective norm to exercise: normative beliefs and outcome evaluations. Normative beliefs are indicative of the perceived behavioral expectations of important "referent" individuals or groups (Ajzen, 1991), such as the crew/shift and/or the crew captain, both of whom have the ability to influence physical fitness and other health behaviors. In combination with normative beliefs there is the associated evaluation of the physical fitness outcome, i.e., the firefighter considers whether or not to exercise or do another activity during the PT period, while also considering what action the captain thinks is important to do during that time, with the combination of these two factors making up the individual firefighter's subjective norm.

The third component of the Theory of Planned Behavior, perceived behavioral control, though to a lesser degree, was still cited as an influential factor affecting PT adherence, as noted in both the ethnographic interviews and focus group discussions.

Perceived behavioral control, or the extent to which the firefighter feels able to exercise/adhere to PT, is comprised of control beliefs, which in this case is the firefighter's perception of the presence of factors that can act as barriers or facilitators to PT adherence, as well as having/not having the confidence in his/her own ability to accomplish the behavior, i.e., perceived self-efficacy or perceived capability to successfully engage in the behavior.

As Francis, Eccles et al note (2004) the Theory of Planned Behavior is "especially useful when considering strategies to help people adopt healthy behaviors"; within the scope of this study this includes developing later interventions to assist firefighters exercise more during the PT period (increased adherence), and to quit smoking through organizational smoking cessation programs.

The final component added to the survey were questions to investigate the evidence of normative expectations for physical fitness behavior (PT adherence) found in the focus group discussions on the broader group level of norms existing on the fire department level. In addition, during debriefing sessions with firefighters following focus group discussions, smoking was indicated as a prevalent behavior in the fire service and participants strongly urged inclusion of this health behavior as well; therefore questions were added to the survey instrument to determine normative structural characteristics for smoking behavior. As a result, physical fitness and smoking were the two health behaviors included to assess the association between fire department group level norms and firefighter self-reported health behaviors. To assess the structural characteristics of any fire department level norms and the specific health behaviors, I used Jackson's Return Potential Model (Jackson 1965, 1966), a unique method used to analyze and measure specific structural characteristics of physical fitness and smoking group norms.

According to Jackson (1966), the Return Potential Model represents a definition of the group norm that differs conceptually from Ajzen's subjective or individual level norm. In terms of the group norm it is "the shared tendencies to approve or disapprove of the act along a particular behavior dimension" (Jackson, 1966). This shared tendency to disapprove or approve by 'others' for various alternatives of an 'actor's' behavior, under specified conditions (Jackson, 1966, 1965) differs from the subjective norm, which is the individual's *perceived expectation* of what behavior is expected by friends, family, or in this case, fellow crew members, captains, and higher level officers. The subjective norm is essentially the individual's feeling based on individual bias and his/her perception that important others expect him/her to adhere/not adhere to the PT program. Though both norm levels can be related, Jackson's group norm differs from the subjective norm in that the group norm is the extent to which an environment provides clear guidance as to the approved level of a certain behavior, such as not smoking or PT program adherence behaviors. In this study, the Return Potential Model allows detailed examination of the "derivable characteristics" of group norms that may be related to physical fitness and smoking behaviors, in which fire department level (group) norms are defined in terms of the "expectations for behavior over the entire range of possibilities" (Jackson, 1966). Central to this concept is the requirement of "the amount or quality of behavior expected of the actor (the firefighter) by relevant others", e.g., crew members and/or crew captains.

The model has two orthogonal (right angle) dimensions, a behavioral dimension, and the *potential return*, or evaluation dimension. The behavioral dimension exists because a norm is always about "something", and usually is a behavior considered to be appropriate or inappropriate, such as the expectation to exercise during the PT period, which may be a

proper action in the eyes of the crew, or it may be an improper action, such as the case in the eyes of some older captains that do not embrace the idea of fitness as something he/she must do, and is indifferent regarding whether or not the crew does the PT behavior. Additionally, there is the evaluation dimension, because when a person considers any act or behavior, there is usually an evaluation by "relevant" others regarding the behavior, and in the firefighter case, evaluation of PT program adherence behavior is carried out along a spectrum of strong approval to strong disapproval, with some middle point of indifference. This spectrum of evaluation was reflected in the focus group analysis; with expectation for PT program adherence a largely variable occurrence across crews, captains, and upper management.

As Linnan et al note (2005), The Jackson model is quite unique because on any given behavior dimension, be it PT adherence, smoking, or any other behavior, the amount of approval or disapproval felt by the group may fall anywhere along the evaluative dimension. As noted in Figure 6, the example of Jackson's Return Potential Model provides a visual schematic of the norm for PT program adherence behavior.

In terms of this example, point "a" represents the behavior dimension, which would be PT program adherence behavior, with the horizontal axis representing the number of occurrences of the adherence behavior. Point "b" on the vertical axis represents the evaluative dimension (return potential dimension), or the level of disapproval- approval for adherence behavior. Point "c" represents the return potential curve, showing the distribution of disapproval-approval among all firefighters of the group over the entire range of adherence behavior.

Figure 6. An Example Return Potential Model of Norms for Physical Fitness Behavior

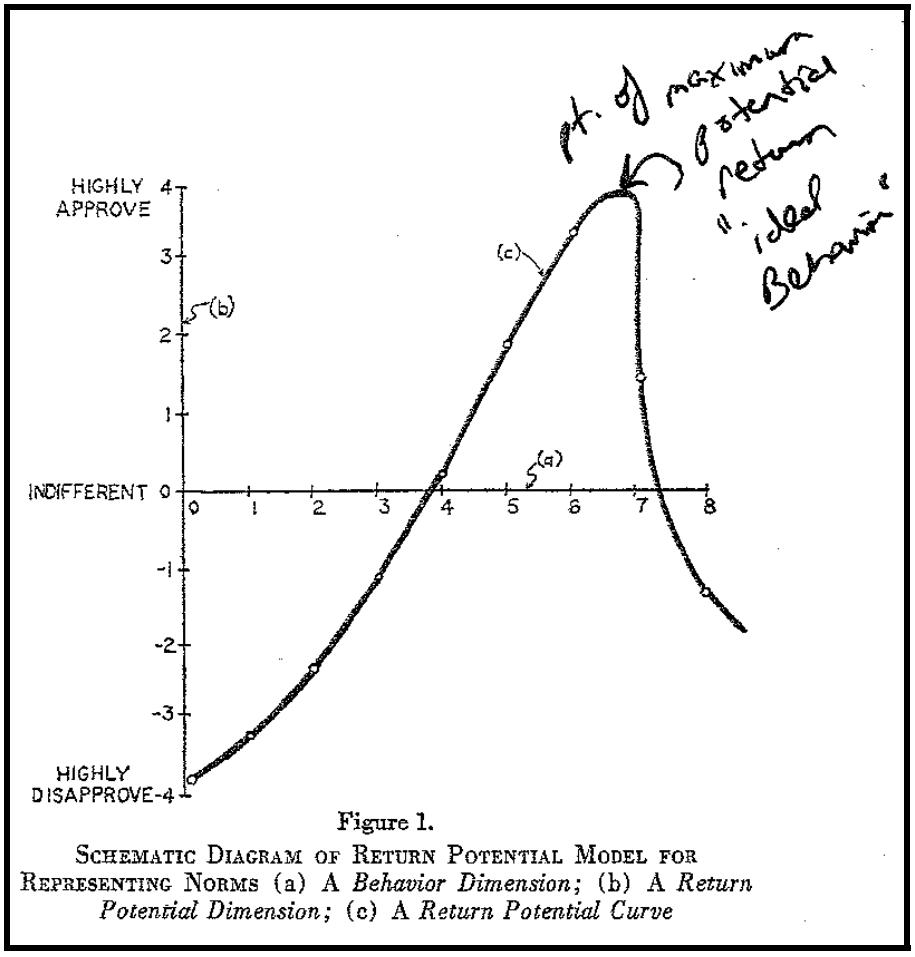


Figure 1.
SCHEMATIC DIAGRAM OF RETURN POTENTIAL MODEL FOR REPRESENTING NORMS (a) A *Behavior Dimension*; (b) A *Return Potential Dimension*; (c) A *Return Potential Curve*

Taken from Jackson's diagram of the Return Potential Model (1966) Reprint permission per conditions of use of the JSTOR Archive.

As noted at the top of the curve (and by my own personal notes) this is the point of maximum "potential return" for the given behavior. The curve does not represent the actual PT behavior taking place, only the feelings held by the group, i.e., the fire department in a given behavioral situation. The highest point on the curve represents the behavior most endorsed by the group, and is the "point of maximum potential return", or norm for PT program adherence.

In addition, the Jackson Return Potential Model provides a distinct method by which to measure structural characteristics for the norm of a specific behavior of interest. In my

study I focus on three of Jackson's norm characteristics - norm *intensity*, *crystallization*, and *power*. In the return potential model, norm intensity represents the height of the return potential curve, both above and below the point of indifference, and describes the overall intensity of feelings in the group, whether intense approval or disapproval, regarding the dimension of behavior. Intensity reflects the "steepness" of the return potential curve (Linnan et al, 2005). For example, in terms of smoking behavior, it may be a more intensely held norm by specific groups of firefighters, such that they have very high disapproval ratings, versus the intensity of a norm for adhering to the PT program during a shift cycle.

Norm crystallization represents group consensus for the specific behavior about the amount of approval or disapproval for each point on the behavior dimension. In our PT adherence example, it was noted earlier that there can be wide variability in the expectations for adherence, and because approval can be widely scattered, crystallization measures the variability in the adherence expectation, with higher levels of variation indicating less crystallization, or less consensus for the PT norm for that group.

Normative power is the central measure of Jackson's model, and is a function of intensity and crystallization for the behavior of interest. High normative power is a function of high intensity and high crystallization, representing a consensus of strongly held opinions, and thus a higher potential for group conformity. Conversely, a behavior with both low intensity and crystallization would have low normative power, reflecting less strongly held opinions with more variability. In terms of the norm for PT program adherence, high normative power would suggest firefighters hold a consensus of strong opinions for conforming or adhering to the PT exercise period.

Table 4 provides a breakdown of all components that comprised the survey instrument design, in terms of where questions were derived from, e.g., ethnographic key informant interview and focus group discussion results, the physical fitness literature, or any other source that make up all 121 questions of the survey.

Table 4. Component elements and Questions of the Firefighter Physical Fitness Survey

Survey Component Element	Question(s) in Survey	Constructs Represented or to be Measured
Ethnographic Informant Interviews and Focus Group Discussions	2-4, 54-57, 60, 65 75-108, 109, 110, 114, 119	Fitness level; activities during or outside the PT period considered exercise; intrapersonal, interpersonal, and organizational level influences; frequency of PT adherence; exercise activities outside the department PT period; years as firefighter; age
Physical Fitness Literature	88,90, 109,110, 111, 112, 113, 119	Fitness incentives; self efficacy; frequency of PT adherence; exercise activities outside the department PT period; history of heart disease; health status; marital status; age
Theory of Planned Behavior	58-74	Attitude toward PT adherence; perceived behavioral control, i.e., control beliefs and capability/self-efficacy regarding PT adherence; intention to adhere; subjective norms regarding PT adherence
Jackson's Return Potential Model (modified from the Healthy Habits Questionnaire, Part 2)	5-53	Norm Intensity, Crystallization, and Power, regarding smoking and PT adherence
Socio-economic and demographic questions	113-121	marital status; years as firefighter; age

Additionally, survey questions designed to obtain group normative and health behavior information were used from the *Health Habits Questionnaire, Part 2*, a survey of individual workers from worksites participating in the WellWorks-2 trial, a randomized intervention study using an integrated health promotion and health protection program to determine if

significant increases in smoking cessation and fruit and of vegetable consumption occurred when compared to a standard health promotion intervention (Sorensen G, Stoddard, et al, 2002; Linnan, LaMontagne, et al, 2005). It should be noted that the column heading "Constructs Represented or to be Measured" provides information on the constructs that are measured from the survey, but also indicate that specific questions (questions 5-53) were used to obtain answers for later determination of Jackson's norm structural characteristics, i.e., intensity (the 'amount' of approval or disapproval for the particular health behavior), crystallization (the degree of consensus for that behavior), and power, the product of intensity and crystallization which as mentioned earlier is central to the Jackson model. High normative power equals a consensus of strongly held opinions for the health behavior, and low normative power being weaker held opinions with larger variability in terms of the behavior. Normative power is hypothesized to be a key determinant of behavioral action in a group setting (Linnan, LaMontagne, et al, 2005), such as PT adherence in the fire department.

4. 2. 2. Data Collection

The phase three survey instrument was developed and administered to all firefighters during the period of July to August of 2007. Table 5 provides a description of each fire department, including stations, crew shifts, the shift schedule, and total number of firefighters. Approximately 1,000 firefighters received invitation to take the survey, either by direct email mailer, the survey program email system, or mass email forwarded through fire department administration. The preliminary email sent prior to the survey included the study purpose and importance of taking the survey, IRB assurances for confidentiality

protection, and a direct link to the survey on the Qualtrics Internet website (Qualtrics Corporation, 2008).

Table 5 Department Stations and Firefighters

Department	Number of Stations	Number of Shifts	Shift Schedule*	Number of Firefighters**
Cary	7	21	3-4	189
Chapel Hill	5	15	3-4	76
Durham	14	42	5-6	255
Raleigh	27	81	3-4	476
Totals	***54**	***159**	**N/A**	***996**

**For Cary's shift schedule, a "3-4", the first number "3" indicates alternating days working; therefore the firefighter works a day, a day off, day on, day off, and a final third day on. Then the firefighter has 4 consecutive days off before reporting back for duty. **Indicated totals at time surveys were completed

By clicking the survey link, participants were instructed to read the instructions, and then by clicking a button to begin the survey on the right of the first page, respondents were reminded that they were giving virtual consent to take the survey. The survey, though internet based and designed using the Qualtrics survey software, was the equivalent of a 17 page instrument, including socioeconomic and demographic questions. There were 121 questions in total; 116 were closed-ended questions in which respondents were asked to rate their agreement with statements regarding physical fitness, organizational physical training (PT) program adherence, and coronary health issues. The remaining five questions were open ended allowing participants to provide specific answers to the following: 1) the total number of cigarettes smoked per day if he/she was a smoker, 2) the total number of times in the last 12 months that the smoker has tried to quit smoking for at least 24 hours, 3) to list the activities done during the PT period after responding that he/she did activities other than those considered 'standard' exercises during the department physical fitness or PT period, 4)

to indicate any activities the person did that he/she considered fitness or exercise in nature outside of work, and 5) to provide age in years at his/her last birthday. The survey also included a complement of standard socio-economic and demographic questions. A print version of the survey from the Qualtrics web site is found in Appendix H, but it should be noted that the survey instrument may appear somewhat disjointed in areas, due to skip level questions causing the printed version to not appear exactly as it did when firefighters took the online version.

Prior to survey administration, questions were reviewed by members of the dissertation committee, the fire department fitness committee representatives, and the UNC Decision Support Laboratory to ensure appropriate wording and ease of understanding of the survey. This period of the study also included a pre-test with a small group of firefighters to confirm the ease of understanding of question and answer choices. The instrument also met the following criteria for surveys, modified from Czaja and Blair (2005), including:

- Does the survey question measure some aspect of one of the research questions? In this case the study explores if there are any associations between fitness barriers/facilitators and norms, and physical fitness, worksite fitness program adherence, and/or coronary health.
- Will most firefighters understand the question and in the same way? This points to appropriate question language.
- Will most firefighters be willing to provide an honest response? Questions will be designed to be neither accusatory nor threatening.
- Is other information needed to analyze this question? Questions will be framed in context so that no additional information is needed.
- Should this question be asked of all respondents or of a subset? Questions will be designed so they can be answered regardless of type and degree of departmental physical fitness program

In conjunction with survey administration, the original study plan (Staley, 2005) called for measuring components of physical fitness to calculate the firefighter's aggregate physical fitness level per the International Association of Fire Fighters Wellness-Fitness

Initiative guidelines for fitness measurement (IAFF, 1999), including measures of flexibility, muscular strength, muscular endurance, and aerobic capacity. However, the collection strategy could not be implemented for two reasons, 1) two of the study's four fire departments decided to redesign their entire fitness program, resulting in an indefinite suspension of fitness testing until new programs were fully developed and implemented. Additionally, fitness testing in the other two departments could not be scheduled in a time period conducive to matching physical fitness measures with the survey results by time of the end of the final phase of data collection. As a result, self-reported individual firefighter fitness level is the primary physical fitness indicator used in the study per the survey instrument.

4. 2. 3. Study Hypotheses

As Morgan (1997) notes, shared values, beliefs, norms, and meaning are all ways to describe the culture of an organization, its "shared reality". It is expected that these shared organizational factors, in addition to interpersonal social variables, act to influence worksite fitness program adherence and subsequent physical fitness in firefighters via normative pressure exerted by the crew/shift. The firefighter crew/shift has several prominent features as a result of the unique work environment, including peer bonds, interdependence, mutual accountability, and commitment to common goals (Elliot, Goldberg, Duncan et al., 2004); therefore it is expected that shared socio-cultural factors emphasizing the importance of physical fitness, *i.e.*, a 'positive' shared reality, will indeed be predictive of program adherence and subsequent physical fitness level. It is expected that fire department level fitness and smoking norms that are intensely held and highly crystallized will have high normative power to influence physical fitness.

Therefore the study's first hypothesis is:

H1: Departmental level self-reported physical fitness and smoking norms with high normative power will be more predictive of firefighter PT program adherence and smoking behaviors, than norms with low normative power.

In terms of examining the affect of intrapersonal, interpersonal, and organizational influences on individual PT program adherence and physical fitness level, specific attention was given to individual level self-efficacy and motivation to exercise, interpersonal level dependability and social support, and organizational level participation strategies and work related environmental factors, i.e., the PT period and equipment available for exercise. These factors identified through the ethnographic key informant interviews, focus group discussions, and the physical fitness literature are predicted to impact individual firefighter PT adherence and subsequent physical fitness level. Therefore the study's second hypothesis is suggested:

H2: Firefighters with higher levels of perceived self-efficacy, personal motivation, dependability, and social support will have higher individual levels of PT program adherence and self-reported physical fitness, ceteris paribus.

The final hypotheses are based on factors affecting physical fitness behavior, as noted from Ajzen's Theory of Planned Behavior. As mentioned earlier, attitude, subjective norm, and perceived behavioral control are three factors collectively working to 'predict' intention to engage in the specific behavior, or in the case of this study, acting as an indirect measure predicting PT program adherence behavior. The focus group discussions provided evidence

that a firefighter's underlying attitude towards PT adherence (negative or positive), subjective norms, in terms of the individual firefighter's perceived expectation of PT program adherence, perceived behavioral control, or the extent to which the firefighter felt able to exercise/adhere to PT influence physical fitness. Therefore two hypotheses are suggested, 1) higher levels of individual level attitude, subjective norms, and perceived behavioral control are more predictive of intention to exercise, and 2) intention to engage in the PT program is correlated with higher levels of PT program adherence behavior:

H3: Firefighters with positive attitudes, perceived subjective norms for PT adherence and a higher level of perceived behavioral control will have higher levels of intention to adhere to the PT program adherence, ceteris paribus.

H4: A higher level of intention to engage in PT program adherence behavior is correlated with high levels of PT program adherence behavior.

4. 2. 4. Data analysis

The survey results were downloaded to into Microsoft Excel for cleaning (Microsoft 2003) and analyzed using the statistical processing software STATA 10.0 (Stata Corporation, 2003). It should be noted that although a larger sample of firefighters were studied in phase three, in comparison to the ethnographic interviews and focus group discussions, the results are not used to strengthen external validity per se, but rather, are used to generalize the findings to other firefighters that demonstrate 'proximal similarity' (Campbell and Stanley, 1966), *i.e.*, firefighters that work under similar departmental conditions.

4. 2. 5. Statistical Power

With a significance level of 0.05 as the selected alpha criterion for the study, with a minimum desired power of 0.80 (Cohen, 1988), the sample size of 581 observations is adequate for this study and all analyses.

4. 2. 6. Outcome Variables

The two primary outcome measures of interest are dichotomous measures: PT program adherence and firefighter self-reported physical fitness level. In terms of PT program adherence, firefighters were asked how often they worked out or exercised during their department's fitness or PT period while on their respective cycle of shift days. Answers options included "Never", "Once during cycle", "Twice during cycle", "Three times during cycle", "Four times during cycle" and "All shifts of cycle". The range of answers was provided as three of the departments, Cary, Chapel Hill, and Raleigh work a "3-4" shift cycle, while the City of Durham Fire Department works a "5-6". In the 3-4 shift cycle, the first number provided, "3", indicates three alternating work days; the firefighter works a day on, a day off, day on, day off, and a third final day on, with each shift lasting 24 and ½ hours. Then, the firefighter has 4 consecutive days off before reporting back for duty. Likewise, a "5-6" is equivalent to a day on/off until the firefighter works five days, and then 6 consecutive days off. Survey responses were normalized to allow for comparison across the four fire departments by forming a dichotomous variable, coding responses as "no PT program adherence", represented by adhering two or less times during the shift cycle, and "PT program adherence" in terms of working out more than two times during the shift cycle. This was based on a histogram of responses indicating that an appropriate cut point was adherence above two times during the shift cycle. More importantly, as noted in Figure 7,

Levene's test for homogeneity of variance (1960) indicates there is equal variance across the four fire departments with regards to PT program adherence. While this test was not really needed because the standard deviations are so close together, it still provides a robust measure of homogeneity or homoscedasticity across groups.

Figure 7 Test for Equal Variance for Physical Fitness Level across the four Fire Departments

	Summary of Physical Fitness Level		
FD	Mean	Std. Dev.	Freq.
CFD	.62711864	.48563308	118
CHFD	.66101695	.47742735	59
DFD	.56321839	.49886265	87
RFD	.64353312	.47971261	317
Total	.62994836	.48323425	581

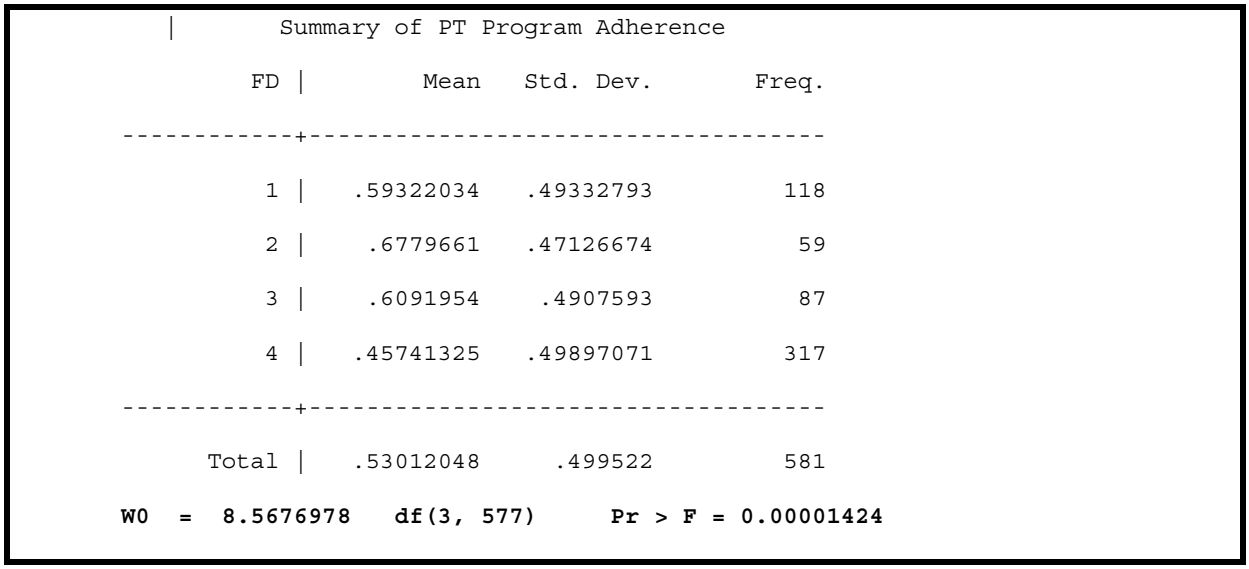
W0 = 1.88721586 df(3, 577) Pr > F = 0.13056143

Figure derived from analysis using STATA 10. STATA Corporation. College Station, Texas. 1996-2008.

In terms of physical fitness level, firefighters were asked their current level of physical fitness at the time of the survey ("today"), from "Excellent" to "poor", and were coded on a scale of one to five, with one equaling "excellent", two "very good", three "good", four "fair", and five 'poor". A dichotomous variable was formed for physical fitness level with one equaling "good or better", and zero "fair and below". This too was based on a histogram of responses indicating that the "good" response level was an appropriate cut point, as well as the literature demonstrating a high level of physical fitness is needed for the rigors of the job. Yet when a test for homoscedasticity across the four groups was conducted, the results on Figure 8 demonstrate that there may be intra-group correlation, or the observations are independent across fire departments but not necessarily within each

department. Therefore, Huber and White robust standard errors are used to adjust for the variance within departments.

Figure 8 Test for Equal Variance for PT Program Adherence across the four Fire Departments



FD	Summary of PT Program Adherence: Mean	Std. Dev.	Freq.
1	.59322034	.49332793	118
2	.6779661	.47126674	59
3	.6091954	.4907593	87
4	.45741325	.49897071	317
Total	.53012048	.499522	581

W0 = 8.5676978 df(3, 577) Pr > F = 0.00001424

Figure derived from analysis using STATA 10. STATA Corporation. College Station, Texas. 1996-2008.

4. 2. 7. Key Explanatory Variables

The key explanatory variables were the intrapersonal, socio-cultural and organizational fitness and norm variables impact physical fitness level, as identified through the ethnographic and focus group discussions. Intrapersonal self-efficacy and motivation, interpersonal dependability and social support, and organizational participation strategies and work environmental factors were measured in the following manner:

- *Self-efficacy*- measured directly using two questions with pairs of opposites which are evaluative, e.g., definitely false-true (Francis, Eccles et al, 2004). The primary questions were "For me to do my typical fitness activity or exercise during each fitness or PT period is", and "If I wanted to, I could do my typical fitness activity or exercise during each fitness or PT period" with answers on a 5 point Likert scale, with 1 scoring the lowest attitude position, e.g., "Impossible", and "definitely false";

and a score of 5 indicates the highest or positive attitude for each question, including ""Possible", and "True". The self-efficacy questions had high internal consistency (Cronbach alpha= 0.80), and the composite attitude score was obtained based on both questions, with a score from one to five, with a higher score indicating more self-efficacy toward PT adherence and physical fitness level.

- *Personal Motivation*- measured as a dichotomous indicator, "yes/no", from asking the firefighter "Personal motivation" is a reason why they adhere to the PT program.
- *Dependability*- measured using a dichotomous indicator, "yes/no", for questions asking the firefighter whether or not they agreed with the statement "Helps me be dependable for my crew during a call" as a reason they exercise during the PT period.
- *Social support*- measured using a dichotomous indicator, "yes/no", for questions asking the firefighter whether or not they agreed with the following statements as reasons they exercise during the PT period "my crew supports me when I exercise", "my captain supports me when I exercise", and "management (above my captain) supports me when I exercise", and "(My coworkers) say something encouraging when you work out/exercise". Along the same line of inquiry, additional questions used to determine social support, based on the focus group participants belief of other indirect indicators of support, including "Station has enough space and variety of equipment", and "My department gives me the PT period to exercise". These were added despite also being coded in the focus group analysis as separate facilitators to physical fitness and PT adherence, e.g., "Participation Strategies", and "Work environmental factors". The five dichotomous indicators of social support had an internal consistency (Cronbach's alpha= 0.68) just under what is considered

'acceptable' in social science research, therefore an analysis of the inter item correlation among items was conducted, resulting in the dropping of the question "Station has enough space and variety of equipment". A composite measure of social support for PT adherence and physical fitness level was created from the remaining four dichotomous indicators (Cronbach's alpha= 0.71), "my crew supports me when I exercise", "my captain supports me when I exercise", "management (above my captain) supports me when I exercise", and "My department gives me the PT period to exercise". The social support score ranged from zero to one, with a higher score indicating social support as a facilitator to individual level physical fitness and PT program adherence.

- *PT participation strategies*- measured as a dichotomous indicator, "yes/no", from asking the firefighter if his/her "department gives me the PT period to exercise" is a reason they adhere to the PT program.
- *Work related Environmental Factors*- measured as a dichotomous indicator, "yes/no", from asking the firefighter if his/her "Station has enough space and equipment" is a reason they adhere to the PT program.

4. 2. 8. Fire Department level group norms

In terms of fire department level norms regarding PT program adherence and smoking behavior that emerged during the inductive portion of the study, structural characteristics of the department norms were measured similar to Linnan, LaMontagne, et al study (2005) employing the Jackson Return Potential Model (1965, 1966) for group norms associated with heath behaviors in the work setting. Norms regarding PT program adherence and smoking behavior were measured for intensity (amount of firefighter approval),

crystallization (consensus of firefighter approval), and normative power (a function of intensity and crystallization) in the survey. For example, in terms of the targeted PT program adherence behavior, norm structural characteristics (intensity, crystallization, and normative power) were assessed by asking firefighters to respond to how he/she felt in three behavioral scenarios: 1) someone teases a coworker for adhering to the worksite fitness or PT period, 2) no one says anything when a coworker adheres to the worksite fitness or PT period, and 3) someone says something encouraging when a coworker adheres to the exercise regimen during the allotted worksite physical fitness period. Response to each scenario was ranked on a five point Likert scale with one equaling "Strongly Disapprove", two "Disapprove", three "Neither Approve or Disapprove", four "Approve", and five "Strongly Approve". For the PT program adherence behavior the norm is scored "1" if the fire department rate of approval is highest for teasing, "2" if the rate of approval is highest for saying nothing and "3 if the rate of approval is highest for encouragement for adhering to the PT program.

- *Norm intensity*- measured as the mean approval score for the group. Intensity was normalized so that "0" indicated neither approval nor disapproval on average, "-1" indicated strong disapproval, and "+1" strong approval.
- *Norm crystallization*- measured as the absolute value of the intensity minus ¼ of the average variance of the items for that behavior. Lower norm crystallization values suggest lower consensus for agreement or disagreement with the fitness PT adherence norm, i.e., greater variability in opinion, whereas higher crystallization values indicate greater consensus and less variability in opinion.
- *Normative power*-the product of norm intensity and crystallization, where a high value indicates a consensus of strongly held opinion regarding the fitness PT program

It should be noted that calculations of smoking behavior norm intensity, crystallization, and power were performed in the same fashion as PT program adherence behavior.

4. 2. 9. Theory of Planned Behavior Variables

- *Attitude*- measured directly using four questions with pairs of opposites which are evaluative, e.g., unpleasant-pleasant(Francis, Eccles et al, 2004). The primary questions was "For me to do my typical fitness activity or exercise during each fitness or PT period is", with four varying answer schemes on a 5 point Likert scale, with 1 scoring the lowest attitude position, e.g., "Unpleasant", "Un-enjoyable", "Bad", and "Harmful"; and a score of 5 indicates the highest or positive attitude for each question, including ""Pleasant", "Enjoyable", "Good", and "Beneficial". All attitude questions had high internal consistency (Cronbach alpha= 0.81), and the composite attitude score was obtained based on all four questions, with a score from one to five, with a higher score indicating a more positive attitude toward PT adherence.
- *Subjective norm*- measured directly using four questions with pairs of opposites which are evaluative, e.g., strongly disagree-strongly agree (Francis, Eccles et al, 2004). Typical questions include "Most people who are important to me think that I should exercise during the department fitness or PT period", with answers on a 5 point Likert scale, with 1 scoring the lowest subjective norm or least social pressure attitude position, e.g., "Strongly disagree" for all four questions; a score of 5 indicates the greatest social pressure or highest subjective norm for each question, scored "Strongly agree". All subjective norm questions had an initial internal consistency

(Cronbach's alpha= 0.57), with the subsequent inter item correlation analysis resulting in the dropping of two questions: "I feel under social pressure to exercise during the department fitness or PT period", and "It is expected of me that I will exercise during the department fitness or PT period". The two remaining questions, "Most people who are important to me think that I should exercise during the department fitness or PT period" and "People who are most important to me want me to exercise during the department fitness or PT period" had a stronger internal consistency measure (Cronbach alpha= 0.82), therefore a composite score was calculated to obtain the subjective norm score, with a higher score on a scale of one to five indicating a higher subjective norm regarding PT program adherence.

- *Perceived behavioral control*- obtained through measures of self-efficacy and control beliefs, using four questions with pairs of opposites which are evaluative, e.g., strongly disagree-strongly agree (Francis, Eccles et al, 2004). Questions included "For me to do my typical fitness activity or exercise during each fitness or PT period", "If I wanted to, I could do my typical fitness activity during each fitness or PT period:, "How much control do you believe you have over doing your typical fitness activity or exercise during each fitness or PY period, and "It is mostly up to me whether I do my typical fitness activity or exercise during each fitness or PT period", with answers on a 5 point Likert scale, with 1 reflecting the lowest level of perceived behavioral control, e.g., "Strongly disagree", "Definitely false", "No control", and "Strongly disagree"; and a score of 5 indicating the highest level of perceived behavioral control, scored "Strongly agree", "Definitely true", "Complete control", and Strongly agree".. The perceived behavioral control questions had good

internal consistency (Cronbach's alpha=0.79), therefore a composite measure was obtained based on all four scores, with scores ranging from one to five, with a higher score indicative of a higher level of perceived behavioral control regarding PT adherence.

- *Intention*- obtained through direct measures of intention using three questions with pairs of opposites which are evaluative, e.g., strongly disagree-strongly agree (Francis, Eccles et al, 2004). Questions included "I plan to do my typical fitness activity or exercise during each fitness or PT period ", "I intend to exercise or do my typical fitness activity during each fitness or PT period", and "I will try to do my typical fitness activity or exercise during each fitness or PT period ", with answers on a 5 point Likert scale, with 1 reflecting the lowest level of intention, scored "Impossible" "Extremely un-likely", and "Definitely false"; a score of 5 indicates the highest level of perceived behavioral control, scored "Possible", "Extremely likely", and "Definitely true". The intention questions had high internal consistency (Cronbach's alpha=0.87), therefore a composite measure was obtained based on all three scores, with scores ranging from one to five, with a higher score indicative of a higher level of intention to exercise (adhere) during the PT period. A dichotomous indicator was then formed, with one equaling "four or higher", or a higher level of intention to adhere to the PT program, and zero being "three and below", or less intention to adhere to the PT program.

4. 2. 1. 10. Control Variables

Socioeconomic and demographic variables were identified in the survey, including gender, race-ethnicity, age, education, income, years as a firefighter, marital status, perceived

health status, smoking status, previous history of coronary heart disease (CHD) and/or heart attack, rank position (base responder, captain, battalion chief, etc.), salary level, and specific fire department. Gender is coded as a dichotomous indicator, with one "if male", and zero "if female". Race-ethnicity is also a dichotomous indicator, with one equaling "Non-Hispanic white", and zero "non-white", due to 84% of the sample being non-Hispanic white. Age is a continuous variable, and education is a dichotomous indicator, with 1 "college graduate or higher" and zero "some college or below". Income is comprised of a dichotomous indicator, with one "greater than $45,000/year", and zero "less than $45-000/year". Years as a firefighter was coded a dichotomous indicator, with one "greater than 10 years" and zero "10 years or less". Marital status is coded a dichotomous indicator with one "never married", zero "married". Perceived health status is coded a dichotomous indicator, with one "good health or better, and zero "average health or below". Smoking status is coded as a dichotomous indicator, with zero if "never smoked", one "smoker", if the respondent answered yes to being a current smoker or has smoked at least 100 cigarettes in his/her life. Previous history of CHD and/or heart attack is coded as a dichotomous indicator, with one "yes" and zero "no". Rank/position level is coded a dichotomous indicator, with one "captain level or higher", and zero "crew level". Fire department was coded a dichotomous indicator with one "not the Raleigh FD" and zero "Raleigh FD", as Raleigh was the referent group.

4. 2. 1. 11. Empirical Models

As the outcome measures self-reported "PT program adherence" and "physical fitness level" are dichotomous indicators indicating low and high levels of PT program adherence and physical fitness level, logistical regression models were used, with odds ratios computed to

aid the interpretation of the results. The following models predicted PT program adherence and physical fitness level:

For Hypothesis 1:

PT program adherence behavior by group = *f* (normative power for PT program adherence for that group).

Hypothesis 2:

Individual firefighter PT program adherence, physical fitness level = *f* (intrapersonal, interpersonal, and organizational level factors, individual-level control variables (gender, race, age, income, previous CHD/heart attack history, martial status, perceived health status, years as a firefighter, smoking status, rank/position, and fire department).

Hypothesis 3:

Individual Firefighter Intention to Adhere to the PT program= *f* (attitude, perceived subjective norms for PT adherence and a higher level of perceived behavioral control, individual-level control variables (gender, race, age, education, income, previous CHD/heart attack history, martial status, perceived health status, years as a firefighter, smoking status, rank/position, and fire department).

Hypothesis 4:

Individual Firefighter PT Program Adherence Behavior= *f* (intention to engage in PT program adherence behavior).

4. 3. Results

4. 3. 1. Survey Response Rate

Surveys were completed by 581 of the 996 firefighters across the four fire departments in the study, or an overall 58% response rate. In terms of fire department

specific response rates, the Town of Cary Fire Department had 118 out of 189 firefighters or a 62% response rate, the Town of Chapel Hill 59 out of 76 (78%), the City of Durham 87 of 255 (33%), and the City of Raleigh 317 of 476, or a 67% response rate. Summary descriptive statistics for all key variables, unadjusted and adjusted, is found in Table 6.

4. 3. 2. Findings

4. 3. 2A. Fire Department Norms Specific to PT Program Adherence and Smoking Behaviors

58% of firefighters reported adhering to their respective PT programs, defined as working out at least three times during the shift cycle. In terms of smoking behavior, 40% reported being a smoker. In terms of the norms for PT program adherence and smoking behaviors, the most approved behavioral response was option 3, "Someone says something encouraging when a co-worker tries to workout/exercise during the fitness or PT period"; "Someone says something encouraging when a co-worker tries to quit smoking".

Both PT program adherence and smoking cessation behavior had high rates of approval or higher, with 89% and 88%, respectively. As noted in Table 7, in terms of norm intensity, or the mean approval of the most approved behavioral scenario (teasing, saying nothing, or encouraging), the norm of encouraging a co-worker who tries to quit smoking was slightly more intense than the norm encouraging co-workers trying to work out during the PT period. Similarly, Table 7 demonstrates that the mean responses for encouraging a co-worker who tries to quit smoking were slightly more crystallized than encouraging a fellow firefighter attempting to adhere to the PT program. Yet, both norms were fairly similar in terms of crystallization across the four fire departments, indicating consensus with the expectation for encouragement when attempting either health behavior across the departments.

Table 6 Descriptive Statistics, Firefighter Survey			
Variable	**Survey participants (n=581)**		
	Mean	**Std. Dev.**	**Range**
Outcome Variables			
Present Fitness Level (unadj)	2.857	1.077	1,5
Present Fitness Level (adj)	0.370	0.483	0,1
PT Program adherence (unadj)	4.269	1.778	1,6
High PT Program adherence	0.530	0.500	0,1
Intrapersonal Level Variables			
Q60 self-efficacy	3.902	1.058	1,5
Q65 self-efficacy	3.969	1.066	1,5
Self-efficacy (composite)	3.935	0.968	1,5
Q78 Personal Motivation (unadj)	1.341	0.698	1,3
Personal Motivation (adj)	0.921	0.270	0,1
Interpersonal Level Variables			
Q82 Dependability (unadj)	1.198	0.554	1,3
Dependability (adj)	0.950	0.218	0,1
Q86 Social Support	3.933	0.857	1,5
Q87 Social Support	4.126	0.818	1,5
Q89 Social Support	3.985	0.882	1,5
Q90 Social Support	3.969	1.066	1,5
Social Support (composite)	0.870	0.242	0,1
Organizational Level Variables			
Q90 Participation Strategy (unadj)	1.229	0.600	1,3
Particiaption Strategy (adj)	0.954	0.211	0,1
Q88 Work related environmental factors (unadj)	1.587	0.800	1,3
Work related environmental factors (adj)	0.516	0.500	0,1
Jackson RTP Variables*			
PT adherence intensity	0.790	0.050	0.750-0.837
PT adherence crystallzation	0.730	0.070	0.67-0.79
PT adherence power	0.570	0.090	0.47-0.66
Smoking intensity	0.810	0.090	0.69-0.89
Smoking crystallzation	0.760	0.110	0.60-0 .86
Smoking power	0.620	0.150	0.41-0.77
Theory of Planned Behavior Variables			
Q58 Attitude	3.697	1.029	1,5
Q66 Attitude	3.826	1.074	1,5
Q70 Attitude	4.336	0.834	1,5
Q74 Attitude	4.577	0.736	1,5
Attitude (composite)	4.109	0.740	1,5

Variables continued	Mean	Std. Dev.	Range
Q64 Subjective norm	3.985	0.882	1,5
Q73 Subjective norm	3.985	0.882	1,5
Subjective norm (composite)	4.013	0.856	1,5
Q60 Perceived behavioral control	3.902	1.058	1,5
Q65 Perceived behavioral control	3.969	1.066	1,5
Q67 Perceived behavioral control	3.594	1.007	1,5
Q68 Perceived behavioral control	3.845	0.970	1,5
Perceived behavioral control (composite)	3.827	0.805	1,5
Q59 Intention	3.914	0.926	1,5
Q61 Intention	3.933	0.857	1,5
Q62 Intention	4.126	0.818	1,5
Intention (composite)	3.991	0.772	1,5
Intention (dichotomours indicator)	0.819	0.385	0,1
Demographic and socio-economic variables			
Age Q119 (continuous var)	37.670	7.931	19,59
Male Q118	0.947	0.225	0,1
Race-ethnicity (unadj) Q120	3.924	0.567	1,6
Non-white	0.241	0.428	0,1
Income (unadj) Q117	4.520	1.577	1,6
Income greater than $45,000/year	0.573	0.495	0,1
Years as a Firefighter (unadj) Q114	4.036	1.582	1,7
10 years or greater as a firefighter	0.599	0.491	0,1
Marital Status (unadj) Q113	1.406	0.845	1,5
Non-Married	0.241	0.428	0,1
Perceived Health Status (unadj) Q112	2.079	0.720	1,5
Good health or better	0.757	0.429	0,1
Smoking Status (unadj) Q16	1.602	0.490	1,2
Smoking Status (unadj) Q17	1.736	0.442	1,2
Smoker	0.398	0.490	0,1
Previous history of CHD Q111	0.026	0.159	0,1
Rank/Position (unadj) Q115	4.291	1.732	1,9
Captain level or higher	0.299	0.458	0,1
Education (unadj) Q116	2.050	0.742	1,4
College grad or higher	0.236	0.425	0,1
Fire Department (unadj) Q121	3.038	1.209	1,4
Not Raleigh FD	0.454	0.498	0,1

Table 7 Norm Intensity, Crystallization, and Normative Power for PT Program Adherence, and Smoking Cessation Behavior (n=4 department sites)

	Intensity			Crystallization			Normative Power		
Behavior	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**	**Mean**	**SD**
PT program adherence	**0.750-0.837**	**0.79**	**0.05**	**0.67-0.79**	**0.73**	**0.07**	**0.47-0.66**	**0.57**	**.09**
Smoking	**0.69-0.89**	**0.81**	**0.09**	**0.60-0 .86**	**0.76**	**0.11**	**0.41-0.77**	**0.62**	**.15**

Table 8 Percent of Firefighters Self-Reporting to Adhere to the PT Program and Percent Self-Reported Smokers, By Fire Department

	Cary Fire Department	Chapel Hill Fire Department	Durham Fire Department	Raleigh Fire Department
Behavior (%)				
PT Program Adherence	59	**68**	61	46
Smoker	40	**42**	37	40

With regards to normative power, or the potential to influence fire department behavior regarding either smoking or PT program adherence, Table 7 reveals that normative power is strongest for smoking behavior, though there is a wider range in power scores for smoking than PT adherence behavior. Overall, this indicates a stronger consensus with less variability when encouraging a fellow firefighter who attempts to quit smoking.

In terms of firefighters overall reporting of PT program adherence within their respective department's program, as well as those reporting to be a smoker, Table 8 shows that the Chapel Hill Fire Department reports the highest percent PT program adherence, with 68% adherence, followed by the Durham Fire Department at 61%, Cary at 59%, and Raleigh at 46%. The highest percentage of smokers was also reported within the Chapel Hill Fire Department at 42%, followed by Cary and Raleigh both at 40%, and Durham with 37%.

Table 9 Intrapersonal, Socio-cultural, and Organizational Factor Influence On Self-reported PT program adherence

Self-efficacy	1.659	(0.177)**
Personal motivation to PT	3.168	(1.328)**
Composite Social Support	0.771	(0.361)
Dependability as reason to PT	2.720	(1.367)*
Workplace PT Participation Strategies	3.918	(2.459)*
Workplace Environmental Factors	1.127	(0.238)
Gender	0.681	(0.295)
Age	0.989	(0.015)
Non-Hispanic White	0.868	(0.229)
Good health or better	1.883	(0.410)**
Previous history of heart disease	1.159	(0.683)
Marriage Status	0.876	(0.191)
Current Smoker	0.821	(0.158)
Firefighter Rank	1.317	(0.342)
Years as a Firefighter	0.914	(0.253)
College Graduate	0.869	(0.189)
Salary above $45,000	1.062	(0.275)
Departments other than RFD	2.774	(0.582)**
Observations	581	
Pseudo R-squared	0.123	

Beta coefficients reported as odds ratios. Robust standard errors in parentheses * significant at 5%; ** significant at 1%

4. 3. 2. B. Intrapersonal, interpersonal and organizational factor prediction of individual PT program adherence and self-reported physical fitness level

As noted in Table 9, in terms of intrapersonal factors influencing the self-report of firefighters adhering to their respective PT programs, self-efficacy and personal motivation were significant predictors of PT program adherence ($p<0.01$), indicating that for every one unit increase in firefighter self-efficacy, the odds of PT program adherence increases by a factor of 1.66, ceteris paribus, i.e., keeping all other factors fixed. If a firefighter indicates that he/she is personally motivated, the odds of PT program adherence increases by a factor of 3.17, ceteris paribus.

In terms of the interpersonal or socio-cultural factors in the model, dependability was significantly predictive of PT program adherence ($p<0.05$), indicating that if dependability is indicated as a factor in PT program adherence, the odds of PT program adherence increases by a factor of 2.72, ceteris paribus.

With regards to the organizational level factors, only the fire department participation strategy in terms of the PT period itself was significantly predictive of PT adherence ($p<0.05$). For every firefighter indicating PT participation strategies was a factor in PT program adherence, the odds of PT program adherence increases by a factor of 3.92, ceteris paribus. In terms of individual level control factors, both health status and firefighter department were significant predictors of PT program adherence ($p<0.01$). In terms of health status, if a firefighter reports a "good or better", the odds of PT program adherence increases by a factor of 1.88, ceteris paribus; if a firefighter reports not to belong to the Raleigh Fire Department, the odds of PT program adherence increases by a factor of 2.77, ceteris paribus.

With regards to the intrapersonal, interpersonal, and organizational factor influence on self-reported physical fitness level, Table 10 provides a slightly different picture in terms of the individual firefighter's physical fitness level. On the interpersonal level, neither

dependability nor social support was a significant predictor of physical fitness level. On the organizational level, only the fire department participation strategy in terms of the PT period itself was significantly predictive of physical fitness level ($p<0.05$).

Table 10 Intrapersonal, Socio-cultural, and Organizational Factor Influence On Self-reported Physical Fitness Level

Self-efficacy	0.822	(0.088)
Personal motivation to PT	0.406	(0.212)
Composite Social Support	1.708	(0.882)
Dependability as reason to PT	1.417	(0.762)
Workplace PT Participation Strategies	0.282	(0.171)*
Workplace Environmental Factors	1.175	(0.263)
Gender	1.186	(0.538)
Age	1.031	(0.017)
Non-Hispanic White	1.377	(0.378)
Good health or better	0.038	(0.018)**
Previous history of heart disease	0.822	(0.490)
Marriage Status	0.606	(0.147)*
Current Smoker	1.127	(0.234)
Firefighter Rank	1.391	(0.388)
Years as a Firefighter	0.897	(0.267)
College Graduate	0.571	(0.132)*
Salary above $45,000	0.693	(0.195)
Departments other than RFD	0.746	(0.165)
Observations	581	
Pseudo R2	0.1956	

Beta coefficients reported as odds ratios. Standard errors in parentheses. * significant at 5%; ** significant at 1%

If a firefighter indicated PT participation strategies was a factor in his/her physical fitness level, the odds of having a "good or better" level of physical fitness decreases by a factor of 0.282, ceteris paribus.

In terms of the individual level controls, health status, martial status, and college graduate status were predictors of physical fitness level. In terms of health status ($p<0.01$), a firefighter reporting a "good or better" health status decreases the odds of having a "good or better" level of physical fitness by a factor of 0.04, ceteris paribus. If a firefighter reports not being married ($p<0.05$), the odds of having a "good or better" level of physical fitness decrease by a factor of 0.61, ceteris paribus. Lastly, if a firefighter reports to be a college graduate or higher ($p<0.05$) the odds of having a "good or better" level of physical fitness decrease by a factor of 0.57, ceteris paribus.

4. 3. 2. C. Theory of Planned Behavior variables and intention to adhere to the PT program

Examining the effect of constructs from Ajzen's Theory of Planned Behavior (1988, 1991), Table 11 demonstrates that both attitude and subjective norm were significant predictors of an individual firefighter's intention to adhere to the PT program ($p<0.01$ and $p<0.05$ respectively), but perceived behavioral control was not. For every one unit increase in firefighter attitude, the odds of higher intention to adhere to the PT program increases by a factor of 14.40, ceteris paribus, and for every one unit increase in firefighter subjective norm, the odds of higher intention to adhere to the PT program increases by a factor of 1.73.

In terms of individual level controls, health status, firefighter rank, and salary level were significant predictors of intention to adhere. In terms of health status ($p<0.01$), a firefighter reporting a "good or better" health status increases the odds of higher intention by a factor of 3.12, ceteris paribus. But in terms of the firefighter's rank ($p<0.05$), being a

captain or higher in rank decreases the odds of higher intention by a factor of 0.36, ceteris paribus. And in terms of salary level, a firefighter making more than $45,000/year ($p<0.01$) increases the odds of higher intention by a factor of 4.19, ceteris paribus.

Table 11 Firefighter Attitude, Subjective Norm, and Perceived Behavioral Control Influence on Individual Level Intention to Adhere to the PT Program

Attitude	14.397	(5.122)**
Subjective norm	1.729	(0.392)*
Perceived Behavioral Control	1.434	(0.343)
Gender	1.438	(1.081)
Age	1.060	(0.032)
Non-Hispanic White	1.517	(0.736)
Good health or better	3.120	(1.132)**
Previous history of heart disease	0.853	(0.994)
Marriage Status	0.690	(0.267)
Current Smoker	1.010	(0.357)
Firefighter Rank	0.361	(0.173)*
Years as a Firefighter	0.401	(0.221)
College Graduate	0.622	(0.269)
Salary above $45,000	4.192	(2.263)**
Departments other than RFD	1.625	(0.588)
Observations	497	
Pseudo R2	0.4763	

Beta coefficients reported as odds ratios. Standard errors in parentheses. Significant at 5%; ** significant at 1%

In terms of the results for the final hypothesis, that intention to adhere to the PT program will be correlated with PT program adherence behavior, the Spearman rank-order correlation coefficient was used to measure correlation, as the “intention” variable is an

ordinal measure. The value of the Spearman rank-order correlation coefficient was 0.39, indicating a modest level of correlation between intention to adhere and actual PT program adherence behavior.

4. 4. Discussion

The measurement of Jackson's norm structural characteristics- intensity, crystallization, and power provides descriptive evidence that fire department group level norms for PT program adherence and smoking cessation behavior are present across all four fire departments. Yet the inability to calculate these measures on the crew/shift level prevents final determination of normative power's predictive ability on either behavior, as there were only four 'group' observations, i.e., the Cary, Chapel Hill, Durham, and Raleigh Fire Departments. Still, the high intensity and crystallization levels indicate that the shared expectation for PT program adherence and smoking cessation behaviors are moderately intense norms across the four fire departments. These results support the focus group discussion findings, in which most firefighters indicated there is an expectation for PT program adherence, but vary across crews, captains, and the management level.

Reflecting on the models of intrapersonal, interpersonal, and organizational influences predicting individual self-reported PT program adherence and physical fitness level, per the study' social ecological framework, it is evident that hypothesis 2 presented partial supports the social ecological influences on both outcomes. In terms of the intrapersonal level, both self-efficacy and personal motivation were significantly predictive of PT program adherence but not individual physical fitness level. This suggests that while firefighters did not directly mention self-efficacy in the focus groups as a salient factor affecting PT adherence, they did mention firefighters are quite confident both on and off the

job, as high confidence levels, under girded by frequent job training and the response command structure, increases control and self-efficacy beliefs for doing the job. This appears to follow the same logic with PT program adherence, as they have strong belief in their ability to do the task at hand. With regards to personal motivation, this too supports the findings of the focus groups results; firefighter's perspective of PT program adherence is one based primarily on the level of personal motivation of the individual, and regardless of the level of norms or other socio-cultural factors, is a strong predictor of adherence.

However, neither self-efficacy nor personal motivation were predictive of individual physical fitness level, indicating that other individual contributors to firefighter physical fitness level, e.g., nutrition, hours of sleep, hydration level, and personal stress may need to be considered to fully explain firefighter individual physical fitness level.

In terms of the interpersonal socio-cultural factors (dependability and social support) affecting PT program adherence and physical fitness level, only dependability was predictive in the model of PT program adherence. This finding was expected, specifically in terms of dependability from the perspective of focus group participants, whose consensus was that being a dependable member of the crew, i.e., not letting fellow firefighters down on the response scene, is a significant motivating factor for firefighter PT program adherence, and to specifically engage in cardiovascular exercise during the PT program.

The unexpected finding was the insignificance of social support as a predictor of either outcome. Though social support is generally not as predictive a factor in male adherence to fitness and/or exercise programs when compared to females, worksite interventions utilizing social support mechanisms (Hallam and Petosa, 2004) and programs using social support as a motivator in similar populations, e.g., the military (Wynd and Ryan-

Wenger, 2004) suggested that social support could be predictive of PT program adherence and/or physical fitness level. However, its inability to predict either outcome supports the focus group findings, in which social support is not a significant factor in the fire service in terms of physical fitness behavior. It could be that the "manly hero" firefighter, with the persona of the competitive, outgoing professional may suppress social support as an action within crews and across departments. Additionally, a better composite measure of social support may be needed to adequately capture other support mechanisms, such as off duty family and friend support.

On the organizational level, the high significance of department PT participation strategies, specifically the PT period itself, is highly supportive of the ethnographic and focus group findings, in that when PT interruptions are avoided with sufficient time provided to workout during the PT period, most firefighters deem fitness important and will adhere with some type of exercise activity during the PT period. It is important to remember that fire suppression accounts for approximately 30% of fire service activities, yet the current reality is that many activities are scheduled concurrently with the PT period, e.g., continuing education and public relations events, thereby sending a strong message of management lack of support for physical fitness.

In addition, though having the department PT participation strategy available does result in significant PT program adherence it does not necessarily result in higher physical fitness levels. It may be that given the current format of the PT program with no job-specific regimen or plan to mimic the rigors of a response, firefighters view it as irrelevant to their physical fitness level. This would appear to support the findings of the ethnographic key informant interviews and the focus group discussions in which firefighters indicated that if

job specific PT programs or regimens were available, the likelihood of adherence would increase.

A final item of interest is the significance of health status and the fitness outcomes. As 25% of firefighters in this study indicated that they were currently at a fair or worse level in terms of overall health status, health indicators other than physical fitness level need closer assessment for their influence on the overall wellness of firefighters, including the need for in depth annual preventive health care exams that assess conditions and health status outside the purview of normal physical fitness exams.

In terms of hypothesis three and the predictive ability of Ajzen's Theory of Planned Behavior on intention to adhere to the PT program, both attitude and subjective norms were significant predictors of intention. This is not surprising, because as mentioned earlier, underlying attitude toward PT program adherence behavior, including the firefighter's overall evaluation of the behavior (negative or positive), greatly influences PT program adherence from the perspective of the focus group participants. The composite measure for attitude included questions with key instrument items (whether or not PT adherence behavior achieves something, e.g., worthless-valuable), as well as experiential items (how it feels to perform the PT adherence behavior), capturing what firefighters thought important regarding attitude, that adherence to the PT program is considered a valuable action with positive outcomes in terms of improved physical fitness. Subsequently, attitude was accurately assessed in terms of its predictive ability on adherence intention, a valuable design consideration of the Theory of Planned Behavior when considering future interventions (Francis, Eccles et al, 2007) in this occupation.

In terms of subjective norms, normative beliefs are indicative of the perceived behavioral expectations of important "referent" individuals or groups (Ajzen, 1991), and as found in the focus group results, PT program adherence expectations are variable but do exist across crew/shifts, captains, and management, having the ability to influence physical fitness and other health behaviors expectation on the individual firefighter level, which corresponds with the subjective norm construct's ability to predict firefighter PT program adherence intention. This supports the focus group findings indicating higher level fire department group norms may impact the individual's subjective normative expectation or perception of the social pressure to exercise by the captain and/or management. As mentioned earlier, the subjective norm construct is comprised of two components interacting to affect the perceived expectation to exercise: normative beliefs and outcome evaluations. As the focus group results demonstrate, when firefighters have the time to workout during the PT program, the consensus is that adherence is expected by the department, and adherence can result in physical fitness improvement and subsequent increase in job performance level. This finding is also supported by the results of the norm structural characteristic analysis per Jackson's Return Potential Model. A modest level of fire department normative power for PT program adherence behavior appears to reflect individual subjective norm levels to adhere to the PT program.

An interesting finding was the insignificance of perceived behavioral control and its inability to predict adherence intention. Perceived behavioral control, or the extent to which the firefighter feels able to exercise/adhere to PT, is heavily driven by control beliefs and self-efficacy, with self-efficacy acting as a significant, solo predictor of both PT program adherence and physical fitness level. The majority of the firefighters in the current study

indicated that firefighters have strong wills with competitive drives, both of which are necessary elements to push them to do the job in the harshest of circumstances without considering the consequences of severe physiological, psychological, and environmental hazards posing eminent injury and death risk. Given this strong control belief in their actions on a response scene, having confidence in their ability to do "what needs to be done to get the job done" lends compelling evidence that firefighters have a high perceived behavioral control level for the rigors of emergency response. This also reflects the perspective noted in the ethnographic chapter, that being able to do the job is culturally equated with physical fitness; therefore it is easy to surmise that perceived behavioral control of PT program adherence behavior would be high. Yet given that higher levels of perceived behavioral control are not predictive of intention suggests that future interventions need not focus on control beliefs, but rather, individual level attitude and subjective norms to adhere to the PT program. Overall, the Theory of Planned Behavior was partially supported in terms of attitude and subjective norms.

In terms of the final hypothesis regarding intention and its correlation with PT program adherence behavior, the Theory of Planned Behavior hypothesizes there is not a perfect relationship between behavioral intention and actual behavior, and intention can often be used as a proximal measure of the behavior. Yet the study results suggest only a modest correlation between intention and PT program adherence; generally speaking intention does not correlate well with actual behavior. This finding is similar to other studies that found variable levels of correlation between intention and behavior (Dean, Farrell, et al, 2007; Rhodes, Courneya, et al, 2007; Kinmonth, Wareham, et al, 2008). Therefore, though firefighters do have high intention to adhere to the PT program, but this intention is not

readily correlated with PT behavior, organization factors should be assessed more closely in terms of securing the PT program time for exclusive fitness activities. This conclusion supports the consensus of firefighters' opinion that the PT program time should be "10-7", allowing firefighters to go out of service. In conclusion, the numerous activities that take place during the PT period, be they unintentional, e.g., fire suppression or other response activities, or intentional, e.g., job tasks, public relations activities, or continuing education training, result in firefighters not making up a missed PT period. Firefighters in both the ethnographic key informant interviews and focus group discussions frequently mentioned that fire suppression normally accounts for less than 30% of firefighter daily job duties, and management has an established policy that firefighters will exercise during the allotted PT time period, but both the unintentional and intentional activities frequently supersede the PT program, suggesting once again that from the firefighter's perspective, management sends a mixed message in terms of support for firefighter physical fitness.

4. 5. Limitations and Implications

The primary limitation of the survey phase of the study is the group level variable used to predict normative power influence on PT program adherence and smoking behaviors, as this was only identifiable on the fire department level. The planned crew/shift group level ($n>150$) could not be obtained at the beginning moments of survey administration, due to factors beyond my control. As a result, the predictive power of the norm intensity, crystallization, and power measures is not available, due to only four group level observation, i.e., the four fire departments. However, the norm measures do provide rich descriptive information supporting other aspects of the study in terms of subjective norms and intention to adhere to the PT program, as well the focus group discussion results indicating that

organizational physical fitness norms, while variable in nature, do exist, and have the power to influence behavior. The modest norm power measure for department expectation of PT program adherence appears to support the supposition that organizational level expectation do result in significant subjective norms on the individual level. This sets the stage for further study of normative structural characteristics and their subsequent influence on a variety of health behaviors on the crew/shift level, as there are 159 crews/shifts across the four fire departments that would allow for rigorous analysis of the predictive power of health behavior norms.

In terms of additional limitations, the results of the survey instrument must be interpreted with caution, as it relies on standardized questions that are generalized enough to be easily understood by all respondents, which can affect the accurate measurement of more complex constructs, such as social support. Additionally, surveys do not provide the flexibility in data gathering that ethnographic key informant interviews and focus groups allow. Moreover, surveys require larger sample sizes to improve external validity, or in this study, proximal similarity, i.e., firefighters working in similar conditions. Furthermore, recall bias can be issue for some firefighters trying to remember specific activities or events, and selection bias can occur when firefighters provide answers perceived to be desired by the researcher.

However, there are several benefits of the present survey instrument. First, the internet based survey was convenient and easy for respondents to take in one setting at work or home, and the collection strategy afforded the researcher the added benefit of no lost responses by 'snail' mail or other methods of delivery. An additional yet significant benefit was the use of the Qualtrics survey program, which was zero cost to me as a member of the

UNC research community. Perhaps the most important benefit was in terms of the instrument design, because the unique nature of data collection in prior phases of the study (ethnographic key informant interviews and focus group discussions) allowed the survey to be designed directly with the firefighters' perspectives and opinions in mind, which as frequently noted in health promotion interventions is critical to intervention success; as Green and Kreuter (1991) note, planning any health program change without consideration of what the problem means to the target population and what health outcomes they value is critical to program success. The survey questions reflected the numerous issues of direct importance to the group affected by the study, as evidenced by the approximate 60% response rate for a 17 page instrument taken by professional firefighters working 24.5 hour shifts, with little downtime for additional activities.

Overall, the use of multiple data collection methods and sources of evidence, i.e., data triangulation, greatly reduce construct validity threats in terms of mono-operations and mono-methods bias. Additionally, survey reliability was increased through use of several questions forming key study constructs, such as self-efficacy, attitude, perceived behavioral control, and subjective norms, allowing for high internal consistency in survey measures and thus assuring the constructs measured what was intended.

In conclusion, the survey instrument identified several factors/constructs affecting physical fitness, which was supportive of the earlier study findings from the ethnographic key informant interviews and focus group discussions. By combining intrapersonal, interpersonal, and organizational level influences, including key constructs from the physical fitness literature, the Theory of Planned Behavior, and the Jackson Return Potential Model, a wealth of information on the culture of physical fitness within the fire service was identified.

In terms of the study's overarching social ecological framework, the logical next step would be to investigate broader social ecological influences, e.g., the community/society and policy levels, as these have the potential to greatly influence overall implementation of worksite health promotion programs and policy change (Linnan, Sorensen, et al, 2001).

In terms of fire service workplace health promotion, factors on the community level such as economic and political influences likely impact how the department (organization) shapes its own policies and procedures, as most fire departments are an important part of the dynamic system of local government agencies. The policy level is also ripe for investigation, as regulatory approaches promoted through the United States Fire Administration and it's National Fire Academy exert significant influence on worksite health behaviors, in addition to non-government agencies that yield influence on health and safety policies and standards within the professional and volunteer fire services, e.g., the International Association of Fire Fighters, International Association of Fire Chiefs, National Volunteer Fire Council, and the non-profit standards organization, the National Fire Protection Association. Lastly, volunteer fire departments, which greatly outnumber professional departments, should be studied for similarities and differences with respect to the social ecological influences on health promotion activities as well.

Moreover, it would be useful to study the application of new theories predicting fitness PT program adherence and physical fitness level, as the unique nature of the occupation may preclude outdated theoretical models, or models needing better measures predicting health behaviors. Additionally, the Jackson Return Potential Model shows promise for predicting behavior based on norm structural measures, including additional model constructs as well, such as the rights and duties of persons in positions perceived to

have the ‘right’ to perform the behavior in a particular way, in addition to role identity clarification (Jackson, 1966) under varying circumstances and conditions, which may come into play within the paramilitary structure of the firefighter organization and varying emergency response activities.

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CHAPTER V

CONCLUSION

5.1. Summary of Findings

The issue of firefighter on duty death due to an increased risk of coronary heart disease (CHD) and sudden cardiac death is as prevalent today as it was when the National Institute for Occupational Safety and Health's (NIOSH) Fire Fighter Fatality Investigation and Prevention Program began to study on-duty firefighter fatalities in 1998. The risk of on duty death due to CHD is still near 45% of all firefighter deaths, and a recent study estimates that firefighters spent just 1% to 5% of their time on fire suppression activities, yet 32% of deaths from CHD related events occurred during that time (Kales, Soteriades et al, 2007). Currently, three areas of concern are still considered critical to reducing CHD and sudden cardiac death risk, including personal lifestyle, smoke related (exposure on a fire scene), and workplace factors. I focused on the lifestyle factor of physical fitness level as a significant risk factor for CHD and sudden cardiac death, as it is clearly recognized that firefighters require a high level of physical fitness for the job, and though their fitness levels are comparable to that of the general population, they are typically below what is needed for the rigors of the job.

To better understand this issue, my study focused on the socio-cultural environment of the fire service in four professional fire departments, with the overall goal of providing insight into the issue of low PT program adherence, inadequate physical fitness for the job,

and coronary health from the firefighter's perspective. Specifically, the aims of the study were to 1) determine the cultural (shared) meaning of physical fitness, worksite fitness program adherence, and coronary health issues from the perspective of the professional firefighter, 2) identify if any physical fitness norms exist among professional firefighters, and 3) identify the barriers and facilitators of firefighter physical fitness via worksite physical fitness programs. Using firefighters recruited from four North Carolina city/town fire departments, the study utilized a social ecological framework, informed by inductive exploration of physical fitness behavior through ethnographic key informant interviews, focus group discussions, and quantitative survey.

5.1.1. Key Findings of the Ethnographic Key Informant Interviews

In terms of the cultural meaning of physical fitness, firefighters share common thematic cultural perceptions of physical fitness. It is clear that all firefighters know they 'should' work out and that fitness is important to their job and their overall health. Yet there are two working definitions of physical fitness within firefighter culture: a research definition correlating somewhat with the 'official' or fire department meaning of physical fitness, one defined by key physiological biomarkers and physical fitness levels, e.g., specific blood pressure level, waist size, or aerobic endurance, flexibility, and muscular strength per established fitness standards. Yet the true cultural meaning of physical fitness is one defined more in terms of the functional expectation or role firefighters must play, a role of doing the job, to "pull your own weight", and most importantly, to support the crew on a response scene, so that "everyone goes home". This cultural meaning also overlaps with the definition of workplace physical training (PT) program adherence, where variable expectations for adherence are dictated in part by the ability to the job. If the firefighter is perceived as being

able to accomplish the goals and tasks that his/her captain or battalion chief prescribe, adherence is not a significant issue. But if the firefighter cannot successfully complete what is required on the scene, especially emergencies requiring overhaul, i.e., removing building material to reduce the spread of fire, or related intense physical duties that impact the safety of crew members, then adhering to the PT program to improve physical fitness level becomes more relevant.

In terms of coronary health issues, older firefighters tend to view younger firefighters as self-identifying as immortal and resistant to injury and coronary related events. And in general, firefighters as a group do not appear to have high CHD risk salience. Culturally speaking, CHD risk is not a reason firefighters work out directly, nor is it a reason they would tell other firefighters to do so. Additionally, PT program adherence is generally perceived as the means by which to primarily lose weight and build muscle mass. The final point regarding firefighter CHD risk salience is that older firefighters do suggest a possible correlation between the abrupt sleep patterns while on duty and CHD and sudden cardiac death risk, and that regular exercise during the PT program may help reduce the risk of coronary events from a night call. This indicates that while CHD salience is low, firefighters are increasingly beginning to recognize risk factors such as abrupt sleep patterns and chronic sleep deprivation that increase CHD risk, factors clearly recognized by firefighter organizations and the research community (Elliot and Kuehl, 2007).

5.1.2. Key Findings of the Focus Group Discussions

The results of the focus group discussions with acculturated firefighters suggest that physical fitness norms, while variable among crews, captains, and higher level management, do exist in the professional fire service. This is not surprising, given the intensely social and

tight knit culture of firefighting, resulting in commonly shared experiences concerning exercise and other behaviors. Several studies have suggested that a normative environment for physical fitness might exist (Rosenstock, 1966; Becker and Maiman, 1975; Hilyer, Brown, et al., 1990; Elliot, Goldberg, et al., 2004) but this had not been fully explored prior to this study. Of note, the high variability in PT program adherence norms among captains was not expected. As fitness norms can vary substantially across shifts or even within a specific shift or fire station, due to 2-4 captains and their respective crews being present on shift, this can led to high levels of confusion and mistrust of captains and higher management level support in terms of physical fitness, given that though one crew may exercise, another may not. As noted in the focus group findings, firefighters frequently indicated that different shifts seldom talk to each other; they sometimes have "family grudges" with other shifts, with shifts having their own refrigerators and food storage areas kept under lock and key for only that crew or shift. With the wide range of normative expectation for fitness, from no expectation, to "walk the walk as I do", it is not surprising that this results in confusion and mistrust among crews and across shifts. Additionally, this can be further exacerbated when there are few sanctions for non-participation during the PT time.

Of additional note were specific intrapersonal, interpersonal, and organizational level factors identified as barriers and facilitators to PT program adherence and physical fitness level. Intrapersonal motivation to exercise was a frequent factor affecting PT program adherence, and this came as no surprise given the ethnographic results indicating a common cultural theme for fitness adherence as being the responsibility of the individual and his/her own level of personal motivation. And across all focus groups, motivation acted as a key

factor in adherence and physical fitness level, even when there were normative and other socio-cultural influences.

Additionally, low firefighter CHD/heart attack knowledge, also noted in the ethnographic phase of the study, reflects the overall low salience of heat attack risk in most firefighters, but it does appear to slowly increase in older firefighters.

Another key factor of note is interpersonal level peer (crew) level dependability. The recurrent mention of dependability on the crew or shift level is reflective of the cultural meaning of physical fitness noted in the ethnographic key informant interviews, defined as being a dependable member of your crew, and having confidence in your crew members' ability to do the job, equated with being a 'fit' firefighter.

And on the organizational level, participation strategies and work environmental factors also influence PT program adherence and physical fitness level. While work environmental factors such as adequate space and available equipment are ongoing issues, e.g. working out in the truck bay with one treadmill for several firefighters, or physical fitness rooms in new stations being the first line item cut due to budget constraints, of particular note were participation strategies provided by the fire departments. These include the allotted PT program period, new candidate fitness testing, rookie academy PT, annual fitness testing, and job-related training, and all are perceived as facilitators for adherence and physical fitness,. But the primary factor acting dually as a facilitator or barrier was the allotted PT time for exercise. As firefighters note, the 'dedicated' PT period is a significant facilitating motivator for staying physically fit, yet the PT period takes a frequent backseat to acceptable response activities, e.g., fire suppression, but of greatest concern and a point of confusion is when management schedules continuing education, public relations events,

and/or daily job tasks during the fire department's committed time for exercise. Once again this can result in misperception as to the true expectation for fitness, leading to perceived management lack of support for both the physical fitness and overall health of firefighters.

A final point regarding the PT period as a participation strategy should also be noted, as firefighters frequently mentioned that the department policy no longer allows participation in team/competitive based sports during the PT period, and this is a significant barrier to adherence and overall physical fitness level. The consensus is that although team sports are perceived by management to increase the likelihood of injury and worker compensation events, firefighters believe that team sports increase participation rates and result in higher levels of crew, shift and department cohesion, as well as significant improvement in physical fitness level, particularly in terms of cardiovascular fitness, which in turn reduces the likelihood of work related injury and coronary events.

5.1.3. Key Findings of the Firefighter Survey

The results of the ethnographic key informant interviews and focus group discussions laid the framework for testing hypotheses regarding the predictive ability of key intrapersonal, interpersonal, and organizational factors to influence PT program adherence and physical fitness level in a group of approximately 1,000 firefighters from the Cary, Chapel Hill, Durham, and Raleigh Fire Departments. Additionally, attention was given to key structural characteristics of norms on the fire department group level for PT adherence and smoking behaviors across the four departments, as well as key constructs from Ajzen's Theory of Planned Behavior (1988, 1991) to predict intention to adhere to the PT program.

The factors most predictive of PT program adherence per the study's social ecological framework included intrapersonal level self-efficacy and personal motivation, but not

physical fitness level. As noted in chapter IV, focus group participants did not directly mention self-efficacy as a salient factor affecting PT adherence, yet they did mention firefighters are quite confident both on and off the job, under girded by frequent hands on job training and the response command structure that increases job control and self-efficacy beliefs. This appears to follow the same logic with PT program adherence, as firefighters have a strong belief in their ability to do any task during an emergency response.

With regards to the predictive power of personal motivation, this too supports the findings of the focus groups findings; firefighter perspective of PT program adherence is one based primarily on the level of personal motivation of the individual, and regardless of the level of norms or other socio-cultural factors, this is a strong predictor of adherence. Yet in terms of individual physical fitness level, neither intrapersonal factor was predictive, indicating that other individual level contributors to firefighter physical fitness, e.g., nutrition, hours of sleep, hydration level, and personal stress may need to be considered to fully explain firefighter individual physical fitness level.

In terms of the interpersonal socio-cultural factors (dependability and social support) affecting PT program adherence and physical fitness level, only dependability was predictive in the model of PT program adherence. This finding was expected, specifically in terms of crew dependability from the perspective of focus group participants mentioned earlier. The unexpected finding was the insignificance of social support as a predictor of either outcome. That it was not predictive indicates that the issue may be that support mechanisms are moderated by the firefighter's self-image of the "manly man", coupled with the persona of the competitive, outgoing professional. This may suppress social support as a facilitator of adherence within crews and across departments. Additionally, a better composite measure of

social support may be needed to adequately capture unique support mechanisms in and outside of the fire service, e.g., family support.

On the organizational level, the importance of department PT participation strategies once again reiterates the ethnographic and focus group findings mentioned earlier, in which the 'dedicated' PT period is a significant facilitator for staying physically fit, yet the confusion due to activities frequently scheduled during PT leads to a perception of management lack of support for physical fitness.

A final item of interest is the significance of health status and both fitness outcomes. As 25% of firefighters in this study indicated that they were currently at a fair or worse level in terms of overall health status, possible indicating the potential for detrimental health outcomes on the job, health indicators other than physical fitness level need to be examined more closely by the fire and research communities.

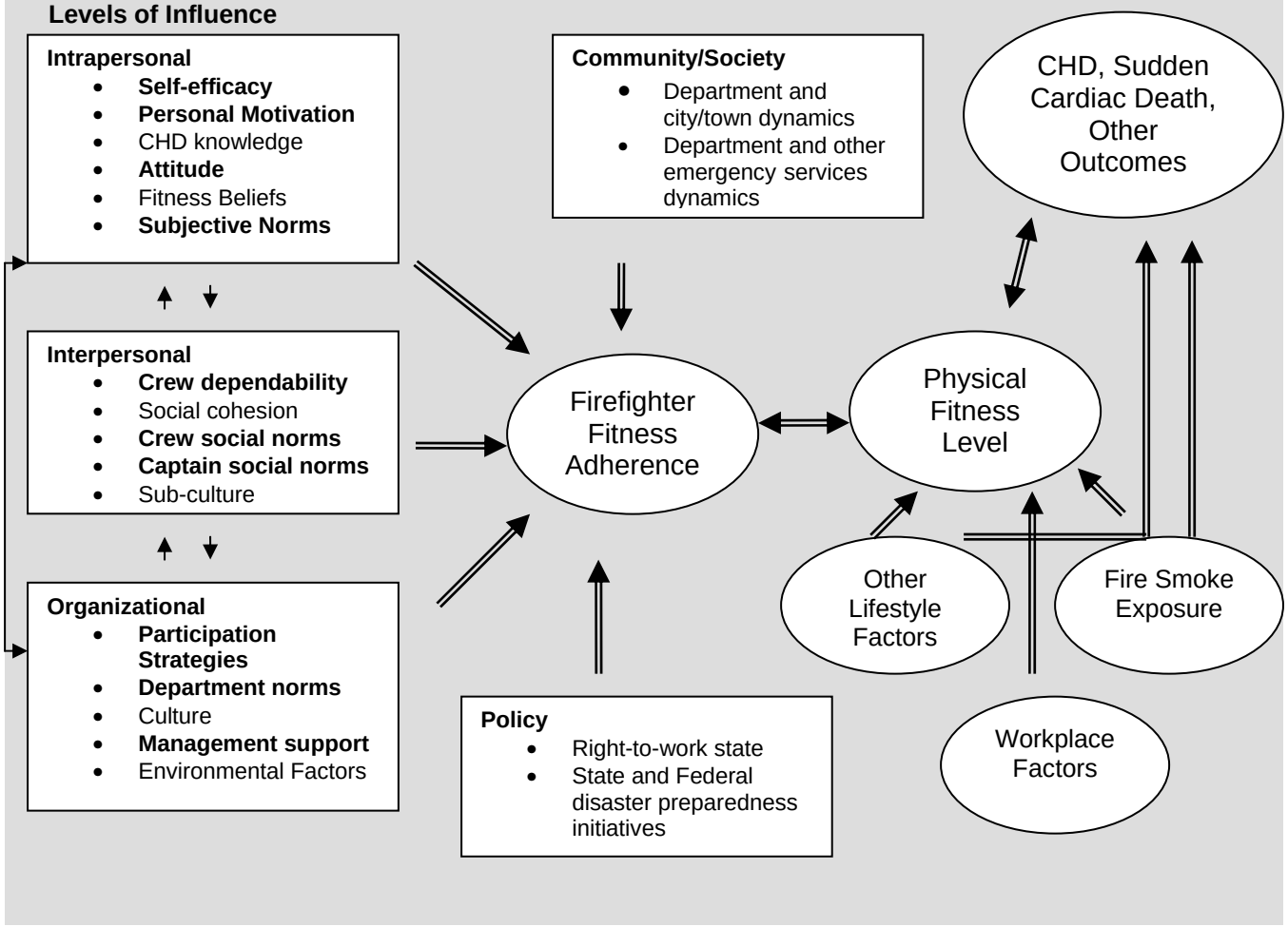
In terms of normative factors, the structural characteristics derived from Jackson's Return Potential Model, intensity, crystallization, and the key construct normative power (Jackson 1965, 1966) did provide evidence supporting the focus group results indicating that norms, though variable, do exist for PT program adherence behavior. It may be that this variable expectation is reflected in the range of the normative power measure, suggesting that there is less consensus and more variability in expectations for PT adherence on the department level than for smoking cessation behavior. However, this interpretation is limited in that the grouping measure on the department level and not the crew/shift level does not allow for predicting the effect of normative power on either health behavior. However, the norm structural measures for PT program adherence behavior do seem to reflect the findings from the model predicting intention to adhere to the PT program, based on Theory of Planned

Behavior constructs such as attitude, subjective norms, and perceived behavioral control. As subjective norms were highly predictive of intention to adhere to the PT program, the modest findings for the normative power measure may suggest that the individual does perceive an existing higher level normative expectation for adherence, be it on the crew/shift, captain, or high management level. Of additional note, though individual firefighter attitude was predictive of adherence as expected, perceived behavioral control was not. As noted in chapter IV, the majority of firefighters in the current study indicated that firefighters have strong wills with competitive drives, both of which are necessary elements to push them to do the job in the harshest of circumstances. Given this strong control belief in their actions on a response scene suggest that perceived behavioral control would be predictive of intention. However, its low predictive ability suggests that other moderating factors may come into play.

Lastly, it was hypothesized that intention would be correlated with PT program adherence behavior, yet the results suggest only a modest correlation between intention and PT program adherence. Despite the fact that firefighters do have high intention to adhere to the PT program, it may be that organizational factors such as response and job activities are strong barriers to adherence behavior. As noted in chapter IV, this conclusion supports the consensus of firefighters' opinion that the PT program time is often disrupted and subsequently should be "10-7", allowing firefighters to go out of service, or at a minimum, management should not schedule other job activities during the PT period, as this again suggests a mixed message on the part of management in terms of support for firefighter physical fitness and overall health from the firefighter's perspective.

In conclusion, based on the results of the study, a new conceptual model is proposed for fitness program adherence, physical fitness, and heart related outcomes, as noted in Figure 9. Key factors are noted in bold face type.

Figure 9 A New Conceptual Model of Factors Affecting Firefighter Fitness Program Adherence and Physical Fitness Level, as Illustrated Within a Social Ecological



5.2. Policy Implications

The policy implication of understanding the cultural relevance of physical fitness in the professional fire service is clear. Given the continued high risk of CHD and sudden cardiac death outcomes due in part to poor physical fitness level, particularly cardiovascular fitness level, it is important to consider the perspective of the firefighter when considering

new intervention methods to improve physical fitness, reduce CHD risk, and/or improve the overall health of firefighters. Given the mixed successes of previous physical fitness and CHD interventions in the firefighter community, it is important to consider what Green and Kreuter (1991) note, that planning any health program change without first considering what the problem means to the target population and what health outcomes they value is critical to program success.

As most CHD interventions in the firefighter population are secondary prevention measures, e.g., the use of screening programs to detect CHD and reduce disability, or tertiary prevention, e.g., medication aimed at reducing the impact of ongoing, long-term high blood pressure and/or CHD disease and disability, improving physical fitness through primary prevention measures should be our goal; by first understanding the cultural relevance of fitness and PT program adherence, and integrating these findings into a program designed to eliminate this risk factor is the ideal in primary prevention.

The results of this study can be used to directly assist fire departments in developing comprehensive health promotion programs and reduce risk factors for CHD and improve cardiovascular capacity, per NIOSH recommendations (NIOSH, 2007), by focusing on the key factors that motivate firefighters to improve their physical fitness, be they new recruits or seasoned veterans. A point of intervention and policy focus should be integrating aspects of the cultural meaning of physical fitness in terms of functional capacity, i.e., being a dependable member of the crew and fire department, into existing workplace fitness policy. Additionally, emphasis on good physical fitness in terms of dealing with the adverse effects of chronic interrupted sleep patterns should also be an issue of focus, as older firefighters frequently identify chronic sleep deprivation as a considerable issue in CHD risk. In terms of

both crew dependability and reducing the effect of sleep deprivation, this should also be of particular focus in younger firefighters, where there is lower salience levels in terms of CHD and sudden cardiac death; therefore workplace policy should focus on being physically fit primarily as the means to support fellow crew members, in addition to being one method to reduce the issues associated with long work hours and abrupt sleep patterns in the fire service. This requires changing existing department training policies to integrate physical fitness and CHD risk factor education into daily continuing education, with the objective of increasing CHD and sudden cardiac death salience physical fitness, and with the overall goal of improving physical fitness and reducing adverse cardiac outcomes. As many firefighters in this study noted, CHD risk, physical fitness, and other health issues are seldom issues of focus in daily training. But in order to increase firefighter knowledge of the myriad of CHD risk factors, workplace training policy must expand past primary fire suppression and first responder education to include physical fitness, as well as healthy eating habits, adequate hydration, and other lifestyle factors contributing to CHD and sudden cardiac death.

Additionally, as was noted across all phases of the study, firefighters frequently perceive a mixed level of management support for physical fitness and health of firefighters through the scheduling of activities during the department PT program period. Firefighter recognize and expect that the PT program should take a back seat to the needs of public citizens during an emergency event, but they have trouble dealing with the department expectation for good physical fitness and PT program adherence when activities such as public relations events, continuing education, and other job tasks are scheduled during the PT period. Therefore, while fire departments cannot simply go “10-7” or completely out of service to exercise, they should consider updating standard operating procedures to keep

activities outside of emergency response from interfering with the physical fitness PT period. This would undoubtedly send a message to firefighters that management does support their physical fitness and overall health, with a clear normative expectation for PT program adherence in both rookie and seasoned firefighters.

5.3. Directions for Future Research

In line with NIOSH recommendations for future research regarding firefighter physical fitness and health, studies should include several strategies:

1. Integrate the cultural (functional) meaning of physical fitness and its importance into existing physical fitness programs as a point of focus, and evaluate both its short and long term effects on physical fitness and reducing CHD and sudden cardiac death risk.
2. Physical fitness interventions should focus on multiple intrapersonal, interpersonal, and organizational factors simultaneously, versus traditional focus on single CHD risk factors. Physical fitness is a complex construct; therefore focus on the multiple social ecological components of fitness could prove fruitful, per a variety of factors impacting firefighter physical fitness, as noted in the updated conceptual model in Figure 1.
3. Incorporate use of a direct measure of physical fitness behavior, rather than self-report that may be affected by recall bias, and asses the correlation between direct measure and self-report measures of physical fitness in the firefighter occupation.
4. Explore further the influence of socio-cultural and normative expectations for physical fitness, to assess the correlation of specific theoretical constructs such as subjective norms in the Theory of Planned Behavior (Ajzen 1988,1991) with higher

order group level norms and norm structural characteristics such as those in Jackson's Return Potential Model (1965, 1966). Additionally, PT program adherence and physical fitness interventions should be based on both individual level and higher order organizational theories to determine the effectiveness of multiple theoretical designs, such as comparing individual level motivation to change theories such as the Transtheoretical Model of Health Behavior Change (Prochaska, DiClemente, and Norcross, 1992; Prochaska and Velicer, 1997) and group level normative theories such as the Theory of Normative Social Behavior (Rimal and Real, 2005). Interventions incorporating multiple theoretical designs such as the PHLAME study (2004) suggest a higher probability of success when using individual and group level methods to change health behaviors.

5. Explore novel participation strategies to increase PT program adherence and physical fitness level that leverages the inherent competitive nature of firefighters, such as team sport intervention. For example, a pilot study is currently in progress based on the findings of this study, in which a competitive framework having crew/teams compete against each other is being used to determine the long term effectiveness of competition as a motivator to improve physical fitness level. The study does not have firefighters directly competing in traditional team sports that could result in physical injury, e.g., basketball or football, but rather, allows teams to develop their own approach and claim ownership of developing their own fitness programs. Studies utilizing novel approaches to physical fitness such as this may appeal to the unique competitive nature of firefighters, versus conventional exercise programs.

5.4. Final Thoughts

Limitations and Implications for a Future Research Agenda

A limitation of the current study is the inability to predict the influence of physical training (PT) program adherence and smoking normative power on actual or observed behavior, as only self-reported adherence and smoking behaviors were collected in the survey phase of the study. Additionally, as there were only four group level measures, i.e., the fire department level (n = 4 fire departments), the true predictive nature of the power to influence group firefighter health behaviors, based on the Jackson's Return Potential Model norm structural components is unclear. As a result, it would be complicated to adequately leverage the study results for intervention design unless a better group level measure is obtained, such as the crew or shift level, where the power to influence health behaviors in the fire service work setting may be the greatest.

Another issue is the low response rate of survey respondents from the City of Durham Fire Department (33%), as compared to the higher response rates of the Town of Cary (62%), Town of Chapel Hill (78%), and City of Raleigh (67%) fire departments. It is uncertain why the response rate was so much lower, as this department was enthusiastic to participate, and given the same amount of time to respond to the survey as the other departments. To ensure that the lower response rate is not due to self selection bias, a healthy worker effect, or some other sampling issue, future research should be conducted in which a representative sample of non-respondents is obtained, with the same key health behavior outcomes and predictor variables measured, in order to compare the characteristics of respondents versus non-respondents. If key differences are found in the profiles of these two groups it may suggest that different intervention approaches are needed to target appropriate variables of interest.

An additional area of future research regards the alarming rates of smoking reported across all the four fire departments. With an average of 40% of firefighters reporting to smoke, this nearly doubles the national average (CDC, 2006) and should be a focus for smoking cessation intervention in the four fire departments. Furthermore, if this increased rate of smoking reflects the smoking prevalence in other, full time fire departments, it would indicate a significant public health issue for our nation's first responders and arena for smoking cessation intervention as well.

A significant finding of my research may be the diverse complexity noted in fire service culture. Specifically, there can be differing normative expectations for PT program adherence and smoking behaviors nested within crews, captains, shifts, and/or stations of a specific fire department. Additionally, multiple individual, interpersonal, and organizational factors also act to influence health behaviors of firefighters. As a result, the clustered or hierarchical nature of the survey data requires more appropriate nested modeling techniques such as those used in hierarchical linear models or other multi-level analysis approaches. This would allow for the variance in the PT program adherence and smoking outcome measures to be analyzed at multiple hierarchical levels.

Overall, the complexity of fire departments exhibited through both nested, hierarchical organizational and cultural structures may require new conceptual models to reflect the unique dynamics impacting firefighter health behaviors. Future research should also expand to other fire departments in both similar and differing geographic and economic locations, as well as explore if new conceptual models better predict the cultural influences affecting fitness and health related behaviors in the full time fire service. In sum, while this study is the first comprehensive attempt to explore the culture of physical fitness within the

fire service and how it is correlated with coronary risk, additional research that addresses some of these issues and/or confirms the results should be conducted before the results are used as the basis for program policies or interventions.

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Appendix A Ethnographic Interview Questions

Several questions are presented, but not all were used with each firefighter, and some were modified as the study progressed.

1. Descriptive Questions for Ethnographic Firefighter Interviews

1.1 Grand Tour Questions

1.11 Typical grand tour questions: ask for a description of how things usually are; asks the informant to generalize, to talk about a pattern of events.

- "Could you describe a typical day at the fire house?"
- "Could you describe your typical shift at the fire house?"

1.12 Specific grand tour questions: takes the most recent day, the most recent series of events, or the locale best known to the informant.

- "Could you describe your shift today, from the moment you began to the moment you stopped?"

1.13 Guided grand tour questions: asks the informant to give an actual grand tour.

- "Could you show me around the fire house?"
- "The next time you go out on an emergency call, can I come along and could you explain what you are doing?"- May not be completely feasible

1.14 Task-related grand tour questions: asks the informant to perform simple tasks that aids in a description.

- "Can you describe what you are doing now while ____?"
- "Can you describe the steps you are doing while ___ during your team/shift?"

*****Note**- Only one or two grand tour questions will be asked; the PI will move quickly to mini-tour questioning relating specifically to physical fitness, worksite fitness program adherence, and coronary health issues

1.2 **Mini-Tour Questions-** are identical to grand tour questions except they deal with a much smaller unit of experience. The four kinds of mini-tour questions (typical, specific, guided, and task-related use the same approaches as their counterparts do with grand tour questions.

1.21 Typical mini-tour questions

- "Could you describe what firefighters typically do during the physical training period?"

1.22 Specific mini-tour questions

- "Could you describe the last team/shift workout?"
- "Could you describe what you did during your last physical training period?"

1.23 Guided mini-tour questions

- "Could you show me around the workout area?"
- "During the next workout period can you explain what you/the group is doing?"

1.24 Task-related mini-tour questions

- "Can you describe what you are doing now during physical training?"
- "Can you describe the steps you re doing while doing/administering the annual fitness challenge/test?"

Key Probing Questions

1.3 Example Questions- even more specific, example questions take a single act or event identified by the informant and asks for an example.

- "You mentioned that firefighters do all kinds of activities during PT; can you give me some examples?"
- "You mentioned that firefighters have several reasons they do/do not follow the required PT; can you give me some examples?"
- "You mentioned that some firefighters are injured or killed in the line of duty by CHD; can you give me some examples?"
- "You mentioned that some firefighters make excuses for not working out during PT; can you give some examples of the type of excuses they make?"

1.4 Experience Questions- merely asks for any experiences they have had in some particular setting. They tend to be open-ended and sometimes informants have difficulty answering them. Best used after several grand and mini-tour questions.

- "You have probably had some interesting experiences as a firefighter; can you recall any of them?"

1.5 Native-Language Questions- minimize the influence of informants' translation competence. They serve to remind the informant that the ethnographer wants to learn their language. "How would firefighters refer to the fitness challenge/test?"

1.51 Direct-Language Questions: when an informant uses a term the question simply asks "how would you refer to it?"

- "Is that the way most firefighters would say ____?"
- "How would you refer to people working out during physical training?"

1.52 Hypothetical-Interaction Questions: It can be difficult for informants to recall ways to talk to other people; the ethnographer can help by creating a hypothetical interaction.

- "If you were talking to another firefighter about the benefits of physical training, what would you say?"
- "If you were in your fitness committee meeting, what are the types of things you would say?"
- "If not all the guys are working out during the team/shift physical training period, what would the other guys say to him/her/them?"
- "When the shift is discussing what exercises to do during the next workout, what would the guys say?"

1.53 Typical-Sentence Questions: asks for typical sentences that contain a word or phrase.

- "What are some of the sentences firefighters would use that include/describe the term heart attack?"
- "What are some the sentences I would hear that include the phrase ____?"

2. Structural Questions

2.1 Verification Questions- asks informant to confirm/disconfirm hypotheses about a folk domain

2.11 Domain Verification Questions- seeks to verify the existence of a domain for which there is a hypothesized cover term.

- "Are there different kinds of physical training/exercise barriers?"

2.12 Include Term Verification Questions- seeks to verify whether one or more terms is included in a domain

- "Is ____ a kind of barrier to exercise?"

2.13 Semantic Relationship Verification Questions- used to verify the most appropriate way to phrase a relationship.

- "Would firefighters say that the weight lifting bench is part of the workout room, or a place in the workout room?"

2.14 Native-Language Verification Questions- used to verify if a particular term is a folk term rather than a translation created for the ethnographer's benefit.

- "Is this a term you or firefighters would use to describe ____?"

2.2 Cover Term Questions- the most frequent type of structural question, it is asked when you have a cover term.

- Example- Types of worksite exercises to improve heart health. "Are there different types of worksite exercises firefighters do to improve heart health?"

2.3 Included Term Questions- utilized after collecting several terms that belong in the same domain, but when unsure of the specific domain.

- "Are X, Y, Z all the same kind of thing?" "Yes, they convince/motivate firefighters to work out." (Facilitators) "Are there other kinds of things that convince/motivate a firefighter to work out?"

2.4 Substitution Frame Questions- one term is removed from a sentence and the informant is asked to substitute other meaningful terms.

1. Original statement: Smoking causes firefighter heart attacks.
2. Substitution frame: _____ causes firefighter heart attacks.
3. Question: "Can you think of anything other terms that might go in that sentence?"
4. Responses: *Being out of shape* causes firefighter heart attacks. The *stress of the response* causes firefighter heart attacks. *Going to a response in the middle of the night* causes firefighter heart attacks.

2.5 Card Sorting Structural Questions- can be used to elicit, verify, and discuss a domain by writing terms on cards and asking if these are all kinds of X.

3. Contrast Questions

3.1 Contrast Verification Questions- used to confirm/disconfirm a difference between folk terms.

- "Can you confirm that these are all barriers to firefighters adhering to the worksite physical training program?"

3.2 Directed Contrast Questions- begin with a known characteristic of one folk term in a contrast set and asks if any other terms contrast on that characteristic.

- An informant indicates that the firefighters tease guys who lift weights during every team/shift physical training period (a potential fitness norm). The ethnographer might ask "How do members of your shift tease you as compared to members of other shifts/houses?" This might provide information on how different shifts act in terms of fitness norms.

3.3 Dyadic Contrast Questions- asked without any differences to suggest to the informant; asks if there are any differences the informant sees between folk terms. The informant reveals contrasts meaningful to them.

- "Can you tell me the difference between these two terms?"

3.4 Triadic Contrast Questions- when presented with three folk terms, the informant is asked which one is different from the others. One of the most effective contrast questions, it always implies similarities between two terms.

- "Here are three kinds of fitness/exercise barriers, X, Y, and Z. Which two are alike and which one is different?"

3.5 Ratings Questions- seek values placed on sets of symbols by asking informants to make contrasts of folk terms based on ratings criteria.

- "Which barriers are the hardest to overcome?"

Appendix B
Follow up ethnographic question guide

Introductory question: Would firefighters see a difference between physical readiness and physical fitness? Physical fitness and exercise?

Q1: Several firefighters mentioned that it's unpredictable, your days, your calls, and could be an issue for physical fitness, or getting your exercising in during your PT period. Could you talk a little bit more about what you do or do not do if you get a call if you are in the middle of a workout, or if you miss it entirely what you may do later on that day.

Q: From the past interviews, I've heard that firefighters exercise for many reasons. Frequently mentioned was weight loss and body strength, putting on some mass. For what other purposes do firefighters exercise?

Q: Are some more favored than others? Are there other reasons, or is it mostly just favored because it is for the purpose of the job, hey you have to do it.

Q: Are the exercises, when the firefighters do exercise, are there any more favored by crews? Like, will the crews say "hey, we work out this way in any the stations or administration. Talk about that a little bit.

Q: Does the battalion/deputy chief work out here?

Q: It had been mentioned in previous interviews that firefighters have played team sports in the past: basketball, volleyball, some touch football. Have all the team sports been done away with?

Would you think from your background, or just knowing the other firefighters and things they like, their experiences, do you think if they could play team sports would they exercise more? Why/why not?

Q: Now, thinking about heart disease, heart attack, I've heard that any heart related issue is more prominent to older firefighters. Would agree with that?

Then if that's the case, why is not, one firefighter said it's not really on the radar on younger firefighter per se, what reasons would firefighters think that was the case?

Q: Oh, when firefighters come in, when their rookies, are they typically very young? What would you say is the typical age?

Q: Ok, I know that firefighters have mentioned that you do a lot of different training activities. You do EMS continuing education, and all kind of stuff. Do you ever have any training activities where you discuss fitness, or health?
Q: And then the agility test that you mentioned, what would they use the results of that for? Has there ever been any discussion about that?

Q: If physical fitness or physical readiness is what I've heard. One term, physical readiness in a firefighter, if it came to play on a scene or a fire call, where they didn't have enough stamina or had to take a lot of breaks, or whatever, how would that be handled? I mean, there on a scene and then afterwards.]

Q: Ok, some of the firefighters have mentioned in the interviews that when you get the calls at night when you're asleep that those are the ones that are physically tough. Talk about that

Q: I've heard that it's common across academies, rookie academies, that you do exercise every day. What's happening, from the academy to when firefighters come on board, to lose that expectation that you will work out every day?

Appendix C: Types of Semantic Relationships

Relationship	Form	Firefighter Example
Strict inclusion	X is a kind of Y	Lack of equipment is a kind of barrier to fitness adherence/improving heart health
Spatial	X is a place in Y, X is a part of Y	Flexibility exercises are a part of the PT period
Cause-effect	X is a result of Y, X is a cause of Y	Physical fitness is a result of good exercise equipment
Rationale	X is a reason for doing Y	Preventing heart disease is a reason for exercising
Location for action	X is a place for doing Y	The recreation room is a place to work out
Function	X is used for Y	Lifting weights is used to improve upper body strength
Means-end	X is a way to do Y	Riding the stationary bike is a way to improve aerobic fitness
Sequence	X is a step (stage) in Y	Warm up is a stage in the morning PT period
Attribution	X is an attribute (characteristic) of Y	Work out partners is an attribute of social support during PT
Location	X can be found in Y	Management support can be found in a ‘good’ fitness program

Appendix D

Sample Domain Analysis Sheet

1. Semantic Relationship: Means-end
2. Form: X (is a way to) Y
3. Example: Walking is a way to exercise

Included terms		**Semantic relationship**	**Cover term**
walking	running		
lifting weights	Pilates	is a way to →	exercise
pulling hose	Carrying a victim		
basketball	bike riding		
climbing stairs	pilates		

Appendix E Pre-Focus Group Screener

All information obtained in this screener will be kept strictly confidential

Questions

1. When you first started as a firefighter, what was your physical fitness level?

   A. ☐ Poor
   B. ☐ Below Average
   C. ☐ Average
   D. ☐ Good
   E. ☐ Excellent

2. What was your physical fitness level after one year as a firefighter?

   A. ☐ Poor
   B. ☐ Below Average
   C. ☐ Average
   D. ☐ Good
   E.. ☐ Excellent

3. What is your physical fitness level today?

   A. ☐ Poor
   B. ☐ Below Average
   C. ☐ Average
   D. ☐ Good
   E. ☐ Excellent

4. How often do you exercise/work out?

   A. ☐ Never
   B. ☐ One day a week
   C. ☐ Two days a week
   D. ☐ Three days a week
   F. ☐ Four days a week
   G. ☐ Five days a week
   H. ☐ Six days a week
   I. ☐ Seven days a week

5. How long have you been a firefighter?

   A. ☐ One year of less
   B. ☐ 2-5 years
   C. ☐ 5-10 years
   D. ☐ 11-15 years
   F. ☐ 16-20 years
   G. ☐ 21-25 years
   H. ☐ Greater than 25 years

6. Are you a smoker?

   A. ☐ Current smoker
   B. ☐ Former smoker
   C. ☐ Never smoked

7. What is your current position?

A. ☐ Firefighter
B. ☐ First Class Firefighter or Firefighter 1
C. ☐ Firefighter 2
D. ☐ Senior Firefighter/ Master firefighter or Driver
E. ☐ Lieutenant
F. ☐ Captain
G. ☐ Battalion Chief
H. ☐ Division Chief

8. Which fire department do you work for?

A. ☐ Cary
B. ☐ Chapel Hill
C. ☐ Durham
D. ☐ Raleigh

D1. Gender

A. [ ] Male
B. [ ] Female

D2. What was your age at your last birthday?

_____

D3. What is the highest grade or level of school that you have completed?
(Check one)

A. [ ] 8th grade or less
B. [ ] Some high school, but did not graduate
C. [ ] High school graduate or GED
D. [ ] Some college or 2-year degree
E. [ ] 4-year college graduate
F. [ ] More than 4-year college degree

D4. What is your salary level?

A. [ ] Less than $25,000/year
B. [ ] $25,000-30,000/year
C. [ ] $31,000-$35,000/year
D. [ ] $36,000-$40,000/year
E. [ ] $41,000-$45,000/year
F. [ ] $46,000-$50,000/year
G. [ ] Greater than $50,000/year

D5. How would you describe your race? (CHECK ALL THAT APPLY)

A. [ ] American Indian or Alaskan Native
B. [ ] Asian or Pacific Islander
C. [ ] Black or African-American
D. [ ] White
E. [ ] Hispanic
F. [ ] Another race or multiracial (write in) _____

Appendix F
Firefighter Focus Group Question Guide

Thank you for coming today. Let me first introduce myself, I am (moderator name). Now let's go around the room and have you all introduce yourself with your first name. You can use an alias if you wish.

The purpose of this focus group is to get your thoughts about firefighter physical readiness, fitness, and health, and how they relate to the worksite. Our discussion will last approximately 2 hours.

With your permission, this session will be recorded to make sure that we collect all of your comments. We will not use your name in our reports; all information will be kept confidential. To help our discussion I would like to offer a few suggestions. To make sure that we understand your thoughts and ideas, please speak loud and clear and one at a time. Also, you may request that the tape recording be stopped at anytime, either for you to make a comment or answer a question you do not want recorded, or to stop the recording completely.

Remember that your participation is voluntary, so you don't have to answer a question if you do not wish to. However, I hope everyone will take a chance to share your thoughts and ideas, and please make sure that you let others share too. Remember there are no right or wrong answers; these are your thoughts, ideas, and opinions. You are the experts; you are the firefighters and your thoughts are very important to this study. It is OK to disagree with each other; we are not looking for everyone to agree.

Does anyone have any questions before we begin?
Do I have permission to begin recording?
OK, we'll get started.

Opening Question
Let's go around the room and have each of you tell me your name and what led you to become a firefighter.

Physical Fitness Questions:

1. When you hear the word physical fitness what comes to mind?
   Probes:
   - When you think about physical fitness what does it mean to you?
   - Are there other things that come to mind when you think of physical fitness?
   - Can you give me some examples of physical fitness that are important to you?

2. Are there things that make it more difficult or harder, if at all, to maintain your physical fitness level?

3. Similarly, are there things that make it easier, if at all, to maintain your physical fitness level?

4. When you think of a person who is physically fit, what characteristics would you apply to that person?
    - When you think of a physical fit firefighter, what characteristics would you apply to that person?

5. When you think about physical fitness and its relationship to firefighting, what comes to mind?
    - When you think about physical fitness what does it mean to your crew?
    - When you think about physical fitness what does it mean to your shift (if applicable, i.e., multi crew company)?
    - When you think about physical fitness what does it mean to your station?
    - When you think about physical fitness what does it mean to your department?

6. Are there instances where the firefighter's physical fitness level is important to fellow firefighters?
    - What does your crew do, if anything, when a firefighter's physical fitness level comes into play on a scene?

7. What activities do you feel are important for you to do to maintain physical fitness?
8. What activities do you feel are important for your crew to do to maintain physical fitness?
9. What activities do you feel are important for your station to do to maintain physical fitness?
10. What activities do you feel are important for your department to do to maintain physical fitness?
    - What are the ways, if any, the crew/ captain/ deputy or battalion chief encourages physical fitness?

11. Thinking about your ideal world, if new firefighters are coming into your station, what advice would you have for your vision of physically fit or physically ready new firefighters?
    - In an 'ideal' world, where money is no object, what activities would you, your crew, etc. do?

Exercise Questions:

While several components have been mentioned in today's discussion, we would like to now focus on one component of physical fitness: exercise, and specifically within the fire department.

12. When you hear the word exercise what comes to mind?
    - When you think about exercise what does it mean to you?
    - Can you give me some examples of exercise that are important to you?

13. Are there things that make it more difficult or harder, if at all, to exercise during the physical fitness/exercise/PT period?

14. Similarly, are there things that make it easier, if at all, to exercise during the physical fitness/exercise/PT period

15. When you think about exercise and its relationship to firefighting, what comes to mind?
    - When you think about exercise what does it mean to your crew?
    - When you think about exercise what does it mean to your shift (if applicable, i.e., multi crew company)?
    - When you think about exercise what does it mean to your station?
    - When you think about exercise what does it mean to your department?

16. What exercises do you feel are important for you/crew/shift/station/department to do to maintain PF?
    - What are the ways the crew/ shift/ deputy or battalion chief encourages exercise?
    - How does the department/house encourage firefighters to adhere to the exercise/PT period?
    - What are the types of things you might hear firefighters say, if anything, if a firefighter does not exercise during the physical fitness/exercise/PT period?

17. In an 'ideal' world, where money is no object, what activities would you, your crew, etc. do?

Scenario
For the next section I'd like to read you a statistic and have you respond with your general impressions and opinions…Over 50% of firefighters' on-duty deaths occur from coronary heart disease or as a result of a heart attack. What does that statistic bring to mind for you?

If you were a consultant brought in to establish a new fire house, what advice would you have given the fact that over 50% of firefighter on-duty deaths occur from coronary heart disease or as a result of a heart attack?

18. Fire houses have been described as paramilitary. If they were to establish a physical fitness program like the military, would that be acceptable? Why or why not?

Ending questions

What have we missed that we should ask in future focus group discussions?

Is there anything else you think we should know related to physical fitness and exercise that would help us understand what occurs in the fire department?

Debriefing firefighters on purpose of questions

Appendix G

FIREFIGHTER FOCUS GROUP CODING MANUAL

Intrapersonal Level Factors

Self-efficacy

A set of beliefs about one's own ability to organize and execute courses of action required to attain specific types of performances (Bandura, 1977).

Operational definition: This code captures the participant's perception of his/her own skills and the ability to use (or not use/lacking) those skills effectively to change or improve physical fitness level; the person's perception of acquiring mastery in the area in question.

Use when: Participant mentions perception of his/her own physical fitness and/or exercise skills and the ability to use (or not use/lacking) those skills to improve or change physical fitness level, or participate in the firefighter physical fitness program. Also use when participant indicates a lack of personal education or training and subsequently lacks ability to either use exercise equipment properly or improve his/her physical fitness level

Examples: 1 Line 0617 M: What are some of the ways um, that the crew, the captain, duty or battalion chief encourages physical fitness for you? …**primary example begins below at line 0655**:

I was going to say this might just apply to a lot of things is it might apply to some of your questions before is to come up with a physical fitness program or plan of what to do and what not to do. What's good for you, what's bad for you? And just I know that going out there and doing something is better than nothing but I mean you know come up and say hey you know lift this or run this far or you know do certain things that are ah, beneficial. M: Okay.

Um, I mean that's my biggest thing with the program. I mean you are exactly right I mean they've given us a lot of equipment and stuff and pretty much up until now it's just here it is go do and I'll be honest with you I mean I don't really know what to do. I mean I go out there and do something but ah, I would like to see a plan to say you know this is what you should do. M: Okay.

Or this is the certain level you should be at in six months or a year or whatever so.

Perceived Genetic Influence or Susceptibility

This code captures any mention of genetics or heredity as a factor affecting the firefighter's ability to change his/her physical fitness level

Use when: participant describes or mentions genetics/heredity as either a reason for his/her or other firefighters inability to change physical fitness level, or a reason increasing the likelihood that a firefighter can improve his/her fitness level or have the appearance of being physically fit

Examples: 6 line 0333: "And for me that's not enough for me. But I'm a lot younger than he is. So I just think that everybody's got a different level of fitness. M: So different levels on the crew, okay. But I wouldn't say its just age because I know guys 50 that workout just like XXX here. How old are you? 30. 30, so I mean. M: Okay. A lot of it too is genetics on some of it."

Perceived Benefits of Physical Fitness and/or Exercise

This code captures mention of the perceived benefit of engaging in physical fitness during the PT period by a firefighter or group of firefighters.

Use when: participant mentions factors such as feeling better, more rested, less pain or discomfort, quality of life, or improved job performance as benefits of physical fitness and/or exercise. Can also include also accomplishing a dual task or chore, i.e., like getting the grass cut is a benefit.

Examples: 3:2 Intra PFF Line 0067"To me it's just about being healthy and having a new quality of life where you can be active and not be sore. You have the energy. You don't want to just lay around. You want to go play so you play. Be able to move." "It's a good stress reliever."

Self Motivation

Self motivation has been frequently shown as a predictor variable in exercise and fitness adherence, and is conceptualized "as a generalized, nonspecific tendency to persist in the absence of extrinsic reinforcement, and is thus largely independent of situational influence" (Dishman and Gettman, 1980).

Operational Definition: This code captures mention of self or personal motivation as a factor in changing or attempting to change physical fitness level or exercise level.

Use when: participant mentions self or personal motivation as either a barrier to changing or improving physical fitness or exercise level, or as a facilitator to changing or improving physical fitness or exercise level.

Examples: 1 line 0137 "Sometimes you get into a routine of doing it at a certain time and if you have calls or something like that throw it off you're kind of not really as interested in doing it. You know, you kind of. You might have had like a busy call or something like that, come back and you know I really don't feel like doing it now."

Examples: 3 line 0803 "The bottom line is it's got to be that not a want to but a decision to do and it's own each person's responsibility for their own physical well being. They have to have an inborn not only desire but an effort to meet that desire to be physically fit."

Lack of Time

This code captures mention of personal time as a factor playing in the daily routine to change or improve physical fitness or exercise level.

Use when: participant indicates that lack of time either due to the job, a second job, personal or other activities that prevent enough time to change or improve physical fitness level.

Examples: 6 line 0167 "In concerning the job here they give us the morning, they give us an hour and a half in the mornings to workout. But quite frequently that time period is intruded upon for a class or for maintenance or not to mention calls. So we're really I would guess we're probably only workout minimal. The reality is we only get two out of three shifts to workout."

Nutrition/Diet

This code captures mention of nutrition practices or diet as factor affecting firefighter's ability to change his/her physical fitness level

Use when: participant mentions his/her personal diet practices as reason for inability to change physical fitness level, or increases likelihood that he/her or another firefighter can improve his/her fitness level

Examples: 2 Line 0547 "M: Maybe, okay. Alright. What activities do you feel are important for you personally to do to maintain physical fitness? Thinking about physical fitness. Pertaining to physical fitness.

I think like (XXX) said earlier, it mostly with this job is a lot about heart health. M: Heart health. Just keeping that cardio. M: Cardio, okay. Eat better. Eating better?
We are notorious for eating stuff we shouldn't. M: Notorious for eating stuff you shouldn't. Yes, yes and eating a whole lot of it. M: Okay. We don't like the healthy food. We hate letting it going to waste so we've got to eat it."

Age

Age is a non-modifiable coronary heart disease risk factor (NHLBI, 2007) in addition to several other factors, but is also linked to exercise adherence and physical fitness level.

This code captures mention of age as a factor impacting change or attempting to change physical fitness or exercise level.

Use when: participant mentions his/her personal age or another firefighter's age as a factor affecting change in physical fitness level, be it a barrier or facilitator to changing or improving physical fitness level

Examples: 6 Line 0831 "The point is like I said there's different levels of fitness due to your age."

Second or Part Time Jobs

This code captures mention of any jobs or tasks firefighters take in addition to their normal firefighting occupation that can impact his/her or another firefighter's physical fitness level.

Use when: participant indicates that second jobs or tasks inhibit the ability to engage in physical fitness activities, either on or off the firefighter job. Can also use when participant mentions any jobs firefighters take in addition to their normal firefighting occupation that acts as a method to improve physical fitness level, or acts as a substitute for engaging in the fire department PT period.

Examples: 2:6 (Intra PFB) Line 0203 "You work late from here and you get home and you don't feel like working out no more because you work all day long."

Physical Fitness Belief

This code captures mention of any personal or higher level belief (crew, station, etc.) regarding fitness or exercise, either in personal life or job practice.

Use when: participant mentions a physical fitness activity related belief that may improve or decrease physical fitness level, or result in no change

Examples: 1:11 (Intra PFF) Line 0309 "You've got to be able to maximize that amount of air you've got in your bottle. A lot of us will suck that bottle out before it's rated to go out. M: Okay. And how would you go about doing that? What is there a rule or trick? Controlled breathing. Controlled breathing but you know if you're not in shape you can't control your breathing. You can take somebody that's out of shape built and they can take down a bottle in a matter of a few minutes."

Stress

Stress is frequently cited as a coronary heart risk factor as well as a factor in exercise adherence.

This code captures any mention of stress as a factor affecting physical fitness level, getting in your work out time or exercise, or as a reason to engage in physical fitness/exercise

Use when the respondent mentions stress either impacting his/her desire to engage in physical fitness activity, i.e., too burnt out or stressed to work out, or as a reason to work out in order to reduce existing personal stress level or stress due to a response event.

Examples: 2 Line 0163 M: Normal schedule is hard, okay. What do you think about stress? Does that play into physical fitness and if yes, how? It helps you handle bad stress better. M: Helps you handle bad stress better, ok.

Personal/Family Life

This code captures mention of life outside the firefighting occupation, including family, which acts as a factor, either as a barrier or facilitator, in maintaining or changing physical fitness level or the level of exercise

Use when: participant mentions that personal life and/or family outside the firefighting family or occupation act as a reason or factor in maintaining physical fitness level or exercise, i.e., to stay healthy for your family, or as a barrier, i.e., spending time with family is a reason not to workout (losing 'precious time'), or takes too much time and no time left to workout or maintain fitness level

Examples:

3 Line 0093 M: Are there things that come to mind that make it more difficult or harder if at all to maintain your physical fitness level? Schedules. M: Schedule. Kids. M: Kids. Kids, schedule. For what reason? Schedule. M: Yeah.

3 Line 0209 M: … okay, continuing along this when you're thinking about physical fitness and its relationship to firefighting um what comes to mind? When thinking physical fitness and the job of firefighting. You've mentioned, ah (XXX) you mentioned the endurance of the job are there other things like that that come to mind when you think of physical fitness and doing the job? Well, let's ah, we'll kind of continue on. Let's expand it a little bit. Think about um, when you're thinking of this thing, physical fitness, what does it mean to your crew?

You depend on the person next to you to stick with you. Keep up or get you out if you need them. If you get in a bind. M: Okay. So crew members depending on you and getting you out if you get in a bind, okay.

Um, the more physically fit you become the longer you can do your job effectively and safely as well. M: Okay. So it goes back to endurance. Being able to do the job longer and safer, okay No, I mean like not so much in the time short time frame, I mean career wise longer. M: Okay, okay, career, okay. It's not just these folks here relying on me to be, maintain a certain level of physical fitness it's folks at my home too, my family. You know the job is inherently dangerous. If we don't maintain a certain level of fitness we run the potential of heart attack. That's the bigger killer of firefighters. And my folks at home depend on me that I don't have a heart attack and that's always in the back of my mind. That's kind of my motivator.

M: So family life is the motivator? Yeah. M: Okay.

Coronary Heart Disease/Heart Attack Knowledge

This code captures any mention of the coronary or cardio vascular health, or heart attack knowledge and tying it in to physical fitness and/or exercise, or relates it to any health and wellness issue among firefighters.

Use when the respondent mentions CHD, CVD, and/or heart attack knowledge or relates it to physical fitness and/or exercise, or comments on the general state of this issue among firefighters.

Examples: 6 Line 1378 M: Well, this kind of takes me, I'm kind of curious here. Let me think now, you guys have touched on some things that I'm interested in. Take a scenario that I'd like to read a statistic and get your response. Your general impressions and your opinions and you may know it. Over fifty percent of firefighters on duty deaths occur to coronary heart disease or heart attack. What does that bring to mind for you when you hear that stat?

Heart attack alley. M: Heart attack alley. Your diet. M: What do you mean by that? Being 40 to 55. M: 40 to 55 years old, okay. Firefighters in that age group die from heart attacks. To me I say it like this, I've done seen some stuff. I've done seen some young people die from heart attacks. So like XXX is having problems with his heart and he's what, 21 years old and in good shape. I say then again it could play diet then it could play something that's in your family. There's a lot of other variables but more than likely if you know you go back and you start looking at age and then other factors you know it still it's less likely if you're in shape than you are if you're out of shape.

Interpersonal Level

Social (fitness) norm- crew level

Operational definition: the shared expectation, standard, or rule by crew members of what firefighters will engage in terms of physical fitness behaviors such as fitness activities during the PT period. It is the shared belief of what is normal and acceptable in terms of physical fitness behavior or practices during the PT period. (Updated 3/6/07 to reflect that the norm can be to workout or engage in something else or nothing at all). *Same below for "*use when"

Use when: participant mentions the expectation by fellow crew members of what he/she or other firefighters are expected to participate or do in terms of fitness activities during PT, or what they will work to do improve his/her physical fitness level to do the job, or support the crew on the job *(if anything)*.

****NOTE: Social fitness norms, regardless of crew, captain, or management level, will be later coded if appropriate as to the type neither of nor in terms of injunctive or descriptive fitness norms. Injunctive norms describe the "ought to do" or what the expected norm is for firefighter fitness, i.e., firefighters** *ought to* **work out during the PT period. Descriptive fitness norms describe the "what is", or the perception by firefighters as to what they believe is actually done regarding physical fitness and/or PT participation/non-participation by firefighters.**

Examples: M: Okay. Alright. Well, bump it up. Let's keep going up a level. When you think about physical fitness and the station itself, what comes to mind? Fitness, firefighting and the station.

As firefighters, I think we're, we're competitive in nature, I mean.

M: Okay.

Whether it be getting to the call first you know or whatever. It's what we do and you know you come in, you come in and you do your workout whatever and you go home the next day and you come back in the next morning and all the stuff you used is exactly where you left it you know, you kind of look at the other shift you know why aren't they doing their fitness or you know whatever.

M: Okay.

And you can most of the time look at their physical body and understand. I think to you, you come in and go oh, they're not doing fitness. Wonder why they're not doing fitness. And I think everybody

else they go XXX just trying to show somebody up. Or look how easy the other shift's got it because they don't have to workout. Well, XXX is all over me because I have to workout everyday but you know XXX doesn't say, XXX doesn't care if I workout, that kind of thing. I think that's actually what crosses peoples minds more than whether or not.

M: So, is that more on the shift level or like across the stations like in different areas.

Stations. Three shifts working in the same station.

Social (fitness) norm- captain level

See definition of social norm given above

Operational definition: the shared expectation, standard, or rule by the crew captain what his/her firefighters will engage in terms of physical fitness behaviors such as fitness activities during the PT period. It is the shared belief of what is normal and acceptable in terms of physical fitness behavior or practices during the PT period (Updated 3/6/07 to reflect that the norm can be to workout or engage in something else or nothing at all). Same below for "use when"

Use when: participant mentions the expectation by the crew or shift captain that he/she or other firefighters are expected to participate or do in terms of fitness activities during PT, or what they will work to do improve his/her physical fitness level to do the job, or support the crew on the job *(if anything), e*ither by following the lead of the captain or by unspoken norm..

Examples: M: So then think I hear a lot about what you're saying about your crew, let's bump it up a level and go how does fitness play in with ah, like what does it mean to your shift itself? Going from the crew to the shift.

I think our shift probably works out as much or…

We've got a young battalion chief. So he definitely encourages physical fitness. I think it plays a part a big part on the battalion chief and the captain.

M: In what way is that?

Because if you've got a crew, let's say you've got a crew and the captain don't encourage physical fitness then them guys ain't gonna go out there and do it.

M: Okay, gotcha.

They don't even have the chance to go out there and do it if the captain.

Oh, yeah and some there's some captains, I ain't going to say no names but it's one captain that will make up an excuse or try and find something else to do just because he don't want to workout, he don't want you to workout neither. Like you're going to get past him or something.

M: So and you were saying XXX that the battalion chief does?

The battalion chief, our battalion chief encourages working out. He's a young guy and he definitely, if one person is out there working out he wants everybody to be out there.

Peer Influence

A set of group dynamics where a group of people influences the individual to do something he or she might not normally do. Peer influence has been shown to increase exercise behaviors.

Operational definition: This code captures mention of the crew or higher level member's influence in convincing a firefighter to engage in physical fitness activities, or to change/improve physical fitness level when he/she may not normally engage in the behavior. This expectation may not be the norm, but an idiosyncratic belief, and can be in the form of direct influence or pressure, or indirectly by actions, e.g., working out.

Use when: participant is influenced to conform to a physical fitness/exercise practice or activity expected by a crew member, captain, or higher level firefighter(s), either directly through influence or pressure, or indirectly by action.

Examples: 1 (Inter PFF) Line 0617 "M: What are some of the ways um, that the crew, the captain, duty or battalion chief encourages physical fitness for you? Lead by example. M: By example, okay. If you're at a station where everybody works out it's easier to fall into a routine. If you're at a station where only one guy works out and everybody else is watching TV then you will fall into the crowd that watches TV. M: Okay, alright. If your captains doing it he can yell at you about it and you ain't going to call him a hypocrite."

2 Line 0255 M: Okay, individual commitment level. Alright, what are some things that might make it easier to maintain a physical fitness level? What are the things that might make it easier?

Guys who want to work out with you. Partner, yeah. M: Okay, work out partner, okay. Yeah, makes you accountable. M: Okay. A lot of times someone like me if I'm, it takes a little more to get me out there so…M: Okay. If I was actually made accountable to someone I would be more apt to work out more often. M: Okay, so accountability is a big factor? Alright, I see nods of agreement. What else, what else makes it easier?

Social Support

Social support is the physical and emotional comfort given to us by our family, friends, co-workers and others (Wikipedia, 2007). Supervisors and coworkers provide social support for healthy behaviors through advice, comfort, verbal feedback, praise and encouragement, attention, or the opportunity for interaction (Stewart and Tilden, 1995). Social support has been used to facilitate change in several health related behaviors, including self-regulation of exercise adherence in worksite exercise interventions (Hallam and Petosa, 2004)

Operational Definition: This code captures mention of emotional support or comfort, or a favorable attitude given by firefighters when he/she or others are engaging or attempting to engage in physical fitness activities on the job or outside the job setting to improve physical fitness level

Use when: participant mentions any emotional support, comfort given by fellow firefighters such as verbal feedback, praise and encouragement, attention, or the opportunity for interaction during or engaging in physical fitness activities or exercising during the fitness or PT period.

Examples: 2:48 Inter EF Line 1025 "What are some things that make it easier to exercise during that physical fitness? If anybody at the station works out and they know how to do certain type of bench presses or any other special stretches. How to do certain exercises. Somebody that is trained in physical training. It goes back to that buddy thing. Having somebody with you, that you know you're working out with is always encouraging."

Social Cohesiveness

Social cohesiveness is the tendency of a group to stick together and remain united in the pursuit of goals and objectives (Carron, 1982). Social cohesiveness also factors in sustaining exercise participation (Estabrooks, 2000).

Operational definition: This code captures mention of the group cohesiveness, "togetherness", or feeling part of the group as a reason for engaging in or sustaining physical fitness activities and/or exercise participation.

Use when: participant mentions a motivator to exercise or engage in a physical fitness activity on the job is the cohesiveness or feeling included in the group the activity brings, including morale and camaraderie (added this 12/14/06) such as team sports like basketball, flag football, or volleyball

Examples: 6 (Inter PFF) Line 0395 "From the stand point of what we want to see, we try to get our crews we understand the fitness aspect. So we get out there and move. And what I've found because there are different levels of fitness you know as long as we keep the opportunity or provide the opportunity like on our crew XXX is going to run and lift and XXX is going to walk and I am going to walk so everybody's but as long as they're doing something you know it still improves the level of your fitness of your crew. And it builds some team cohesion."

(Crew) Dependability

The reliability of a person to others because of his integrity, truthfulness and trustfulness, traits that can encourage someone to depend on him. (Wikipedia, 2007)

Operational definition: This code captures mention of either being able to depend on a member of the crew, or the crew being able to depend on him/her as a reason to engage in, to change/improve, maintain, or is an example of physical fitness activities or a current state or level of physical fitness

Use when: participant mentions peer dependability of the crew in him/her self as a reason to engage in, to change/improve, maintain, or is an example of physical fitness activities or a current state or level of physical fitness

Examples: 1 Line 0335 M: Okay. What does physical fitness mean to your crew? What does it mean to your crew?

You're each others support. M: You're each others support? Yeah. M: In what way? Well you go in as a crew and you come out as a crew so if you've got three guys going in and I breathe my bottle down in two minutes then (XXX)'s got to come out with me. M: Okay. You know, so basically you take everybody out. If there's a weak link in the chain and that one person is not able to keep up or do his part then that kind of breaks the team down, I guess you would say. M: Okay. You know or either those other people have to take up his slack and you know work a little harder to, to do what needs to be done. M: Okay. If you can't back up on the hose line you're just hurting the nozzle man.

Teasing for lack of fitness

The act of harassing someone playfully or maliciously (especially by ridicule); provoking someone with persistent annoyances (Wordnet 2007). While not directly referenced in the adult fitness literature, it is cited as a type of peer victimization in child/pediatric literature as a result of the child's physical appearance (Hayden-Wade et al, 2005).

Operational Definition: This code captures the act of teasing by crew members or other firefighters as a means to discourage or ridicule a firefighter when his/her physical fitness level is perceived as less than adequate, either for job tasks or in general.

Use when: the participant mentions being teased or discouraged for lacking a perceived level of physical fitness deemed appropriate for the job, or lacking the ability or skills when attempting to improve his/her physical fitness level for job tasks or general fitness or health

Examples: 5 Line 1260 M: Well think, so then what are the types of things I might hear firefighters say, anybody, if, if a firefighter is not exercising during the PT period?

You want to cut those off? M: Yeah. So and that's fine I, anybody can laugh but what kind of things evolve, if any? Put that biscuit down, get your fat butt off the couch and come out here and workout. M: Okay. I mean honestly that's… M: Yeah. What we would say. There would be a lot of bleeps in there.

Yeah, I mean I'd say get up. We'd have to clean that up a lot. M: We'll X that out so. I mean people can't, they're out of shape and they can't even come to work because they do something off duty and they get hurt. And ahh, I can't come to work so then that shorts the whole shift. People on the other shifts get held over which makes everybody mad because it's one person's fitness that's poor. Oh, I can't, I'm hurt today. M: So do people always say something if somebody is not exercising?

Sometimes it might be. I think it gets to be a habit and you just go oh, he's never going to workout… He's not going to do it anyway. A few of them go do it and the other one just kind of sits in the office and does paperwork or watches TV or eats a biscuit or. M: Okay.

Teasing/discouragement for participating in PT or fitness

Same definition for teasing: The act of harassing someone playfully or maliciously (especially by ridicule); provoking someone with persistent annoyances (Wordnet 2007). While not directly referenced in the adult fitness literature, it is cited as a type of peer victimization in child/pediatric literature as a result of the child's physical appearance (Hayden-Wade et al, 2005).

Operational Definition: This code captures when crew members tease or discourage the firefighter when he/she either attempts to, or is currently engaged in, physical fitness activities/exercise for the job or personal fitness level.

Use when: the participant is teased or discourage by fellow firefighters for trying to improve his/her physical fitness level or engage in any physical fitness/exercise activity

Examples: 2:59 Inter EB Line 1235 "What are the types of things that you might hear firefighters say, if anything, if a firefighter does not exercise during the physical fitness or PT period? You don't want us to answer that. Reverse that, what if you are working out just the people are not saying it to you. M: Okay, well then let's flip it. What would they be saying? It's harsh. M: It's harsh. Yeah, they're mean. Come on, can't you lift any more than that? And they're the one standing there drinking a Coke. A little sweaty ain't you?
M: Alright, so it sounds like it's almost a reverse thing if you're working out you get picked on. You get picked on whether you're working out or not. It just varies with what you're doing, you know. M: Okay. You are going to get picked on no matter what you do."

Institutional/Organizational Level

Work Environmental Factors

This code captures any mention of workplace environmental factors regarding physical space, temperature, and equipment that can affect the firefighter's ability to change or improve his/her or others physical fitness level or attempt to exercise in general.

Use when: participant indicates that physical factors in the work's environment prevent/decreases or improve/increases the likelihood of exercising or engaging in physical fitness during the PT period-can be a barrier or facilitator

Examples: 4 Org EB Line 1447 "It all comes back to having sufficient equipment to do something with. And like we said some of these stations, we're a little more fortunate here because we have some stuff, we have room still I mean a lot our guys won't even go down there because it's depressing to go down there almost. M: Really. I mean it's a hundred degrees. It's ninety eight down

there. There's windows. There's no ac. M: Oh, there's no air? Oh, wow. Smells like turn out gear. M: Smells like turn out gear? Okay. M: Like the smoky smell? Yeah. And the turn out gear room is attached to your weight room. M: Okay. And all those carcinogens. Plus you've got a 1920's model bicycle to go down there and get your cardio on. M: Old equipment. Yeah, nobody wants to do that."

Management (level) social fitness norms

As with a social norm defined for crew and captain level norms, a social norm is a pattern of behavior expected within a particular society in a given situation. The shared belief of what is normal and acceptable shapes and enforces the actions of people in a society. The very fact that others in one's society follow the norm may give them a reason to follow it.

Operational definition: the shared expectation, standard, or rule of the battalion chief, deputy chief, or chief that his/her firefighters will engage in physical fitness behaviors such as fitness activities during the PT period. It is the shared belief of what is normal and acceptable physical fitness behavior on the part of management.

Use when: participant mentions the expectation of the battalion chief, deputy chief, or chief that he/she or other firefighters will exercise or engage in other fitness activities, or will work to improve his/her physical fitness level, either by following the lead of management, or by unspoken norm

Examples: M: Well, that's kind of a good lead in, XXX. Thinking about like doing activities like that. Let's think now, think of your ideal world money is no object. New firefighters coming in but they're like if it's new firefighters, what activities would you, what advice would you have for your vision of a physically fit or physically ready department with new firefighters. You've got new firefighters coming in.

Right. Our department would present an image to these people before they even get here. When they walk in the door they look from the top down. They don't see one of our bosses standing in the doorway with his gut out to here, smoking going you need to be doing fitness.

M: Yeah.

They wouldn't see things like that. They'd see the whole department physically fit. They'd see us with the opportunity to be physically fit. Somewhere to do our fitness, they'd see you know fitness to be a priority…

M: Gotcha.

To the department and it's not from the top down. It's not. Yeah. I think that's the problem. That is the ideal world. I think if you ask anybody they'd say yeah, I want to be in shape for myself and for my crew because it's going to benefit me all around. Ideally, I think anybody would say that and that's probably crazy if they wouldn't. But the fact of the matter is like I used to workout five, six times a week like all the time it didn't matter.

M: Yeah.

But eventually this schedule wears on you. I don't care who you are and it doesn't matter how dedicated you are eventually this catches up and you slow down. Because you don't have any choice. You can't keep up. You can't operate on more lower than average levels of sleep, added stress on top of second jobs and families and all that stuff. You just can't do it.

M: It wears you down over time?

Yeah, no matter who you are at some point in your career you're going to bottom out. You're not going to be able to keep up that pace.

Because the motivation is not there though. If you feel like everyday that you came to work and that was the expectation and everybody above you was doing it, it would be less of a problem.

Perceived Social Support/Lack of Social Support- Management Level

As with social support on the interpersonal level, social support is the physical and emotional comfort given to us by our family, friends, co-workers and others (Wikipedia, 2007). Supervisors and coworkers provide social support for healthy behaviors through advice, comfort, verbal feedback, praise and encouragement, attention, or the opportunity for interaction (Stewart and Tilden, 1995). Social support has been used to facilitate change in several health related behaviors, including self-regulation of exercise adherence in worksite exercise interventions (Hallam and Petosa, 2004)

Operational Definition: This code captures mention of the battalion chief's (or higher) perceived support or a favorable attitude towards efforts to change or improve physical fitness level or engage in physical fitness activities on the job by the firefighter(s). Also captures the reverse in terms of mention of the battalion chief's (or higher) perceived lack of support or a negative attitude towards efforts to change or improve physical fitness level or engage in physical fitness activities on the job by the firefighter(s) .

Use when: participant mentions any emotional support or comfort (or lack there of) give by management such as verbal feedback, praise and encouragement, attention, or the opportunity for interaction.

Examples: 1 Line 1319: And along those same lines, I think motivation has to start from the top. M: Okay. If administration acts like they really care not like Dr. (XXX), or nothing against Dr. (XXX) but it's really, you know it's pretty much a joke but if ah, if they act concerned and they put time and effort into it I think it will trickle down. M: Okay. But in the past they really haven't even acted like they could care less. M: Okay, so that top down approach would make a difference. Well, that's my opinion.

Participation Strategies

Participation strategies refer to organizational level initiatives such as workplace exercise programs designed to encourage participation and improve health and overall wellness. These programs have demonstrated mixed success in terms of sustained exercise adherence (Dishman, Oldenburg, et al, 1998).

Operational definition: This code captures any mention of department organizational strategies to encourage firefighter participation in physical fitness or exercise activities, either on or off the job.

Use when: participant mentions strategies such as the allotted PT period, the Candidate Physical Agility Test (CPAT), annual physical fitness testing, academy PT, providing fitness trainers or equipment training, or job-related training that is fitness inducing.

Examples: 1 Line 1291 M: We're getting to the end of it and then John may have a few questions that he's going to ask but the last one I would like to ask is there anything that we've missed or think we should know related to physical fitness in the fire department so it will help us better understand what you face day to day.

I really think what Captain (XXX) says um the way that our heart rate goes from sixty to a hundred, hundred and twenty at times, we can be in top physical shape and it's still going to take a wear and tear on us. M: Okay. Simply for that reason. Genetics have a lot , would have a lot to do with that. I don't think there's any ideal world or set way to do this. There are a great amount of improvements that we need to make. I really think that the CPAT, like I've said before, is the right direction. I think it's going to create accountability on each individual. I think you will see and this could be a whole

other study that the wear and tear on our bodies specifically cardiovascular would, would decrease the better shape we're in. M: Okay.

Job Task/Activities

This code was derived from the in-vivo code domain "calls" from the ethnographic interviews.

Operational definition: This code captures mention of any job related functions, tasks, and activities that can/do inhibit participation in physical fitness and exercise activities.

Use when: participant indicates that job tasks, i.e. training/ continuing education, public relations activities, inspections, etc. that decrease the time available to engage in physical fitness activities and/or exercise

Examples: 1 Org PFB Line 0137 "Sometimes you get into a routine of doing it at a certain time and if you have calls or something like that throw it off you're kind of not really as interested in doing it. You know, you kind of. You might have had like a busy call or something like that, come back and you know I really don't feel like doing it now. M: So schedules… Yeah."

Fitness/Exercise Incentives

Worksite incentives have been shown to have a positive influence on worksite health promotion program participation (Linnan, Sorensen, et al, 2001). In general, worksite incentives to improve health, physical fitness or exercise participation can include health education, smoking cessation, screening programs, and exercise facilities.

Operational definition: This code captures specific mention of any incentive that exists or could exist that might result in changing or improving physical fitness/exercises habits among firefighters.

Use when: participant mentions any departmental incentives that change or improve fitness/exercise habits such as the allotted PT period itself, management recognition, i.e. plaque, financial bonuses, gym memberships, tying fitness into evaluations, or work related physical fitness exams or physicals.

Examples: 2 (Org OFF) Line 0769 M: What else? Do they, how could they encourage physical fitness? What are some other ways? We've got flexibility, leadership. Recognition. M: Recognition, for? Some type of incentive program for the guys. M: Okay. Some type of small rewards program. Whether it's just a plaque or a gym membership or something, some type of, some way for them to show they appreciate their accomplishments. Some people respond a lot really well to that.

Team Sports

This code emerged as an in-vivo code during review of the focus group transcripts and captures any mention of team oriented sports as a means to change or improve firefighter physical fitness and/or level of exercise.

Use when: Respondent mentions any team sports such as basketball, volleyball, flag football, or other that leads to a change, improvement in, or helps to maintain physical fitness or exercise level in a firefighter or firefighters.

Examples: 3 Line 0328 M: ... Alright, now let's think a little bit about in terms of physical fitness activities that you may do um, what are the activities that you feel are important to maintain your physical fitness personally? I think team sports. M: Team sports. Even more so than doing the rotation and on that single weight machine we've got back there. We, we were in a period where we went to the YMCA and we played basketball everyday. And we'd play basketball for two hours, full court basketball. And that was the best shape we were in for a while. And then we were told you know you're not supposed to be playing basketball. M: Okay. And that put an end to it. I think the

team sport thing is really particularly with the cardiovascular aspect of it that's ah, that's the way we need to go.

General/ Miscellaneous barrier or facilitator codes-

Physical Fitness Barrier

This code captures any barrier, either real or perceived, to improving individual firefighter physical fitness level

Use when: participant mentions any intrapersonal, interpersonal, or institutional factor that prevents or decreases the likelihood of improving his/her or other firefighters' physical fitness level

Examples: 1:1 (Misc B) Line 0113 "M: Okay, alright. Are there things that make it harder or more difficult to maintain physical fitness? What might make it…
This heat. M: Heat. Okay, let's talk about heat for a second. What about heat?
This is too hot to work out in. M: Okay."

Physical Fitness Facilitator

This code captures anything, either real or perceived, that facilitates improvement in physical fitness level

Use when: participant mentions any intrapersonal, interpersonal, or institutional factor that improves or increases the likelihood of improving his/her or other firefighters' physical fitness level

Examples: 6:8 Misc F Line 0249 "We have some folks here who are runners but they're not very strong. We have some folk who lift a lot of weights but they don't run well. But XXX is balanced. Our jobs, you get a lot of people don't think but our job requires a balance of cardiovascular and strength."

Exercise Barrier

This code captures any mention, either real or perceived, of barriers to exercising during the PT period or while off duty.

Use when: participant mentions any intrapersonal, interpersonal, or institutional factor that prevents or decreases the likelihood of exercising during the PT period or while off-duty

Examples: 3:51 (Intra EB) Line 0785 "So if because the policy states you know this is your work out period, our work out period literally ends when that period ends. And if it's interfered with then it's.. M: So the policy makes it difficult, more difficult. For some place, yeah."

Exercise Facilitator

This code captures anything, either real or perceived, that facilitates exercising during the PT period or while off duty.

Use when: participant mentions any intrapersonal, interpersonal, or institutional factor that improves or increases the likelihood of exercising during the PT period or while off-duty

Examples: 2:48 (Inter EF) 1025 "What are some things that make it easier to exercise during that physical fitness? If anybody at the station works out and they know how to do certain type of bench presses or any other special stretches. How to do certain exercises. Somebody that is trained in physical training. It goes back to that buddy thing. Having somebody with you, that you know you're working out with is always encouraging."

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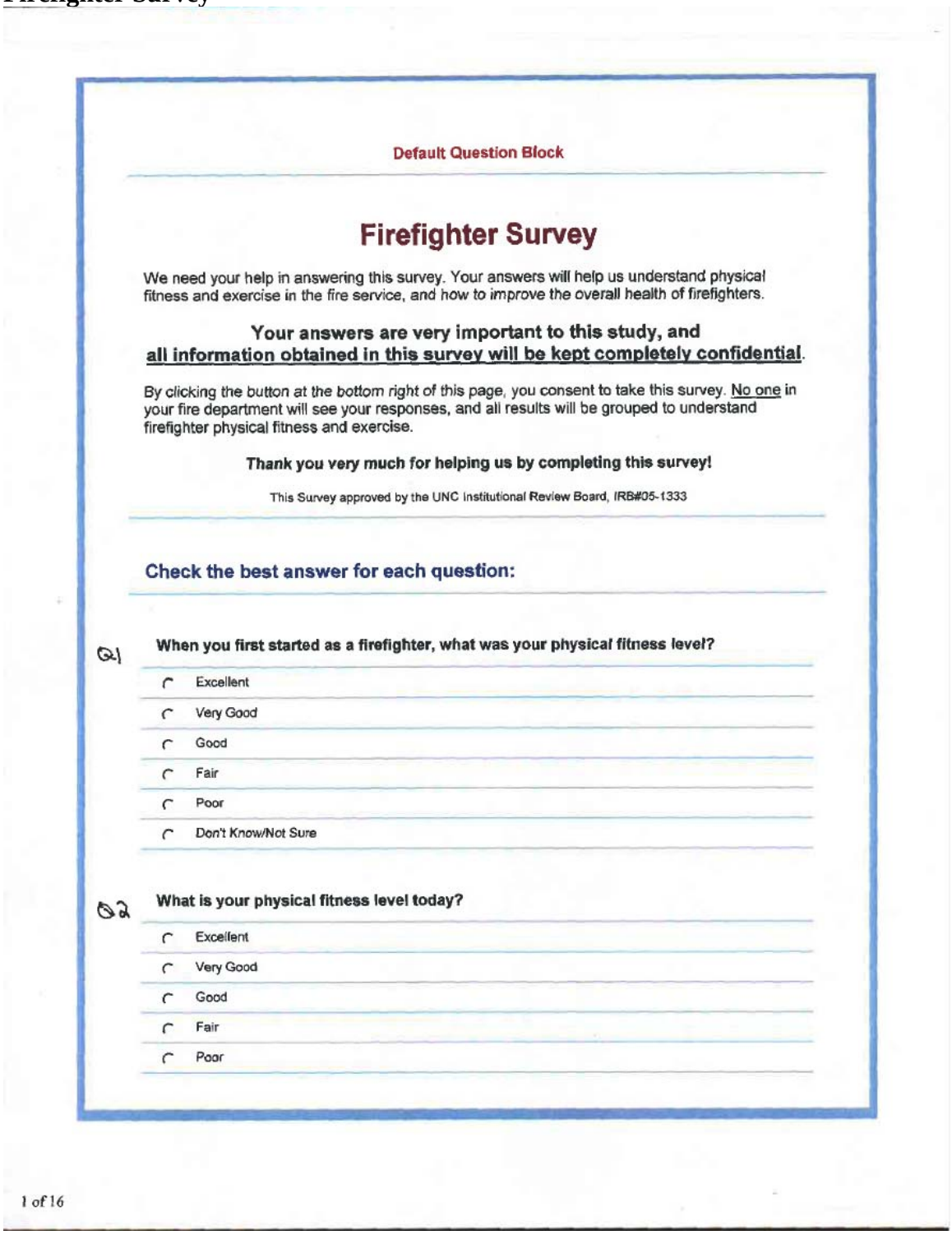
Appendix H
Firefighter Survey



Default Question Block

Firefighter Survey

We need your help in answering this survey. Your answers will help us understand physical fitness and exercise in the fire service, and how to improve the overall health of firefighters.

Your answers are very important to this study, and all information obtained in this survey will be kept completely confidential.

By clicking the button at the bottom right of this page, you consent to take this survey. No one in your fire department will see your responses, and all results will be grouped to understand firefighter physical fitness and exercise.

Thank you very much for helping us by completing this survey!

This Survey approved by the UNC Institutional Review Board, IRB#05-1333

Check the best answer for each question:

Q1 **When you first started as a firefighter, what was your physical fitness level?**

- Excellent
- Very Good
- Good
- Fair
- Poor
- Don't Know/Not Sure

Q2 **What is your physical fitness level today?**

- Excellent
- Very Good
- Good
- Fair
- Poor

1 of 16

Q3 **Do you enjoy working out or exercising during your department fitness or physical training (PT) period?**

- ○ Yes
- ○ Sometimes
- ○ No

Q4 **How often do you typically work out or exercise during the week? (Including inside and outside your fire department job.)**

- ○ Never
- ○ One day a week
- ○ Two days a week
- ○ Three days a week
- ○ Four days a week
- ○ Five days a week
- ○ Six days a week
- ○ Seven days a week

For this next section, these questions ask about the level of encouragement you experience at work for working out during the fitness or physical training (PT) period.

How often do any of your co-workers do the following?

Please check the one best answer for each question.

	Always	Usually	Sometimes	Rarely	Never	Does Not Apply
Q5 Kid or tease you for working out/exercising during the fitness or physical training (PT) period	○	○	○	○	○	○
Q6 Say nothing when you work out/exercise during the fitness or PT period	○	○	○	○	○	○
Q7 Say something encouraging when you work out/exercise during the fitness or PT period	○	○	○	○	○	○
Q8 Give you a hard time when you do not work out/exercise during the fitness or PT period	○	○	○	○	○	○

This question asks about the level of encouragement you experience at work for healthy eating. Answer the question in the same way you did for the previous

question.

How often do any of your co-workers do the following?

Please check the one best answer for each question:

		Always	Usually	Sometimes	Rarely	Never	Does Not Apply
Q9	Kid or tease you for eating a healthy meal during breakfast, lunch, and/or dinner	○	○	○	○	○	○
Q10	Say nothing when you eat a healthy meal during breakfast, lunch, and/or dinner	○	○	○	○	○	○
Q11	Say something encouraging when you eat a healthy meal during breakfast, lunch, and/or dinner	○	○	○	○	○	○
Q12	Give you a hard time when you do not eat a healthy meal during breakfast, lunch, and/or dinner	○	○	○	○	○	○

Cigarette Smoking

In this next section, please answer these questions even if you do not currently smoke. Non-smokers and ex-smokers will be asked to skip some questions. Choose the one best answer for each question.

Q13 **At my fire department, there is a smoking policy that says:**

- ○ Smoking is not allowed anywhere
- ○ Smoking is allowed only in a few smoking areas
- ○ Smoking is allowed anywhere except a few non-smoking areas
- ○ There is no policy
- ○ I don't know what the policy is

Q14 ***Not including yourself, does anybody in your household smoke cigarettes?***

- ○ Yes
- ○ No

Q15 **Please select any of the tobacco products below (excluding cigarettes) you currently use:**

Cigars	Pipe	Tobacco "dip" or "snuff"	Chewing tobacco	None of the above

Q16 **Have you smoked at least 100 cigarettes in your entire life?**

- ○ Yes
- ○ No

Q17 **Are you currently a cigarette smoker?**

- ○ Yes
- ○ No

The next couple of questions are because you indicated you were a previous smoker but have quit smoking.

Q18 **Have you quit smoking within the last 2 years?**

- ○ Yes
- ○ No

Q19 **How confident are you that you <u>will not</u> be smoking a year from now?**

- ○ Extremely confident
- ○ Very confident
- ○ Somewhat confident
- ○ Slightly confident
- ○ Not confident

This next question asks about the level of encouragement you experienced at work when you tried to quit smoking.

How often did a co-worker?

Please check the one best answer for each question.

	Always	Usually	Sometimes	Rarely	Never	Does Not Apply

Q20	Kid or tease you for trying to quit smoking	○	○	○	○	○	○
Q21	Say nothing when you tried to quit smoking	○	○	○	○	○	○
Q22	Say something encouraging when you tried to quit smoking	○	○	○	○	○	○
Q23	Gave you a hard time FOR smoking	○	○	○	○	○	○

Q24 **During the past seven days, how many cigarettes did you smoke on an average day?**

Type number of cigarettes smoked per day: [ ]

Q25 **Are you seriously thinking about quitting smoking in the next six months?**

○ Yes

○ No

Q26 **Are you seriously thinking about quitting smoking in the next 30 days?**

○ Yes

○ No

Q27 **How many times in the last 12 months have you quit smoking for at least 24 hours?**

Type number of times here: [ ]

This next question asks about the level of encouragement you experience at work when you try to quit smoking.

Please check the one best answer for each question.

How often has a coworker done the following:

		Always	Usually	Sometimes	Rarely	Never	Does not apply
Q28	Kid or teased you for trying to quit smoking	○	○	○	○	○	○
Q29	Said nothing when you tried to quit smoking	○	○	○	○	○	○
Q30	Said something encouraging when you tried to quit smoking	○	○	○	○	○	○
Q31	Given you a hard time FOR smoking	○	○	○	○	○	○

Q32 **How confident are you that you will be able to stop smoking in the next six months?**

- Extremely confident
- Very confident
- Somewhat confident
- Slightly confident
- Not confident at all

Now in this next section, the following questions will ask you about certain health-related situations at your fire station.

Q33 **Generally speaking, which of the following happens most frequently at your station for each of the following health related behaviors?**
About Smoking:

- Someone teases a co-worker trying to quit smoking
- No one says anything when a co-worker tries to quit smoking
- Someone says something encouraging when a co-worker tries to quit smoking
- Someone gives a co-worker a hard time FOR smoking

Q34 **About physical fitness/exercise participation during the fitness or Physical Training (PT) period:**

- Someone teases a co-worker when trying to work out/exercise during the fitness or PT period
- No one says anything when a co-worker tries to work out/exercise during the fitness or PT period
- Someone says something encouraging when a co-worker tries to work out/exercise during the fitness or PT period
- Someone gives a co-worker a hard time FOR working out/exercising during the fitness or PT period

Q35 **About healthy eating:**

- Someone teases a co-worker trying to eat a healthy meal during breakfast, lunch, and/or dinner
- No one says anything when a co-worker tries to eat a healthy meal during breakfast, lunch, and/or dinner
- Someone says something encouraging when a co-worker tries to eat a healthy meal during breakfast, lunch, and/or dinner
- Someone gives a co-worker a hard time when eating a healthy meal during breakfast, lunch, and/or dinner

Now for this section, please check the one best answer for each question.

The choices are <u>your level of approval</u> with how someone most frequently responds to the health related behavior.

How would you feel if any of the following happened at work?

About smoking:

	Strongly disapprove	Disapprove	Neither approve or disapprove	Approve	Strongly approve
Q36 Someone teases a co-worker for trying to quit smoking. Would you:	○	○	○	○	○
Q37 No one says anything when a co-worker tries to quit smoking. Would you:	○	○	○	○	○
Q38 Someone says something encouraging when a co-worker tries to quit smoking. Would you:	○	○	○	○	○

About physical fitness/exercise participation during the fitness or Physical Training (PT) period:

	Strongly disapprove	Disapprove	Neither approve or disapprove	Approve	Strongly Approve
Q39 Someone teases a co-worker when trying to work out/exercise during the fitness or PT period. Would you:	○	○	○	○	○
Q40 No one says anything when a co-worker tries to work out/exercise during the fitness or PT period. Would you:	○	○	○	○	○
Q41 Someone says something encouraging when a co-worker tries to work out/exercise during the fitness or PT period. Would you:	○	○	○	○	○

About healthy eating:

	Strongly disapprove	Disapprove	Neither approve or disapprove	Approve	Strongly Approve
Q42 Someone teases a co-worker trying to eat a healthy meal during breakfast, lunch, and/or dinner. Would you:	○	○	○	○	○
Q43 No one says anything when a co-worker tries to eat a healthy meal during breakfast, lunch, and/or dinner. Would you:	○	○	○	○	○
Q44 Someone says something encouraging when a co-worker tries to eat a healthy meal during breakfast, lunch, and/or dinner. Would you:	○	○	○	○	○

Now, how would you feel about your co-workers if they...

	Strongly disapprove	Disapprove	Neither approve or disapprove	Approve	Strongly Approve
Q45 NEVER worked out/exercised during the fitness or PT period	○	○	○	○	○
Q46 SOMETIMES worked out/exercised during the fitness or PT period	○	○	○	○	○
Q47 ALWAYS worked out/exercised during the fitness or PT period	○	○	○	○	○

Now for this question, please indicate whether you agree or disagree with the following statements.

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Q48 I am motivated to workout/exercise during the fitness or PT period	○	○	○	○	○
Q49 My co-workers encourage each other to work out/exercise during the fitness or PT period	○	○	○	○	○
Q50 My captain encourages the crew to work out/exercise during the fitness or PT period	○	○	○	○	○
Q51 My direct supervisor generally works out/exercises during the fitness or PT period	○	○	○	○	○
Q52 Those higher than my captain, i.e. Battalion Chief, Deputy Chief, encourage the crew to work out during the fitness or PT period	○	○	○	○	○
Q53 Physical fitness is important to my fire department	○	○	○	○	○

Q54 **What exercise activities do you typically do during the department fitness or PT period?**
Please check all that apply

- ☐ Run/walk on treadmill
- ☐ Bicycle
- ☐ Run/walk outside
- ☐ Lift weights
- ☐ Stair-climber
- ☐ Elliptical machine

Q55 **Do you ever do other activities during the department fitness or PT period other than what you checked for the previous question?**

- ○ Yes

○ No

Q56 **If you chose yes for the last question, what other activities do you typically do during the department fitness or PT period? Type in the space all that apply. (These can be <u>any activities</u> and do not have to be exercise related)**

Q57 **Outside of work, please indicate any activities you do that you consider fitness/exercise. If there are not any, simply type "None".**

Now for the next set of questions, consider the fitness/exercise activity or activities <u>you typically do or would do</u> during the fitness or PT period.

Please choose the one best answer for each question.

Q58 **For me to do my typical fitness activity or exercise during each fitness or PT period is:**

Unpleasant	Somewhat unpleasant	Neither unpleasant nor pleasant	Somewhat pleasant	Pleasant
○	○	○	○	○

Q59 **I plan to do my typical fitness activity or exercise during each fitness or PT period:**

Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
○	○	○	○	○

Q60 **For me to do my typical fitness activity or exercise during each fitness or PT period would be:**

Impossible	Somewhat impossible	Neither impossible nor possible	Somewhat possible	Possible
○	○	○	○	○

Q61 **I intend to exercise or do my typical fitness activity during each fitness or PT period:**

Extremely unlikely	Unlikely	Neither unlikely nor likely	Likely	Extremely likely

○	○	○	○	○

Q62 **I will try to do my typical fitness activity or exercise during each fitness or PT period:**

Definitely false	Somewhat false	Neither false nor true	Somewhat true	Definitely true
○	○	○	○	○

Q63 **For me to do my typical fitness activity or exercise during each fitness or PT period would be:**

Impossible	Somewhat impossible	Neither impossible nor possible	Somewhat possible	Possible
○	○	○	○	○

Q64 **Most people who are important to me think that I should exercise during the department fitness or PT period:**

Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
○	○	○	○	○

Q65 **If I wanted to, I could do my typical fitness activity or exercise during each fitness or PT period:**

Definitely false	Somewhat false	Neither false nor true	Somewhat true	True
○	○	○	○	○

Q66 **For me to do my typical fitness activity or exercise during each fitness or PT period is:**

Un-enjoyable	Slightly un-enjoyable	Neither un-enjoyable nor enjoyable	Slightly enjoyable	Enjoyable
○	○	○	○	○

Q67 **How much control do you believe you have over doing your typical fitness activity or exercise during each fitness or PT period:**

No control	Slight control	Some Control	A lot of control	Complete control
○	○	○	○	○

Q68 **It is mostly up to me whether I do my typical fitness activity or exercise during each fitness or PT period:**

Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly Agree
○	○	○	○	○

Q69 **It is expected of me that I will exercise during the department fitness or PT period:**

Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
○	○	○	○	○

Q70 **For me to do my typical fitness activity or exercise during each fitness or PT period is:**

Bad	Somewhat bad	Neither bad nor good	Somewhat good	Good
○	○	○	○	○

Q71 **I feel under social pressure to exercise during the department fitness or PT period:**

Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree
○	○	○	○	○

Q72 **For me to do my typical fitness activity or exercise during each fitness or PT period is:**

Worthless	Somewhat worthless	Neither worthless nor valuable	Somewhat valuable	Valuable
○	○	○	○	○

Q73 **People who are most important to me want me to exercise during the department fitness or PT period:**

Strongly disagree		Neither disagree nor agree		Strongly agree
○	○	○	○	○

Q74 **For me to do my typical fitness activity or exercise during each fitness or PT period is:**

Harmful	Somewhat harmful	Neither harmful nor beneficial	Somewhat beneficial	Beneficial
○	○	○	○	○

You are doing great so far!

Now for the next section, I want you to consider possible reasons why you might exercise during your department fitness or PT period.

For each statement, check "Yes" if you agree that it is a reason why you exercise, "No" if you do not consider it a reason why you exercise during the department fitness or PT period, and "Sometimes" if you consider it a reason why you exercise sometimes during the department fitness or PT period.

Remember, check "Yes" if you agree the statement is a reason why you exercise, "No" if you do not consider it a reason why you exercise, or "Sometimes" if you consider it a reason why you exercise sometimes during the department fitness or PT period.

Q75-91

		Yes	No	Sometimes
75	It makes me feel better physically	○	○	○
76	Makes me feel better mentally	○	○	○
77	Helps relieve job stress	○	○	○
78	Personal motivation	○	○	○
79	To stay in good cardiovascular shape	○	○	○
80	To combat the effect of my age	○	○	○
81	Helps prevent heart disease or heart attack	○	○	○
82	Helps me be dependable for my crew during a call	○	○	○
83	My crew thinks I should exercise	○	○	○
84	My captain thinks I should exercise	○	○	○
85	Makes me feel like part of the group	○	○	○
86	My crew supports me when I exercise	○	○	○
87	My captain supports me when I exercise	○	○	○
88	Station has enough space and variety of equipment	○	○	○
89	Management (above my captain) supports me when I exercise	○	○	○
90	My department gives me the PT period to exercise	○	○	○
91	Management (above my captain) thinks I should exercise	○	○	○

Now, I want you to consider reasons why you do not exercise during the department fitness or PT period.

Check "Yes" if you agree the statement is a reason why you do not exercise during the department fitness or PT period.

Check "No" if the statement does not apply

Check "Sometimes" if the statement is a reason why you sometimes do not exercise during the department fitness or PT period.

Q92 108

		Yes	No	Sometimes
92	Eat meal or snack	○	○	○
93	Take personal downtime (television, email, shower, smoke, rest, etc.)	○	○	○
94	Lack personal motivation	○	○	○
95	Too tired from second job	○	○	○
96	Too tired from firefighting job	○	○	○
97	To combat the effect of my age	○	○	○
98	My crew does not support me exercising	○	○	○
99	My captain does not support me exercising	○	○	○
100	I do not know what to do during the fitness or PT period	○	○	○
101	Emergency calls	○	○	○
102	Job tasks at the station (cleaning, truck and turnout gear upkeep, etc.)	○	○	○
103	Training/continuing education	○	○	○
104	Building inspections	○	○	○
105	Public relations events	○	○	○
106	Work-related paperwork, reports, and/or email	○	○	○
107	Lack of time	○	○	○
108	Station lacks facilities and/or equipment	○	○	○

How often do you typically work out/exercise during your department fitness or PT period while on your cycle of shift days?

Q109 **It does not matter how many days are in your shift cycle. For example, you can work a 3 day shift cycle, 4 day, 5 day, etc.**

- ○ Never
- ○ Once during cycle
- ○ Twice during cycle
- ○ Three times during cycle
- ○ Four times during cycle

- ○ All shifts of shift cycle

Q110 **Do you exercise or participate in physical fitness/exercise activities outside the department fitness or PT period?**

- ○ Yes
- ○ No

Q111 **Do you have a previous history of heart disease and/or a previous heart attack?**

- ○ Yes
- ○ No

Q112 **What is your overall health status?**

- ○ Excellent
- ○ Good
- ○ Average
- ○ Below Average
- ○ Poor

Q113 **Are you currently :**

- ○ Married
- ○ Never Married
- ○ Divorced
- ○ Widowed
- ○ Other

Q114 **How long have you been a firefighter?**

- ○ One year of less
- ○ 2-5 years
- ○ 6-10 years
- ○ 11-15 years
- ○ 16-20 years
- ○ 21-25 years
- ○ More than 25 years

Q115 **What is your current position?**

- ○ Firefighter
- ○ First Class Firefighter or Firefighter 1
- ○ Firefighter 2
- ○ Senior Firefighter/ Master firefighter or Driver
- ○ Lieutenant
- ○ Captain
- ○ Battalion Chief
- ○ Division Chief
- ○ Chief

Q116 **What is the highest grade or level of school that you have completed?**

- ○ High school graduate or GED
- ○ Some college or 2-year degree
- ○ 4 year college graduate
- ○ More than a 4-year degree

Q117 **What is your current salary level?**

- ○ Less than $30,000/year
- ○ $31,000-35,000/year
- ○ $36,000-$40,000/year
- ○ $41,000-$45,000/year
- ○ $46,000-$50,000/year
- ○ Greater than $50,000/year

Q118 **What is your gender?**

- ○ Male
- ○ Female

Q119 What was your age at your last birthday (how old did you turn at that birthday)?

Type in your age

Q120 **How would you describe your race?**

- American Indian or Alaskan Native
- Asian or Pacific Islander
- Black or African-American
- White/ Non-Hispanic
- Hispanic
- Another race or multi-racial (write in) _____

Q 121 **Which fire department do you work for?**

- Cary
- Chapel Hill
- Durham
- Raleigh

THANK YOU VERY MUCH FOR YOUR TIME AND PARTICIPATION!!! YOU ARE DONE!!!!

The results of this survey will be used to help improve the fitness and overall health of firefighters from your department and others across North Carolina. If you would like a copy of the aggregate survey results when the study is completed, please email:

Again, thank you for your participation!

Click the button at the bottom right of the screen to exit