



AN ABSTRACT OF THE THESIS OF

Kristin H. Kipp for the degree of Master of Science in Nutrition and Food Management presented on July 1, 2008.

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Abstract approved:

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Although firefighting is associated with a high level of physical health, heart attacks are the leading cause of deaths among firefighters. Research has identified factors that influence health behaviors in the general public, but little is known about this unique subset of the population. Since so little is known, this study was performed to provide further insights into this population and help to understand the barriers and supportive factors to practicing healthy behaviors among this at-risk population. This was an exploratory study that sought to identify the perceived factors that influence firefighter's health behaviors and utilized qualitative techniques in order to answer the research question. Specifically, data from six focus group sessions that were conducted on firefighters in Corvallis, Oregon was utilized. Three distinct but interrelated themes emerged from the data: The environmental influences on firefighter's healthy behaviors, the knowledge, beliefs, and attitudes firefighters have about healthy behaviors, and the perceived social influences that affect firefighter's healthy behaviors. The results of this study suggest that many of the obstacles to eating healthy and exercising regularly that exist for the general population also exist for firefighters, but seem to be worsened by the interactions between environmental and peer influences and the attitude and belief

systems within the firefighting community. While some individual firefighters managed to maintain healthy lifestyles, this study suggests that those firefighters were very motivated or determined to be healthy. Determining how to address their health behavior influences and identifying the supportive and obstructive elements among the firefighting community are needed in order to find ways to positively impact their lifestyle. Nutrition and health educators need to develop programs that focus on creating team support for motivating healthy lifestyles and targeted intervention programs to help reduce the risk for chronic diseases among firefighters.

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Firefighter's Perceptions of Factors That Influence Healthy Behaviors: A Case Study in  
Corvallis, Oregon

by  
Kristin H. Kipp

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Kristin H. Kipp, Author

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## CONTRIBUTION OF AUTHORS

Dr. Cluskey and Annie Reay conducted the focus groups that were used for this thesis. Dr. Cluskey assisted with data analysis and interpretation. Dr. Grobe assisted with the design and writing of the materials and methods section.



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# **FIREFIGHTER'S PERCEPTIONS OF FACTORS THAT INFLUENCE HEALTHY BEHAVIORS: A CASE STUDY IN CORVALLIS, OREGON**

## **INTRODUCTION**

Despite the known benefits to healthy eating and exercise in reducing chronic disease, many still do not choose to eat nutritious foods or participate in a regular exercise program. According to the Centers for Disease Control and Prevention (CDC)<sup>1</sup>, heart disease remains the number one cause of death in the U.S. and overweight and obesity continue to increase. Currently an estimated 66% of the U.S. population is considered either overweight or obese<sup>1</sup>.

Although firefighting is often associated with a high level of physical health, it has become apparent that not all firefighters meet this particular stereotype. The CDC reports heart attacks as the leading cause of fatality among firefighters, and a large percentage of firefighters are considered overweight<sup>2</sup>. Other researchers have shown that firefighters appear to be following the trend toward increasing obesity as well, and may have other cardiovascular disease (CVD) risk factors such as sedentary lifestyles, hypertension, and dyslipidemia<sup>3-5</sup>.

Research has identified factors that influence health behaviors for the general public<sup>6-17</sup>, but it is unknown which of these factors may be relevant to the lifestyles of firefighters. This study will utilize a qualitative research approach to better understand firefighters' perceptions of the factors that influence their health behaviors. Recognizing influences that may be perceived as barriers or supportive to healthy living will provide insights and information that may aid in designing targeted intervention programs for this population, thus helping to prevent future cardiac-related deaths.

## LITERATURE REVIEW

Social networks, physical activity, dietary habits, and the environment have all been found to be influential on health behavior. This literature review begins by looking at the relationship between firefighters' social network and their work environment and how that may influence their perceptions and behaviors. Then, other factors that influence health such as physical activity, dietary habits, the environment, as well as the attitudes and beliefs of firefighters and of individuals with similar demographic characteristics to firefighting will be discussed. This review concludes with a brief summary of the existing literature gaps and why this study is of importance.

### **Social Network and Group Influence on Firefighters' Choices**

According to Cohen <sup>18</sup> there has been recent attention to the role that social relationships play on physical health. The structure of social networks, the support that is received from others, and the quality and quantity of social interactions have all been identified as predictors of health and well being. According to Heaney and Israel <sup>19</sup>, the web of social relationships that surround individuals is called their social network. These social networks are connections between individuals that may or may not provide social support and may serve other functions. The authors <sup>19</sup> proposed five pathways in which social support and social networks influence health behaviors and outcomes: (1) meeting basic needs such as intimacy and companionship, (2) increasing coping resources, (3) reducing an individual's exposure to stressors, (4) increasing community capacity, resources and problem solving which leads to an increased ability to cope, and (5) providing support for health behavior changes.

Firefighters have a distinct social network within their work environment.

Because of this, the workplace may influence firefighter's health. A large portion of firefighters' lives are spent at work; and when not working, firefighters may continue to experience the effects of work both mentally and emotionally<sup>20</sup>. During a twenty-four hour shift at the fire station, not only do firefighters respond to calls and perform their regular duties around the station, but they also prepare their meals and eat, sleep, relax, and exercise together. As a result, firefighters often develop close ties with their peers.

Firefighters have a unique job structure that is centered on teamwork, and they often rely on one another in life and death situations. Because of this, the social ties that are created with one another may be even closer and more supportive than what is developed between individuals who are not a part of this group<sup>21</sup>.

During each shift, firefighters are responsible for responding to all calls within their region for a 24-hour period of duty. This causes an irregularity in daily schedules among firefighters; therefore, establishing a routine that fosters healthy behaviors becomes a challenge. They may sacrifice sleep, meals, and exercise in order to respond to emergency calls. As a result, the perceived barriers to healthy living (lack of time, inconvenience, etc.) may be compounded among firefighters.

Firefighters do not have a regular work week and may not celebrate holidays at the same time as other friends and family members who are not firefighters. For this reason, social and recreational activities outside of work are usually spent with other firefighters who have similar schedules, thus creating even stronger relationships<sup>21</sup>.

Additionally, each fire station has both a formal team leader (the lieutenant) and an informal team leader (someone who other firefighters respect and turn to for

information or help) and a hierarchy within the group. Within this framework, beliefs and values of each leader and the team a firefighter is assigned to may affect behaviors or choices of individual firefighters.

Although social support can often have a positive impact on health, lack of social support among firefighters, or among firefighters and their close friends and family members may have a negative impact on firefighters' health. A study by Regehr et al.<sup>22</sup> found that experienced firefighters perceived lower social support from other firefighters and lower perceived social support from their family and employer than new recruits. This lack of support resulted in increased traumatic stress symptoms and depression. The authors hypothesized that new firefighters often have a "honeymoon phase" where they develop close ties and camaraderie, which results in a tight social network. Competition for promotion may occur the longer a firefighter is on the job and the more experience they accumulate. This competition among firefighters changes when a peer firefighter becomes the superior, which may decrease the sense of social support<sup>22</sup>. While this social network is important in influencing behavior among firefighters, other factors may also affect healthy behavior.

## **Factors Influencing Health**

### ***Physical Activity***

Physical inactivity has been suggested to be the most important risk factor in developing heart disease and physical inactivity and poor dietary habits are underlying factors for an estimated 300,000 deaths each year in the U.S.<sup>23,24</sup>. Maintaining a high level of physical fitness is a requirement for the firefighting profession, yet inadequate

physical fitness levels have been observed in some firefighting populations<sup>25</sup>.

Firefighters have also been found to have lower physical fitness levels than individuals in other hazardous occupations such as construction workers and police officers<sup>24</sup>.

Despite a high physical work demand, some firefighters may lead sedentary lifestyles with a high risk for obesity, hypertension, dyslipidemia, certain malignancies, chronic musculoskeletal complaints<sup>5</sup>. The risk of musculoskeletal injuries and cardiovascular disease is worsened when faced with the additional physical stress of firefighting<sup>26</sup>. Although firefighting may be a strenuous job, the amount of time spent fighting a fire may be very little, and consequently, could result in a relatively sedentary work environment. Firefighters may have long periods of inactivity followed by bouts of strenuous exertion when responding to a call. No studies, however, have been conducted on how firefighters spend their time at work when not responding to calls.

Persons with higher levels of leisure-time physical activity have been found to have an overall healthier lifestyle<sup>8</sup>. According to Dietz<sup>6</sup>, low recreational physical activity levels have been shown to be associated with both the risk of weight gain over a 10-year period as well as obesity. Dietz<sup>6</sup> also stated that lower levels of physical activity are associated with other adverse health practices such as increased dietary fat intake and foods that are considered to be less-healthy.

Kay et al.<sup>2</sup> examined the cardiovascular disease related risk factor knowledge among 187 firefighters. Most firefighters were knowledgeable about the amount of physical activity needed to maintain cardiovascular fitness, but also believed that they should be in better physical condition than they currently were to help improve job

performance. Most firefighters also stated that they had heard or read that food choices can help to prevent heart disease, but they were unwilling to change their dietary habits.

### ***Dietary Habits***

The dietary habits of individuals are influenced by multiple factors. According to Kearny and McElhone<sup>9</sup>, people do not follow sound dietary practices because they lack knowledge or information, or they lack interest in making a change. Perceived or encountered barriers such as cost, availability, time, and taste may prevent people from eating healthier diets as well. Kearney and McElhone<sup>9</sup> also stated that some people may perceive their diet as being healthy and therefore do not see a need to change.

Glanz et al.<sup>7</sup> assessed the importance of taste, nutrition, cost, convenience, and weight control on the influence of personal dietary choices by sending out two self-administered surveys nationally to 2,967 adults. Taste was reported to be the most important influence on dietary selections followed by cost. Young men were most likely to choose foods based on taste and convenience. Fast food consumption was reported highest among men as well. Fruits, vegetables, and grains were reported as inconvenient and were only regularly consumed by individuals concerned with nutrition and maintaining a healthy body weight.

Previous studies have shown that men and the elderly are less well-informed on nutrition than women and young adults, and that a weak correlation exists between nutrition knowledge and healthy eating. Dallongeville et al.<sup>11</sup> investigated whether nutrition knowledge influenced dietary behaviors in 361 middle aged French men (45-64 years old) at risk for cardiovascular disease. A 10-question quiz regarding food



composition and nutrition practices was administered to these men in order to assess their nutrition knowledge related to coronary heart disease risk control. Food intake was assessed by means of a 3-day food record. The authors found that those earning a higher score on the nutrition quiz were more likely to have a lower intake of total fat, particularly from animal sources, and a higher intake of fat from olive oil; however, fat consumption was still higher than recommendations. These authors concluded that nutrition knowledge can influence dietary behavior <sup>11</sup>.

In a more recent study, Kolodinsky et al. <sup>10</sup> found similar results when looking at college students in university dining plans. The authors investigated whether college student eating patterns were related to their knowledge of the dietary guidelines. University cafeterias are not required to include nutrition labeling, thus students may be unaware of which foods are high in energy, fats, and added sugars. The students were given an internet-based survey that examined the relationships between self-reported eating behaviors and nutrition knowledge. The authors found that increased knowledge of the dietary guidelines was associated with more healthful eating patterns.

### ***Environmental Influences***

Social and physical environments have been found to influence health behavior as well. Poortinga <sup>12</sup> stated that “environments may be obesogenic in the sense that they promote caloric intake and/or discourage the expenditure of energy.” Epstein suggested that environmental changes that both increase the proximity and convenience of physical activity opportunities and decrease access to sedentary activities can increase physical activity <sup>13</sup>. The environment has become inundated with calorically dense convenience

foods and lifestyles have become conducive to sedentary activities that decrease the need to be physically active.

Environments with easy access to stairways that are well lit and not hidden, or workplaces that have lockers and a place to shower so that physical activity is more convenient may help to increase physical activity. According to Poortinga<sup>12</sup>, living in an environment where access to exercise and/or leisure facilities is available helps to increase participation in activities. Many fire stations have a gym filled with weights and cardiovascular training equipment. Outside basketball courts are common, and lockers and shower facilities are also provided. Fire stations have kitchens where food can be prepared and stored, which provides an environment for healthy eating; however, when out on a call or interrupted during meals to respond to a call, convenience foods and fast food restaurants may be used by firefighters. Gaining insight into whether or not the environment is perceived as a barrier to physical activity and healthy dietary habits is needed in order to address the needs of this population.

### **Healthy Beliefs and Attitudes**

Previous studies have investigated the beliefs of firefighters about healthy behavior<sup>2,5</sup>. These studies revealed that firefighters recognize the difference between their occupational demands and their own physical health, and the effects of nutrition and physical activity on their CVD risk. Nonetheless, in the study performed by Kay et al.<sup>2</sup>, even though 84% (79) of the firefighters who participated were overweight and at risk for cardiovascular disease, 37% (35) perceived what they ate and drank to be healthy and saw no reason to change. Forty-seven percent (45) of the firefighters stated that

because there are so many recommendations regarding nutrition and fitness, they don't know what to believe <sup>2</sup>.

Although the obesity epidemic and the associated problems have received attention, many obese or overweight people seem to be unaware of the risk or do not believe these problems will affect them. According to the American Dietetic Association <sup>14</sup>, older respondents (55 years and over) were significantly more likely than younger respondents (25-44 years) to express an increased awareness of obesity. Older respondents were also found to be significantly more likely than those aged 25-54 to express a high level of concern about obesity, and older women had a greater awareness of obesity than older men. Thirty percent of respondents indicated an awareness of healthful eating behavior, but for unknown reasons they had not changed their current dietary behaviors.

Dinkins <sup>15</sup> reported that many Americans believed that eating healthfully is too complicated. Thirty-seven percent of Americans surveyed reported that they were not interested in improving their diet, and 40% stated that their diet did not need to be improved. The largest group of Americans that wanted to improve their diet was women.

Recent research suggests an increasing resistance by the general public to health promotion and interventions <sup>16</sup>. Although firefighters are a unique subset of the general public, their attitudes toward health promotion and intervention may be similar. In a study performed by Bowman <sup>17</sup> on nutrition attitudes, men were only about half as likely as women to consider nutrition very important. Adults 55 years and older were twice as likely to think health was very important compared to younger adults, likely due to a

greater frequency of being diagnosed with a chronic disease. These statistics about young males are of concern since the firefighter population consists mainly of men between 25-55 years old.

### **Summary**

To date, little is known about the perceived influences upon healthy behaviors among firefighters, despite there being known factors that influence healthy behaviors in the general population. Barriers such as the perceived cost and taste of healthy foods, lack of time and accessibility to eat healthy, or lack of nutrition knowledge may prevent individuals from taking part in healthy behaviors<sup>7,9-11</sup>. Environments with easy access to physical activity opportunities and healthy food choices with strong social support or networks may promote healthy behaviors<sup>12,19</sup>. According to the U.S. Fire Administration (USFA)<sup>27</sup>, 737,000 (67%) firefighters across the U.S. serve in fire departments with no program to maintain basic firefighter fitness and health. Exploring the perceived influences on firefighter's health behaviors is important in designing wellness programs to prevent future cardiac-related deaths in this particular population.

### **Purpose**

The purpose of this study was to develop a broader perspective about the factors that may or may not influence healthy behaviors among a group with a high risk for chronic disease.

**Research Question**

1. What are the perceived factors that influence healthy behaviors among Corvallis firefighters?

## **MATERIALS & METHODS**

The goal of this study was to better understand the perceived influences upon healthy behaviors among a group with high risk for early mortality and morbidity. This study was exploratory in nature and utilized qualitative techniques in order to answer the research question. Specifically, data from six focus group sessions that were conducted by a team at Oregon State University in November 2006 on firefighters in Corvallis, Oregon was utilized. The team conducted these focus groups and gathered assessment data in order to develop a wellness program for the firefighters. These focus group discussions were not previously analyzed for research purposes at the time they were collected. Since little is known in this area, this study was performed to provide further insights into this population and help to understand the barriers and supportive factors to practicing healthy behaviors that are relevant for this at risk population. These findings will ultimately provide information that can be used in designing more targeted intervention programs in the future.

### **Sample Demographics**

There are six fire stations with a total of 67 firefighters in Corvallis, Oregon. The population is comprised of 65 males and two females, with an age range of 25-55 years, who are primarily of non-Hispanic white ethnicity. The average age of this sample population is 39 years of age.

## **Health Characteristics of the Sample**

This study relied on a convenience sample for which existing assessment data was available. The following assessment data was collected as background information about the focus group participants, and helps to frame their responses based on these assessments of their health. Anthropometric data (height, weight, and three-site body fat skin-fold measurements) were collected and calculated into Body Mass Index (BMI) and body fat percentages for each of the firefighters. The firefighters were also given a modified Leisure Time Exercise Questionnaire <sup>28</sup>, Food Choice Questionnaire (FCQ) <sup>29</sup>, Health Resistance Questionnaire <sup>16</sup>, and a 24-hour recall. All questionnaires and procedures were approved by the Oregon State University Institutional Review Board for human subjects, and all firefighters signed an informed consent before proceeding. The assessment data summary will be used in describing the sample population and in reflecting on this population in the analysis of the focus group discussions.

### ***Height, Weight, and Body Mass Index***

Height and weight was recorded for each firefighter who participated in this second stage of data collection. Height and weight assessments followed standard anthropometric protocol <sup>30</sup>. Body mass index (BMI) was calculated to determine weight status of all firefighters according to the BMI guidelines used by the Centers for Disease Control <sup>31</sup>. The BMI of Corvallis City firefighters ranged from 21 to 35.5 with the average BMI being 28.57. Fifty-two percent of firefighters were considered overweight, and 30% of firefighters were considered obese according to these guidelines.

### ***Percent Body Fat***

A three-site body fat measurement was also taken with skin-fold calipers using the American College of Sports Medicine's (ACSM's) guidelines<sup>32</sup>. Body fat percentages were calculated using the equations set forth by ACSM<sup>32</sup> and ranged from 6.70 - 40.70 with an average percent body fat of 22.91.

### ***Leisure Time Exercise Questionnaire***

The firefighters were given the Leisure Time Exercise Questionnaire developed by Godin and Shephard<sup>28</sup> to determine leisure time physical activity level. This questionnaire measures strenuous, moderate, and mild leisure time activities performed within a 7-day period<sup>28</sup> and can be converted into metabolic equivalent (MET) values, which can be used to determine how many calories per minute are burned during each activity using ACSM's guidelines<sup>32</sup>. This questionnaire was modified to distinguish between on-duty and off-duty activity, as well as to include the number of minutes spent participating in each type of activity so that total daily caloric expenditure could be assessed. In order to describe this particular population, the average amount of time spent in mild, moderate, and strenuous physical activity/week was calculated as well as an average of the total amount of time spent in activity/week. According to this questionnaire, the average amount of time spent in mild, moderate, and strenuous activity was 216.67, 136.77, and 152.83 minutes respectively, with a total average of leisure time activity/week of 506.27 minutes. The average amount of kilocalories (kcal) per week that was reported was 4285 kcal. ACSM<sup>32</sup> recommends a target range of 150-400 kcal



of energy expenditure per day in physical activity and/or exercise (1050 – 2800kcal/week).

### ***Food Choice Questionnaire***

The Food Choice Questionnaire (FCQ)<sup>29</sup> was another validated instrument Corvallis firefighters completed to assess the factors that influence dietary choices such as health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity and ethical concern. Responses to this questionnaire results in a scaled score that revealed the most important factor that firefighters perceived as being influential on their dietary choices. Health, taste, and mood were considered the top three reasons for choosing food by Corvallis firefighters.

### ***Health Resistance Scale***

The health resistance (HR) scale<sup>16</sup> was developed to assess the amount of resistance to health promotion within different populations. The scale consists of 17 items and each item is rated on a five-point Likert Scale by the participants. The average total response was calculated for this group to determine their health resistance and was found to be three, indicating a neutral response.

### ***24-Hour Recall***

A 24-hour recall, which included both on-duty and off-duty time, was performed to assess the average caloric and fat intake. This recall was performed using the USDA's five-step multiple pass method<sup>33</sup>, and both food models and measuring cups were used

to help determine portion sizes. Data was analyzed using Food Processor <sup>34</sup> and indicated an average caloric intake of 2964 calories and an average fat intake of 105.4 grams. The average percentage of calories from fat was found to be 33%, of which 11% was saturated fat.

<b>Assessment</b>	<b>Description</b>	<b>Assessment Results Corvallis Firefighters</b>
BMI	BMI: $\frac{\text{Weight (kg)}}{\text{Height (cm)}^2}$	<ul style="list-style-type: none"> <li>▪ BMI Range = 21-35.5</li> <li>▪ Mean BMI = 28.57</li> <li>▪ FF with Overweight BMI= 52%</li> <li>▪ FF with Obese BMI= 30%</li> </ul>
Percent Body Fat	Body Fat Skin Folds (insert site locations) Assessed using skin-fold calipers and ACSM's guidelines <sup>32</sup> .	<ul style="list-style-type: none"> <li>▪ Body Fat Range = 6.70-40.70</li> <li>▪ Mean Body Fat = 22.91</li> </ul>
Leisure Time Exercise Questionnaire	Godin and Shephard's instrument <sup>28</sup> which assesses mild, moderate, and strenuous leisure time activity levels and total kilocalories burned based on self reported exercise for a one week period burned/week.	<ul style="list-style-type: none"> <li>▪ Total average exercise time <ul style="list-style-type: none"> <li>○ Mild: 216.67 mins/week</li> <li>○ Moderate: 136.77 mins/week</li> <li>○ Strenuous: 152.83 mins/week minutes respectively</li> </ul> </li> <li>▪ Total average of leisure time 506.27 mins/week</li> <li>▪ Total kcals expended = 4285 kcals/week</li> </ul>
Food Choice Questionnaire	Steptoe et al. instrument <sup>29</sup> determines motives for making food choice.	<ul style="list-style-type: none"> <li>▪ Top three food choice motives: health, taste, and mood</li> </ul>
Health Resistance Scale	Crossley's instrument <sup>16</sup> assesses resistance to health promotion.	<ul style="list-style-type: none"> <li>▪ Average total response = 3 (neutral resistance to health promotion)</li> </ul>
24-Hour Recall	USDA's five-step multiple pass method dietary recall <sup>33</sup> assesses the food intake in a 24 hour period. Data was analyzed using Food Processor <sup>34</sup> .	<ul style="list-style-type: none"> <li>▪ Average kcals = 2964</li> <li>▪ Average fat = 105.4g</li> <li>▪ Kcals from fat = 33%</li> <li>▪ Kcals from saturated fat = 11%</li> </ul>

## **Focus Groups**

This study utilized the existing focus group discussions that were conducted in developing the wellness program for the firefighters. This data was analyzed to answer the research question about the group that has just been described. The methodology used for the focus groups follows.

### ***Participant Selection and Recruitment***

The focus groups were comprised of firefighters who work in Corvallis, Oregon. Since we were interested in knowing more about this specific population, a nonprobability convenience sample was utilized. A nonprobability convenience sample consists of people that were available to use and easy to recruit<sup>35</sup>. Participation in the focus groups was based on availability of each firefighter at the time of the session and was voluntary. Incentives for participating in the focus groups were provided by the Benton County Health Department. Specifically, all participants were given a wellness participation credit that was equivalent to a monetary reduction in their health insurance premium. Recruitment involved posting flyers throughout the fire stations and by communicating through the fire chief who assisted in recruiting firefighters for participation in the focus groups.

### ***Focus Group Sessions***

A total of six focus groups were conducted at the main fire station involving a total of 58 firefighters (56 males, 2 females) in November of 2006. This represents 87% of all the firefighters in Corvallis. Each of the six stations in Corvallis has three shifts, A,

B, and C, and these shifts are typically fixed at one station. Participation in the focus group sessions were designed so each team of firefighters working together on a shift and at a station was in a focus group session together. Each focus group consisted of 6-11 participants and was open to both male and female firefighters. Only two female firefighters participated in the focus group sessions. Both of these female firefighters were in administration and were not regular shift duty schedule for firefighters and therefore their responses were not analyzed for this study. Focus groups were not separated by gender. In this study, the goal was to explore relevant factors that may or may not influence healthy behaviors and not make generalizations to any specific population<sup>35</sup>. According to Krueger<sup>35</sup>, at least three or four focus groups should be conducted with a particular audience. All methods were approved by the Oregon State University Institutional Review Board for Human Subjects.

Three days were chosen for the completion of the focus group sessions, with two sessions being held on each day. Each focus group lasted 1.5 hours and all participants signed an informed consent document before participating. Two moderators conducted the focus group sessions by following an interview guide developed by the researchers. The questions consisted of general questions on health, exercise, and nutrition regarding influences of food choice and healthy behavior (see Appendix) and were based on the review of the literature. The questions were not piloted with another group before conducting the focus group sessions with the firefighters. The focus groups were audio-recorded and then later transcribed into text documents.

### ***Data Analysis***

Information from the focus groups was analyzed by separating out existing themes in the data set. In order to identify these themes, the transcripts were read and re-read several times both individually and together with another researcher. As the transcripts were read, notes were taken and categories were developed based on the themes and patterns that emerged from the transcripts. After the transcripts had been read several times, the researchers compared themes and patterns that emerged and created a list of common themes and patterns.

The data from the transcripts were then coded using the cut and paste method in Microsoft word based on the themes that were created using the principles of grounded theory<sup>36</sup>. A more in-depth analysis of the codes by themes was then done to determine if different influences existed for individuals or shifts of firefighters, or if factors varied between on-duty and off-duty times. The data was then re-analyzed a final time to see if they were any underlying dimensions within each of the themes and to distinguish how these dimensions related to the literature. A discussion of the broad conceptual themes revealed by the focus groups that highlighted the perceived influences upon firefighter's healthy behaviors have been reported.

## RESULTS

The purpose of this study was to determine the perceived factors that influence firefighter's health behaviors. Information from the focus groups discussions helped answer the research question and is summarized below. Three distinct but interrelated themes emerged from the data: The environmental influences on firefighter's healthy behaviors; the knowledge, beliefs, and attitudes firefighters have about healthy behaviors; and the perceived social influences that affect firefighter's healthy behaviors. These themes will be discussed in how they may both support and interfere with firefighters' practicing healthy behaviors.

### **Environmental Factors Influencing Health**

There were many factors influencing firefighter's health behaviors from both their work environment and off-duty (or home) environment. The structure and nature of the work environment and the call volume all affect their exercise routines, eating behaviors, total amount and sleep patterns, and the job stress associated with firefighting. What firefighters do in their off-duty time may affect their health behaviors as well depending on off-duty job status, family or marital status, or other lifestyle factors.

### ***Work Environment***

The work environment itself sometimes causes firefighters to miss sleep or meals, not exercise, and have high stress levels. At the same time, their work demands encourage firefighters to be healthy in order to function well in their job performance

and/or because they want to avoid many of the health issues that affect the population they see on a daily basis. One firefighter commented:

“Yeah, I mean, you do it for yourself, you do it for your brothers, but in the long run, we see a lot of sick folks. I don’t know anybody in this room who want to end their life like some of the people we treat. I would think in the long run too, it’s in the forefront of my mind.”

This concept came up many times in the focus group sessions and seemed to be a driving force for being healthy and staying in shape.

“I think that’s a lot of the difference. Like one or two times a month we see someone that’s going to die a horrible death. We see someone whose lungs do not work. You see someone who’s not managing their diabetes. You see people who are functioning, living in a nice house, not under a bridge, and alcohol is killing them. We see every one of those every single month.”

The work environment also influences how firefighters eat and what they eat. The firefighters talked about making food that is quick to fix or easy to reheat in the event that they get a call during a meal. They also discussed how the anticipation of another call would cause them to eat fast, eat for comfort, or load up their plates because they never knew when their next meal would be.

“I eat more at the fire station because we’ve got this feeling that you have to pack in the calories because you don’t know when you are going to eat again. When I’m at home, I just eat a half of sandwich and some yogurt and I’m good. If I’m hungry again I’ll just go and grab something else. Here it’s different.”

Even though physical training (PT) is scheduled to happen at 4p.m. each day, there are many times that the firefighters will not get the opportunity to exercise due to the call volume, scheduled training, or just lack of motivation or energy due to stress, or having missed meals or sleep.

“You get motivated at 4 o’clock. 4 o’clock comes around and you want to go workout, so you get in the workout room and then these guys at station three will get in the workout room for five minutes and they’ll get interrupted and then they’re gone for an hour. Then it’s five o’clock and now they’re hungry. If he gets his workout clothes on again and tries to go workout and they get another call so that’s twice that he’s tried and he’s been denied and now he’s back at the station and he’s really hungry and it’s 6:30. So he’s been motivated twice, but because of the circumstances and the ways that calls work he just hasn’t been able to do it. So he’s motivated to do it, but the system.”

Some firefighters use exercise to help manage their stress, so if exercise is used to handle stress after a long day, lack of routine exercise because of the frequent interruptions may impact firefighter’s health in the long run.

### ***Stress***

Firefighters risk their lives on a daily basis in order to help the public. As a result, a certain amount of stress is associated with this occupation. Many of the Corvallis firefighters talked about stress and how it influenced their health.

“The thing that gets people that I think a lot of the general public doesn’t see is the stress of whether it be, seeing a somebody burned in a house, or seeing a young child killed in a car wreck. That’s the kind of thing. It may not physically hit you right away, but emotionally it will get you for a long, long time, and physically getting you in the long run. Like these guys were saying, heart attacks are what is killing a lot of the firefighters these days. It’s interesting because we see a lot of guys that retired when we all got started, and either they’re laying real low and some of them are dying before they hit 70.”

The firefighters also discussed various ways of dealing with stress in the focus group sessions. Some felt that eating was comforting and others used exercise as a stress management strategy. One firefighter monitored his stress level by stepping on the scale to see if he was gaining weight.



“I step on the scale to keep track. I think it helps me monitor my stress. Stress for me, stress and eating go hand in hand. If I see that I’m putting on extra weight, even just four or five pounds, I can kind of go, well why am I putting on this weight?”

Eating more or not exercising because of high stress levels can negatively impact a firefighter’s health. Stress levels may be made even worse if the firefighters are not getting enough sleep to recover.

### *Sleep*

Firefighters work a 24 hour shift, which means they may be responding to calls throughout the night when they should be sleeping. Many of the firefighters talked about sleep issues throughout the department and how sleep affects their health. “I would bet probably 30, maybe even 40 percent of our department has sleep issues. I’ll go out on a limb and say that, probably 30 percent or more.” The firefighters talked about various sleep issues such as an inability to put together more than 3 or 4 hours of sleep at a time because they are used to being awakened for calls at night or because they can’t catch up on missed sleep in their off-duty time due to family or job commitments.

When asked if the firefighters considered themselves healthy, one firefighter’s response was,

“One thing that I think has affected me a lot more than I thought it would, it’s been 6 years now, is the sleep schedule. It seems like it’s starting to finally get to me. I used to be able to run on no sleep and now I’m finding that I’m a lot more tired on my off days, especially when I get into these ruts when I don’t work out. It’s hard to force myself back into my regular workouts, and I find I have to mix it up quite a bit, whether it’s working out at home or if I start commuting to work on my bike, that’s kind of a good way to help get myself back into it. But yeah, health is very important.”

If firefighters have had a long day at work with multiple calls they may not exercise on their shift, but responding to calls in the middle of the night and missing sleep seemed to be a determining factor for whether or not firefighters chose to exercise off duty as well.

“That’s a biggy for me. We have calls during the middle of the night when you don’t have a lot of sleep. You get three or four hours of sleep and you don’t feel like working out the next day, so it’s hard to meet that regular PT time of day when you’re dragging.”

Not only does sleep affect their regular workout schedule, but it also affects how they eat. “I find for me that eating becomes more important than sleep. If you are not getting recuperated from sleeping, you’ll find that you need to eat to compensate.” This creates a never ending cycle for firefighters in which an exercise routine and healthy eating behaviors are challenging to establish.

“You never get consistent from the time you go on-duty to off-duty and you’ll sleep during the day because you’re so tired and then at night time you don’t sleep anyway, and it’s just this huge thing where it keeps going.”

Depending on what firefighters do in their off-duty time, they may or may not get to catch up on the sleep that they missed while on duty.

### ***Off-Duty Environment***

Often firefighting is not the only job that firefighters hold. Many of the firefighters in our focus group sessions revealed they had another paid job or were students, or were responsible for household duties such as cooking and cleaning and childcare. This off-duty environment was found to influence eating, exercise, and sleep behaviors as well.

Although eating and exercise behaviors tended to be more consistent at home for some, other firefighters described their meals and exercise times as more structured at work since their off-duty lifestyle or second job obstructed these routines. Some firefighters felt that meals could be planned at home, but others did not have regular meals because there wasn't the anticipation of going out on a call.

“We're up on a ranch, and normally breakfast is the only meal that we eat. We go out and feed the animals and then come back and eat breakfast and start the day. There's never really a... it's kind of unknown. We'll have different things that we're going to do throughout the day. There's no schedule. The animals might decide to get out or we have to move this bunch, so for me, being at work here is a lot more scheduled than when I'm home. There's not a certain time that I stop and go exercise. There's not a certain time that we stop and eat. Sometimes we'll break for lunch, grab something and go. Other times we might just wait till we get back and eat. It just kind of depends.”

Many married firefighters with children talked about how their first activity when they got off work was to have breakfast with their kids or get them off to school. Some would then go to exercise after they dropped the kids off at school. Others disagreed and believed that exercise wasn't possible at home because of their family's schedules. “I have kids. Sometimes I work out. Sometimes I don't. I might go a week. I might go a month. Sometimes I'll go a year. *Laughter.* That's just the way it is.”

Many of the firefighters believed that they were active in their off-duty time even though they did not have a consistent exercise routine at home. “I don't really exercise at home. I work around the house, but that's all I really have time to do. I do probably three hours of manual labor at home.” Outdoor activities were not uncommon either.

“A lot of us work out off duty, not just lifting and bending and chasing our kids, but actually go out and do physical activities whether it's going to the gym, running, bicycling, that kind of thing. Everything that can be done, ski, gardening, things around the house,

water sports, anything that we can do outside, we are very active people.”

Seep was also an issue for firefighters when they were off duty. Some firefighters may have the luxury of being able to sleep when they get off duty, particularly if they’ve had a rough night, but others with second jobs or family-related tasks are still not able to rest. The environmental factors that firefighters perceive as affecting their health behaviors may then influence their beliefs and attitudes about leading a healthy lifestyle, both in supportive and interfering ways.

### **Knowledge/Beliefs/Attitudes About Leading a Healthy Lifestyle**

Since firefighters were all aware of their risk for heart disease related deaths they had positive attitudes about being healthy. “We read the statistics all the time about what happens to the firefighters so that’s another motivating factor too. Most firefighters die not in fires, but because of heart attacks from training or exercising.” Still some firefighters were not concerned about preventing chronic disease or about their weight. “I’m going to get concerned when I have to look in the mirror to find my belt buckle.” The primary concern that firefighters had that was revealed in many of the focus group sessions was their ability to do their job, which in turn served to motivate them about living healthy lifestyles. In fact, all of the firefighters agreed that health was an important value, and many suggested that health was important because the people they serve and their peers depended on them to be able to function in their job. “Honestly, diet and exercise our important, but what’s really important is that we get to your house and do our jobs appropriately, professionally. Everything else gets put on hold for that.”

Despite this sentiment, many of the firefighters still believed they could be healthier. “Are we healthy? That’s the question right? I think most of us will say that we are healthy, but could we do better? Yeah.” Some firefighters also compared themselves to the general population or other people their same age or older who work a desk job and felt that they were in better health. “Look at the general population. I’m 44, and I look at a lot of 44 year olds that are in poor shape, and that doesn’t make me better than them, but I think I’m more on track.”

Many of the firefighters were discouraged by the challenge and frustration of not being able to live a healthy lifestyle. This tended to create a perception that their work interfered with practicing healthy behavior. Some thought that due to work, changing their behaviors was not possible even though they knew that they could impact their health by changing their behavior.

“I think some of the behavioral changes aren’t, especially if you think about work schedules and stuff, we can’t change. There’s nothing we can do about it. We do the best we can to adapt and go along with it. Behaviors outside of work, lots of things like learn how to cook better, healthy food.”

What also discouraged some firefighters was being interrupted by a call while exercising. “I think every time I go to work out here I get interrupted. I have not had a workout here that hasn’t been interrupted, so most of the time I don’t.”

There was also some discussion about how genetics played a role in their health and many thought health was a “total package deal” with weight being just one piece. Some thought that you could eat poorly or not exercise regularly and still maintain health while others disagreed and believed that it takes both healthy eating and regular activity to be healthy. Some firefighters thought you could eat poorly when you are young and

active and still maintain your health, but that this changes when you get older. Many firefighters also talked about the importance of both physical and emotional health, still placing emphasis on the importance of being able to do their job.

“I think if you can come and do your job and not...It has a lot to do with how you feel about your job. If your job becomes a burden because you are unhealthy, like we’ve had some people in the past that we can see that they are either in pain because of a back injury or a leg injury, and they just don’t look like they’re enjoying being here and you can immediately pick up on it. But if you come to work and you do your job no matter what the day throws at you, and that also includes mental and emotional stress, and not go home and kick the dog or take that stress with you, I would say that’s probably our biggest judge of whether we are healthy or not. So it has to do with not only physical health but also mental health and they kind of go hand in hand. If you just have a bad night with numerous calls or something out of the ordinary that you just can’t handle, you may not feel like working out the next day or going on a run, as good as it may be for you, you may just hibernate. But I think health for us is, especially in our line of work is not only physical health, but emotional health. I think if you are emotionally healthy you are going to feel physically healthy.”

Even though the firefighters believed working out was important for both their mental and physical health, some firefighters said performing a weight lifting routine or running on a treadmill was boring and they just did it because they thought they had to workout to stay in shape. Some firefighters talked about the need for exercise to be exciting for them to want to exercise, which often meant that their physical training (PT) time was used playing basketball or exercising with a partner, or their off duty time was spent in the outdoors.

“It helps to do it with somebody because doing it by yourself gets so boring, especially a weight lifting routine. I tried that once and maybe stuck with it six months. I just can’t stick with that kind of stuff. It’s got to be different, it’s got to be interactive, it’s got to be exciting. I think that’s probably why a lot of us do the things that we do off duty cause I don’t want to work out. I want to row my boat down the river or ride my bike somewhere.”

Having a rough day at work motivated some firefighters to stay in shape because they thought it was easier to recover.

“On the days that you do get your butt kicked at work, it’s a lot easier to recover. You’re not spending both of your days off laying around the house not doing anything. You’re helping and it’s a lot easier to go back to work and have a better attitude about it.”

Some firefighters said they workout so they can eat what they want, but other firefighters said that if they have a hard day at work they could reward themselves with food. “We kind of joke about it, but we work out so we can eat what we eat. You kind of justify it.”

Eating food as a reward or in compensation for having a hard day often meant eating high calorie, less nutritious foods even though the firefighters were aware of how to make healthier choices. When asked what it was about healthy foods that they didn’t like, many firefighters agreed that healthy foods don’t taste good, but some said they eat healthy foods to offset what they thought were less healthy foods. “It is prevention. I eat vegetables and oatmeal to offset the meat. That’s all it is for me.” Some firefighters had changed their health behaviors to lose weight or to manage a chronic disease such as diabetes, and these firefighters felt that eating better and exercising regularly was important for their overall well being. Eating healthier for most though was thought to take a lot of work, and some firefighters believed they did not have the time.

“Trying to eat right is not always easy. What’s easy is to go to Burger King or box food at the grocery store. To have a healthy eating nutritious lifestyle seems to take a lot of work. In our busy schedules it’s hard finding the time to do that. At least that’s what I thought. I’d like to eat better, but it takes a lot more work, so I think you have to get over that I think.”

Many of the beliefs and attitudes firefighters had were shared with their fellow firefighters, and these peer influences were evident in all of the focus group sessions. Peer pressure and informal leaders was suggested to set the stage for both attitudes and practices relative to health among Corvallis firefighters in general and among smaller sub groups that worked together.

### **Social Influences on Healthy Behavior**

Both peer and family influences were found to impact the health behaviors of firefighters. Peer influences caused firefighters to eat more and generally less healthy food. It also encouraged firefighters to stay in shape or not to fail because they didn't want to let other firefighters down. The social influence of being married or having kids also influenced eating and exercise patterns as well as sleep at home. These influences had both positive and negative impacts on firefighter's health behaviors, and individual personality differences and intrinsic motivation seemed to be a factor in the ultimate behaviors among each of the firefighters.

### ***Peer Influences***

Firefighters spend about a third of their life together at the fire station and often spend their off-duty time together as well<sup>21</sup>. Because of this, the peer relationships that were developed among others on their shifts can be important influential factors on health behavior. Some firefighters believed they were supportive of positive health behaviors like eating healthier, exercising, and trying to lose weight, but many characterized this influence as peer pressure.



“It’s more peer pressure than anything. We don’t buy donuts for the most part. We give guys peer pressure a little bit and the last thing you want to do is go get re-sized for our city uniforms cause you don’t fit into yours. That’s kind of one of those things that’s almost embarrassing to do. Guys will give you a little bit of lip say like hey man, nice notch in your belt. It’s those subtle things that they say. So yeah we discuss it, but more like brothers in a big family than like adults.”  
*Laughter.*

Many firefighters agreed with this statement: “The dynamics really are like a large family.” Throughout the focus group sessions the firefighters were joking around and teasing each other as if they had known the other firefighters for their whole life. Many firefighters talked about the joking and teasing that takes place in their groups and how this influences their behavior.

“If you don’t go back for seconds they’re insulted.” *Laughter.* “But the weird thing is if someone brings in something like fruit bars for dessert they are crucified. You’re almost forced to bring in a big old pie or ice cream. Tell me this is not true.”

Although much camaraderie appeared to exist between these firefighters, it also seemed to produce a constant competitive environment having both a positive and negative impact on behavior. Some firefighters thought that this peer pressure or competition motivated them to stay in better shape or eat healthier. Health was said to be important because firefighters needed to be strong and healthy in order to do their job and not let the other team members down.

“If we can’t do our job and they can’t trust us to help them if they need our help because they’re worried about our strength or our ability, then it’s not fair to them, it’s not fair to us. We all rely on each other and we stay in shape for each other’s sake. We don’t want to get up in the middle of the night and go from sleeping, where usually our heart rate’s at forty, and then you get up to go to a fire and your heart rate soars to 120 and something happens. I think that’s our biggest driving force for staying in shape is being able to do the job.”

It was also suggested that peer pressure caused some firefighters to perform tasks even if they were in pain, or to make sure that they passed the annual physical ability test because they didn't want to disappoint the team. "If he's struggling, I might not ever know it because he doesn't want to fail not only for him, but for us."

It was evident that the firefighters did not want to let each other down, but the fear of being teased by other firefighters for failing in any way, gaining weight, or being unable to perform their job as well as they should had a very strong influence on the firefighters.

"I think I mentioned this before. If you show a weakness in the fire service areas, we'll attack it. So he might show he's weak in fitness and we'll attack it and it might make it better, it might make it worse. It just depends on how that person receives it, but we eat our own. You've see that in the three days that you've been here how we tease each other."

The need to portray an image of masculinity among other firefighters came out again when they were asked about how they handle stress or the aftermath of a bad call. "Alcohol" (*Laughter in the background*). "Exercise, verbal abuse amongst ourselves, humor." When asked if they would talk about it as a group a firefighter said, "You don't want to show you're underbelly, but then admitting might actually be doing it." At the same time, many firefighters believed they were comfortable talking among themselves because they were so close. They knew everything, both good and bad, that went on in each others lives anyway.

"I think that when there is genuinely a serious situation then we're all the same and we care about each other. If he comes in and he's got his shirt inside out, yeah we'll pick on him or his pants are getting too tight. But if his wife is sick, there are certain things that we're not going to joke about. We just don't. We had a number of serious calls around here lately, and what we do I've noticed, is we'll talk amongst ourselves and make sure everyone's o.k., but I don't think

any of us we'll go and search out the employee assistance program. I mean, we're just not going to do that."

Other influences within the fire house such as the influences of the group leader were also discussed. The firefighters talked about how the lieutenant was a huge influence on whether or not they exercised at the scheduled PT time. "The lieutenant is the big...I mean if you had to pick someone to make sure we did it, he'd be the one." Whether or not firefighters choose to adhere to PT requirements, can also be influenced by the other members in the house.

"There are stations that all work ceases at four o'clock. It doesn't matter if you are right in the middle of the something, everything stops, you go work out, period. There's no way around it. Then there are shifts that say well, we'll work out if it fits in today or shifts that would rather watch the news."

This group influence also exists when exercising together. Some firefighters talked about how their fellow firefighters influenced them to work out harder, particularly if exercise involved playing a competitive sport such as basketball. Peers could also influence willingness to exercise, as doing workouts with someone made the routine less boring.

Because on-duty firefighters often eat meals together, healthy eating is often influenced by the person cooking the shift meal. It is also influenced by the foods brought in to eat by other firefighters. "Well the hard part is the on shift meals. If you're not cooking then you don't have a choice of what the food is." If firefighters go on a diet or are trying to make healthier choices it becomes difficult when the rest of the crew is not eating the same way. The firefighters thought they were supportive of someone going on a diet, but they also said there was a lot of joking around and tempting each

other with food. “I think we’re supportive, but I think we’d be *real* supportive if we backed them up by not eating the good stuff in front of them.”

The majority of the firefighters agreed that when they ate as a group they ate more food and made less healthy choices.

“The one thing I’ve noticed on the eating. Some of the groups do group meals, some of them just eat at the same time, and some of them don’t have any relationship at all with the meals. If you do group meals, you’ll eat a lot more food. *Huge* amounts of food. Both in the quality. I mean cause you’ll eat less healthy food and more of it if you do group meals.”

Some of the firefighters talked about how they didn’t want to bring in really healthy or tasty foods to the fire station because somebody else might eat it, so they ate better at home because they could buy better foods.

“I’ll eat better. Especially because, again there are a couple of things you have to take into account. One is that if you buy really good stuff, we all share refrigerators, that people will graze on your stuff, and you don’t want to bring in anything you’re afraid to lose. It’s kind of like gambling. Never gamble more than you’re willing to lose. For the most part people are pretty good, but we all get hungry late at night or you forget your food. A lot of guys get bumped around to different fire stations because of relief and they just can’t take their food with them, so if they get stuck at a station on a last minute move they don’t have any food. There’s guys that will say you know there’s food in there just help yourself, but you can’t really bring really, really good stuff. You’re not going to go to Trader Joes or Wild Oats or something like that and get good, good food, but for the most when you’re off duty you eat better food. You get better cuts of meat or better produce, more disposable foods.

Not only do firefighters spend a lot of time at work with other firefighters, but many firefighters also had spouses and/or children at home with whom they spend their off-duty time. These family influences were also found to be an important social factor impacting firefighter’s health behaviors.

### ***Family Influences***

Whether or not a firefighter is married or is a parent greatly influences their eating and exercise behaviors and can even impact their sleep schedule while at home. This is due to both home tasks (cooking, child care, etc.), but also includes the social roles within families.

Many of the firefighters become the household cooks when off duty and the social aspect of family meals became an influence on their behaviors off-duty. Some believed that their eating schedules were more consistent at home because they ate family meals. Others thought their meals were less consistent especially when their kids were involved in sports or other activities and/or when their spouse worked.

“He is in a position all the rest of us were in 20 years ago. He’s a young firefighter, first career job, really able to celebrate life. As for the rest of us, if your daughter has soccer practice at 3p.m. and your wife can’t or won’t...We have a great work schedule. 24 on and 48 off is a great schedule, but it is not unusual for me to go home in the morning and not go back to bed before noon. I get my kids off to school and make arrangements. I don’t have that choice as Chris has because my family life and the things we do. If by chance I get off at 7 and I’ve had a good night, then I’m out of here. If the kids are covered, then I’m gone, fishing, hunting, all of the above, I’ll be at a meal period probably late in the evening, and then going to bed and I’m gone the next day.

Sporadic family schedules also led to more frequent eating out. “My wife’s a nurse and works nights so we eat out a lot, probably 4 times/week.” At the same time, many of the firefighters talked about how having a family made it more important to have regular family meals in the home especially for dinner. When the firefighter’s wife was at home on their off days, regular family meals seemed to be more common throughout the day. Firefighters with pre-school children and a working spouse spent days at home with their kids, and this usually meant having consistent meals throughout the day as well.

“I’ve got a two year old and a three month old and I do whatever they want. Those five meals a day work pretty good for me because they end up being a structured meal with them or their nap time.” Family influences varied for each firefighter, but were still considered to be an influential factor on their health behaviors.

## DISCUSSION

The focus groups revealed three themes that influence this group of firefighter's health behaviors: environmental, knowledge, attitudes, and beliefs, and social factors. Although these factors have been reported in the literature<sup>12, 14-18</sup>, there is limited evidence on how these factors may influence a population whose eating, exercise habits, and lifestyles are inevitably unstructured due to the nature of their work. Each of these factors affected firefighter's practices relative to health both independently and in interrelated ways. The lifestyle described by these firefighters is greatly influenced by the environments that they do not always perceive to have control over. Their attitudes about health, their knowledge of health risks and their perception of their ability and willingness to practice positive behaviors are reinforced among their peer firefighters. Likewise, the social influences from their fellow firefighters with whom they spend the majority of their time, as well as family roles and responsibilities are perceived to both support and obstruct their ability to practice healthy lifestyle.

Perhaps the biggest factor for firefighter's health that is not well established in the literature is the environment's influence on their health behaviors. Many of the environmental factors that affected the firefighters depended on the fire station to which they were assigned as this influenced the frequency, type and length of the calls for which they had to respond. Call factors as part of the work environment also contributed to a perception that work obstructs health, and due to individual firefighter assignments this perception varied among the group. The firefighters are at the mercy of the call volume and because of this, exercise and healthy eating become difficult, sleep may be scarce, and stress levels may be high. This cycle of responding to calls, missing meals or sleep, trying

to deal with stress, and not getting to exercise can create a never ending pattern for some firefighters that can become difficult to break. Only a few very motivated firefighters were devoted enough to make sure they practiced good behaviors regardless of their work environment.

The side effects of shift work have been reported by Swinhart<sup>37</sup> and include increased likelihood of obesity, high risk of cardiovascular disease, high risk of mood swings, higher risk of motor vehicle crashes, increased likelihood of family problems/divorce, trouble controlling blood sugar levels in persons with diabetes, and chronic fatigue. If the firefighters are also sleep deprived, additional side effects can result such as increased reaction time, lapse of attention, poor motor function, memory loss, and a depressed immune system<sup>37</sup>.

The Corvallis firefighters work a 24 hour shift and may be responding to calls throughout the night. Responding to frequent ambulance calls at night have been found to cause high stress and fatigue in ambulance paramedics, and these authors<sup>38</sup> also hypothesize that high stress and fatigue may be even more severe for persons working the night shift who are awakened in order to respond to multiple emergency calls. So not only do firefighters have to deal with this disruption in sleep or lack of sleep while working, they also have to worry about maintaining the needed skills to do their job and their personal safety when responding to calls. All of these factors have been found to be major sources of job stress in firefighters<sup>39</sup>. It has been suggested that a change in firefighter's work schedules or shifts may need to happen so that firefighters can have periods of uninterrupted sleep<sup>38</sup>, and all of these factors need to be addressed when looking at positive ways to help impact firefighter's health behaviors.



The environmental work factors influenced their beliefs and attitudes about healthy eating and exercise even though they seemed to be knowledgeable about how to eat well and exercise. The attitudes were apparent when some firefighters described interruptions to their work routine as a barrier to working out at work, or when they said that eating healthy takes too much time. These are both examples of how some of the firefighters considered the work environment to be an obstacle to healthy living. Much of what was revealed in the focus groups about the knowledge or awareness of healthy eating and exercise among firefighters is consistent with what has been reported in the literature<sup>2, 14, 15, 17</sup>. However, because firefighters spend a large amount of time at work with their peers, their knowledge, beliefs, and attitudes as well as how the firefighters behave in response to the environmental circumstances are greatly influenced by their fellow firefighters.

Social influences on health behaviors, particularly in adolescents and teens, are well reported in the literature<sup>40-43</sup>; but literature addressing these effects upon firefighters is not as abundant. It has been reported that having available social support from fellow firefighters can help to mediate stressful outcomes<sup>44</sup>. This study revealed that competitiveness and the need to be appear masculine or “macho” out of fear of being teased by the firefighters may discourage them from appropriately dealing with their stress. Showing stress or emotions when trying to deal with a difficult work call or situation causes the firefighters to appear less masculine. Since they do not want to show weakness and have the need to appear tough and masculine, this may actually contribute to poor health behaviors. Instead of resolving their stress in a positive way such as

exercising or seeking a counselor, firefighters may try to be tough and deal with it using alcohol, humor, overeating and perhaps even denial.

Oginska-Bulik<sup>45</sup> also found that high levels of perceived social support can reduce the sense of stress at work and have a positive impact on health, but this author also showed that individual personality characteristics can have an effect on health. High levels of self-esteem, self-efficacy, and dispositional optimism in police officers was found to reduce the level of perceived job stress and protect them from negative health outcomes<sup>45</sup>. The results of this study showed that how much the social and environmental factors impacted firefighter's health behaviors seemed to be based on their own individual characteristics such as their personality and motivation. Unmotivated firefighters may be more likely to let the social and work environment interfere with having positive health behaviors. It provides an opportunity or rationale allowing them to attribute these influences to be deterrents to health. More motivated firefighters may be more immune to these influences or have found ways to overcome some of the obstacles perceived by the firefighters who are less intrinsically motivated.

The lieutenant's influence on firefighter's health behaviors was also evident in the Corvallis firefighters. Elliot et al.<sup>5</sup> found that among firefighters, a team-based approach led by a firefighter who was designated to be the team leader increased shift cohesion and the perception that firefighters who worked on their same shift were exercising more and eating healthier.

By identifying the perceived factors that influence firefighters' willingness to choose to practice healthy behaviors, efforts to reduce or minimize those that obstruct healthy behavior can be identified and used when designing targeted intervention programs to help motivate them to choose healthy behaviors.

Enhancing shift cohesion and social support may in turn reduce stress and increase self efficacy and optimism in the work place when faced with challenges, so designing intervention programs that increase shift cohesion may be more beneficial.

Changing work schedules may prove to be more of a challenge, but may also be advantageous for fire service personnel. Switching to an eight or 12 hour shift may allow firefighters to obtain more sleep, which in turn would lead to decreased stress and potentially decreased risk of obesity and cardiovascular disease.

As professionals we also need to think about the factors that firefighters have no control over such as the call volume. Call volume and the amount of time firefighters spend out on a call greatly influence their eating and exercise schedules. Designing programs that teach firefighters how to make quick, easy meals and snacks that are not only healthy, but can also be reheated or eaten while performing tasks around the fire station should be considered. Helping firefighters design exercise routines that are not only varied and challenging so as to minimize boredom, but also specific to their duties is also important. Collectively, this information should provide professionals practical information to spearhead interventions targeted at decreasing firefighter's risk of chronic disease.

## CONCLUSION

This study sought to identify the perceived factors that influence firefighter's health behaviors. This was done by using pre-existing focus group discussions data. The results of this study confirm that many of the obstacles to eating healthy and exercising regularly that exist for the average population also exist for firefighters, but that these obstacles may be made worse by the interaction between their environment and peer influences and the effect that this has on their attitudes and beliefs. Additional studies should be done using larger firefighter study populations including more women and minorities. Larger and more diverse sample sizes will reveal if the results of this study are evident among other firefighters. In the long run, efforts geared to impact the health and longevity of firefighters will require such data and will contribute to the development of more effective or better wellness program designs for this population. Other research is needed to better understand the influence of a 24 hour work shift on health. This may lead to schedules that better accommodate a healthier lifestyle for firefighters.

Because this study utilized pre-existing data in order to answer the research question, the questions that were developed for the focus group sessions were not as targeted as they could have been and therefore may limit the results. The focus groups also consisted of shifts of firefighters who worked together, and these shifts were not separated by ranks or peer groups, with responses impacted by group peer stigma or pressure. This in turn could have influenced the answers of some firefighters<sup>35</sup>.

Firefighting requires healthy and strong individuals, yet from this study it appears that this job hinders healthy behavior at times. This study was useful in revealing many of the factors that are perceived to impact firefighter's health behaviors. Although these

factors are similar to that of the general public, firefighters are a vulnerable sub-population with a unique work environment and a higher risk for cardiovascular disease thus research to address their particular lifestyle is suggested. Determining how to address their health influences and identifying the supportive and obstructive elements among the firefighting community in order to find ways to positively impact their lifestyle is needed. Nutrition and health educators need to develop programs that focus on creating team support for motivating healthy lifestyles and targeted intervention programs to help reduce the risk for chronic diseases among firefighters.

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**APPENDICES**

**Appendix A: Focus Group Questions**

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## Focus Group Questions

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### HEALTH QUESTIONS

1. Talk us through a typical day.
2. Are there set times for various activities? When do you report to the station? What happens first? When do you eat? Do you exercise? What do you do in your slack time?
3. Does your work day differ from a day at home? Do you exercise at home? Do you eat regular meals?
4. Describe or define a healthy person.
5. Is health an important value to fire fighters? At this station? To you? How does peer pressure or station competition impact health?
6. Do you consider yourself healthy? Why or why not?
7. How do you know if you are healthy or not?
8. How much can you influence your health by changing your behavior?
9. How does your exercise and eating behavior relate to health? Weight? Chronic disease?

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### FOOD QUESTIONS

1. What are mealtimes like when you're at work? Who cooks? Shops? Plans the menu? Does it rotate?
2. Does everyone always eat together?
3. What happens if you don't like what's being prepared? Do you know ahead of time?
4. If someone is not eating with the group can they just prepare their own meal?
5. What happens if someone in the house has medical or personal diet restrictions?
6. Do you read food labels? Do food labels have any influence on the foods you choose?
7. Describe / Name a healthy food; List 5 healthy foods (not categories).
8. Are healthy foods tasty?

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### EXERCISE QUESTIONS

1. Do you exercise on a regular basis? What is your exercise routine? How did you develop your exercise routine?
  2. Do firefighters have a generally active lifestyle?
  3. Is there an exercise requirement of firefighters? If so, what is it? Does everyone adhere to it?
  4. Do firefighters ever exercise as a pair/ in a team?
  5. Do most firefighters take vitamin, mineral, or protein supplements? Why or why not? How are these supplements beneficial to you?
  6. Most of you have completed the Reliant Behavioral Health (RBH) survey? Was it useful? Why or why not?
  7. Would you prefer other instructional methods? Which would you like? (Face-to-face, individual or group sessions, email notification, web pages, pamphlets or brochures).
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Appendix B: Food Choice Questionnaire

Food Choice Questionnaire

		Not Important	A Little Important	Moderately Important	Very Important
It is important to me that the food I eat on a typical day:					
1.	Is easy to prepare	1	2	3	4
2.	Contains no additives	1	2	3	4
3.	Is low in calories	1	2	3	4
4.	Tastes good	1	2	3	4
5.	Contains natural ingredients	1	2	3	4
6.	Is not expensive	1	2	3	4
7.	Is low in fat	1	2	3	4
8.	Is familiar	1	2	3	4
9.	Is high in fiber and roughage	1	2	3	4
10.	Is nutritious	1	2	3	4
11.	Is easily available at market	1	2	3	4
12.	Is good value for money	1	2	3	4
13.	Cheers me up	1	2	3	4
14.	Smells nice	1	2	3	4
15.	Can be cooked very simply	1	2	3	4
16.	Helps me cope with stress	1	2	3	4
17.	Helps me control my weight	1	2	3	4
18.	Has a pleasant texture	1	2	3	4
19.	Is packaged in an environmentally friendly way	1	2	3	4
20.	Comes from countries I approve of politically	1	2	3	4
21.	Is like the food I ate when I was a child	1	2	3	4
22.	Contains a lot of vitamins and minerals	1	2	3	4
23.	Contains no artificial Ingredients	1	2	3	4
24.	Keeps me awake/alert	1	2	3	4
25.	Looks nice	1	2	3	4
26.	Helps me relax	1	2	3	4
27.	Is high in protein	1	2	3	4
28.	Takes no time to prepare	1	2	3	4
29.	Keeps me healthy	1	2	3	4
30.	Is good for my skin/teeth/ hair/nails, etc.	1	2	3	4
31.	Makes me feel good	1	2	3	4
32.	Has the country of origin clearly marked	1	2	3	4
33.	Is what I usually eat	1	2	3	4

Food Choice Questionnaire Continued

		<b>Not Important</b>	<b>A Little Important</b>	<b>Moderately Important</b>	<b>Very Important</b>
It is important to me that the food I eat on a typical day:					
34.	Helps me to cope with life	1	2	3	4
35.	Can be bought in shops close to where I live or work	1	2	3	4
36.	Is cheap	1	2	3	4

Appendix C: Leisure Time Exercise Questionnaire

## LEISURE TIME EXERCISE QUESTIONNAIRE

1. Considering a 7-day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write in each circle the appropriate number).

2.

	TIMES PER WEEK ON DUTY	TIMES PER WEEK OFF DUTY	TOTAL MINS <u>ON DUTY</u>	TOTAL MINS <u>OFF DUTY</u>
<p>a) <b>STRENUOUS EXERCISE (HEART BEATS RAPIDLY)</b> (i.e. running, jogging, hockey, football, soccer, squash, basketball, cross country, skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)</p>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<p>b) <b>MODERATE EXERCISE (NOT EXHAUSTING)</b> (i.e. fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)</p>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<p>c) <b>MILD EXERCISE (MINIMAL EFFORT)</b> (i.e. yoga, archery, fishing from river bank, bowling, horseshoes, golf, snowmobiling, easy walking)</p>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

3. Considering a **7-day period** (a week), during your **leisure-time**, how often do you engage in any regular activity long enough to **work up a sweat** (heart beats rapidly)?

OFTEN

SOMETIMES

NEVER/RARELY

•

•

•

4. When on duty, I am more likely to exercise with another firefighter. • Agree   • Disagree

5. Sometimes when I am on duty, I don't exercise because no one else is exercising. • Agree   • Disagree

6. I exercise off duty because there are others who supports or encourages it • Agree   • Disagree



**Appendix D: Health Resistance Scale**

<b>Health Resistance Scale</b>					
	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neutral</b>	<b>Agree</b>	<b>Strongly Agree</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
To a certain degree, I am responsible for my own health.					
I'm sick and tired of being told what is good or bad for my health.					
In today's world, people have lost a lot of faith in doctors.					
People are so worried about their health they don't know how to enjoy themselves any more.					
I have the right to risk my own health by engaging in whatever behavior I choose.					
There are so many health adverts/leaflets around, I tend not to take notice of them anymore.					
There is so much conflicting information around regarding health, it's difficult to know what to believe anymore.					
In today's world, people have lost a lot of faith in science.					
On the whole, I am skeptical about what I am told is good/bad for me healthwise.					
Everything seems bad for us, so we might as well enjoy what we enjoy doing and throw caution to the wind.					
Sometimes I like to do things that are bad from my health because it makes me feel free.					
Even if I know something is bad for my health (e.g. smoking, sunbathing), if it gives me pleasure, it's worth it.					
I don't want to live without risk, that would not be living.					
The more I'm told something is bad for me, the more I'm inclined to want to do it.					
The government has a duty to inform us what is good/bad for our health.					
If I become ill as a result of doing things I know are bad for me (e.g. smoking, sunbathing), then it's my fault.					
We've been told so many things are bad for our health, I don't take much notice anymore.					