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Overweight and Obesity in Health Care Workers in Relation to Musculoskeletal Conditions and Weight Loss

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Overweight and Obesity in Health Care Workers in Relation to Musculoskeletal Conditions and
Weight Loss

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A Thesis
Submitted in Partial Fulfillment of the
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APPROVAL PAGE

Master of Science Thesis

Overweight and Obesity in Health Care Workers in Relation to Musculoskeletal
Conditions and Weight Loss

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ABSTRACT

Statement of the Problem: Musculoskeletal disorders (MSD) are the most prevalent occupational injuries in nursing home employees. Most of the research and interventions in the past 30 years have focused on teaching and training nursing home staff in proper lifting and body mechanics to reduce the risk of injury. The weight of the nursing home staff and patients have increased dramatically in recent years parallel to the significant growth of adiposity in the general population with two out of three adults overweight, and one of four obese (Body mass index (BMI) >30). This puts the staff at even higher risk for MSD injuries due to the stress on the lower back and joints during lifting. The long shifts, unavailability of healthy foods, stressful and demanding job all put nursing staff at higher risk of overweight and obesity. Elevated body mass (both patients and nursing staff) increases the mechanical loading on the joints and back and predisposes the nursing staff to occupational injuries including MSD, osteoarthritis as well as many chronic conditions associated with overweight and obesity.

Purpose: The purpose of this study was two-fold. First was an evaluation of the prevalence of MSD in a group of nursing home employees who were overweight / obese and at risk for type 2 diabetes. Second was to evaluate the effect of losing 3% of body weight with a tailored weight loss intervention on the reported MSD, general well being, and job performance. Information related to barriers to exercise and physical activity as well as eating habits specific to this population was collected to propose new weight management interventions for in this population.

Study Design: Pre-post quasi experimental design.

Sample Size & Composition: 99 nursing home staff employees from four nursing homes.

Measures utilized: Body weight, waist hip ratio, Body Mass Index (BMI), blood pressure and completion of a confidential survey for the measurements of reported MSD, general well being, and job performance.

Weight Loss Intervention: Each participant received a one-hour tailored consultation with a health educator based on responses to the survey questions and a booklet from the National Diabetes Education Program (NDEP) regarding weight loss goals, nutritional information, physical activity, and motivation for change.

Results: Overall 45.8% of participants lost at least 3% of their body weight, as well as improvements from pre-post in chronic disease, absenteeism, decreased sick days, MSD conditions, as well as general well-being, energy level and overall reported health. Of the 45.8% of participants who lost more than 3% were found to have significant improvements in BMI, physical health and general well-being. Correlational analysis found moderate activity improved significantly at post-intervention with the positive correlation to weight loss self efficacy. Self-efficacy for weight loss and eating improved as well as the global readiness scale after 28 weeks of a weight loss intervention.

Conclusion: A worksite promotion program that includes a tailored intervention to worksite wellness as well as a one hour, 1-on-1 consultation and accessibility to a health educator in and outside of the workplace is important to include in a WHP program.

Barriers to an effective program as well as worksite and lifestyle barriers should all be addressed in the beginning of the programming as well as throughout. By identifying these barriers to change and motivating one for change, we can find an effective worksite promotion program.

CHAPTER 1: Introduction:

In the past decade the United States has seen an increase in life expectancy. From 2000-2007 life expectancy at birth had increased by 1.3 years.¹ Due to the increase in aging population, there has been a significant increase in patient load in the nursing homes and subsequent demand on nursing home staffs.^{2,3} With this increase, nursing home staff have been faced with more stressful working environments due to increases in shift patterns/hours and demanding job productivity.^{3,4} Employees at these facilities are also faced with more stress and strain on the joints due to lack of proper techniques in lifting and patient transfer, which may predispose the joints to musculoskeletal injury and pain.⁵

Obesity is a prevalent public health problem in the United States and has been surging in the past 20 years.⁶ Two-thirds of adults in the United States are overweight, and almost one-third is obese.⁶ Excess body fat can lead to many different co-morbidities and chronic diseases. Calculation of Body Mass Index scale (BMI) has been used for categorizing of body weight. The BMI of lower than 25 kg/m² is considered normal, while a BMI \geq 25 is considered overweight and \geq 30 is considered obese.⁷

Studies have shown that energy imbalance (energy intake (nutrition) exceeding energy expenditure (physical activity)) is an increasing problem at worksites. Types of working conditions can also be a major contributor to this problem. For example, work environment such as inflexible work hours, hourly vs. salary, and access to unhealthy food and unhealthy snacks are other contributors to this imbalance. Physical inactivity at worksite (decreased energy expenditure) and consumption of and availability of abundant unhealthy food (increased energy intake) lead to a positive energy balance, which will eventually result in overweight. Maintaining energy balance could play an important role in the prevention of overweight/obesity and related disorders, hypertension, diabetes, hypercholesterolemia, cardiovascular diseases, and some

types of cancer.^{8,9} These trends in obesity have increasingly affected those in working conditions such as nursing home staff, who are faced with unhealthy lifestyle behaviors due to their work environment.

Based on research by the National Institute of Occupational Safety and Health (NIOSH) many other organizations, it is widely believed that job stress increases the risk for development of back and upper- extremity musculoskeletal disorders (MSD).¹⁰ Job stress is also directly related to over eating and consequently over weight and obesity.¹¹ Although more research is needed, there is a growing concern that stressful working conditions interfere with safe work practices and set the stage for injuries at work.¹²⁻¹³ The unavailability of healthy food, lack of time to manage healthy lifestyle behaviors such as exercise and healthy eating as well as stressful working condition put nursing home employees at risk for overweight and obesity as well as MSD.¹⁴ Musculoskeletal pain is one of the most chronic and debilitating conditions, especially in the knee, hip and back.¹⁵⁻¹⁶ The constant stress on these four anatomical areas leads to the inability to perform normal activities of daily life and compromise productive job performance.¹⁵ Studies have shown direct relationship between MSD, disability leave and absenteeism.¹⁷⁻¹⁹ All have direct effect in increased health care costs.²⁰⁻²² These direct costs affect the costs of the employer as well as employee. Worksite health promotion programs that allow for access in a controlled environment, contain similar social and communication networks, allow for faster changes for policy and environmental change and training the trainer can all be cost effective in aiding in the reductions in health care costs.

The workplace has been identified as an ideal place to target adults at risk for obesity and other chronic conditions related to lifestyle behavior, because most people spend more than half of their daily awake time at work.²³ Currently, on average 62 percent of companies offer a wellness program. Wellness programs provided a return on investment of \$3.48:1 through

reduced medical costs and \$5.82:1 through decreased rates of absenteeism. Interventions that increase employees' knowledge about unhealthy behavior and provide tailored education for changing the unhealthy lifestyle has been reported effective.²⁴ It is implied that employees' behaviors are determined not only by conscious choices, but also by unconscious processes, or habits. Increasing knowledge (e.g., by education or worksite counseling) on the advantages of healthy eating, increasing physical activity and managing a healthy weight will influence individual's conscious choices. Preventing or treating overweight and obesity may also reduce the MSD related disorders and improve the quality of life for employees. Additional workplace benefits such as decreases in staff turnover, sick days, and health care costs, as well as increases in productivity, self care and self confidence may be attained.²⁵

CHAPTER 2: Present Study

Statement of the Problem

With the increasing rates of obesity worldwide, researchers have linked trends of weight gain to reductions in the quality of life as well as life expectancy.²⁶ Nursing home staff are at a higher risk for weight gain and chronic disease conditions due to the increase in stressful working environments from the increase in working hours and disrupted shift patterns²⁷ increased patient care²⁸ lack of available healthy food choices^{20,29} and lack of nutrition knowledge and skills.³⁰ In addition to these stress-related and unhealthy conditions, nursing home employees also face hurdles to exercise and increased risk of musculoskeletal pain due to poor body mechanics and lack of proper techniques for lifting and moving the patient load.¹⁵

Health promotion programs in nursing home facilities need to accommodate the number of employees as well as barriers in the worksite to ensure program achievement. Nursing home work environments are characterized by long shift work/hours, stressful job demand at the worksite, increased patient care.²⁰ Strong administrative support is needed to facilitate positive changes in lifestyle and working conditions as well as to address the needs and views of the nursing home employees. Therefore focusing on a tailored approach to weight loss and behavior change, which targets the demands of the employees will allow for greater employee participation as well as success of the program.³¹

Worksite promotion programs that consist of evidence-based research, are theory driven and use a participatory approach show higher rates for success than the “one size fits all” approach.³²⁻³³ These programs are more readily able to determine employee’s risk for chronic disease and health risk factors as a basis for creating a program tailored to the needs of the individual by using the Diabetes Risk Score (DRS). The DRS was developed to identify risk for Type 2 Diabetes, with one or more cardiovascular risk factors age, BMI, waist circumference,

chronic disease, eating and physical activity habits.³⁴ Kobayashi (2008) and Heaney (1997) found through WHP that individual counseling and increased awareness of health will reduce stress, health risk reduction and lower levels of health care.

Purpose: The purpose of this study was two-fold. First was an evaluation of the prevalence of MSD in a group of nursing home employees who were overweight / obese and at risk for type 2 diabetes. Second was to evaluate the effect of losing 3% of body weight with a tailored weight loss intervention on the reported MSD, general well being, and job performance. Information related to barriers to exercise and physical activity as well as eating habits specific to this population was collected to propose new weight management interventions for in this population.

1. To evaluate the frequency and magnitude of pain in four anatomical areas in a group of nursing home staff who are overweight and obese and evaluate the number of reported improvements in pain with a 3 % weight loss.
2. To evaluate the co-morbidity of overweight and obesity with other reported chronic conditions such as diabetes, hypertension, elevated cholesterol and low back/spine disease, as well as evaluate the percentage of improvements in these conditions with losing at least 3% of body weight.
3. To evaluate the effect of losing at least 3% of body weight on reported MSD as well as physical, social, emotional health and general well being.
4. To describe changes in absenteeism and presenteeism pre-post intervention with the 3% loss of body weight.
5. To determine the relationship of self-efficacy for eating and exercise, Stages of Change, 3 % weight loss and reported MSD pre-post intervention.
6. To identify barriers to a healthy lifestyle and proposed more efficient weight management intervention for at risk population

Definitions

1. *MSD* is defined as frequency and magnitude of pain in four anatomical areas of Back, Shoulder, Knee and Wrist/forearm
2. *Frequency of MSD* is defined as how often on hourly, daily, weekly or monthly bases a participant have pain in any of the above anatomical areas.
3. *Magnitude of MSD* is defined as how long pain lasts-- less than an hour, more than an hour, a day or a week.
4. *Chronic health* conditions are defined as reporting to currently having or being treated for any of the following conditions: high blood pressure, high blood cholesterol, and diabetes or spine problems. *Diabetes Risk Score* is defined by answering a series of questions with a given number of points per question. A score of 8 or higher marks at risk for Type 2 Diabetes and other related chronic disease. Participants who answered an 8 or more would be considered for the program.
5. *Physical, social and emotional health* is defined based on responses to SF-12 quality of life questions.
6. *General well being* is defined as self reported general health, energy level and difficulty performing daily activities.
7. *Absenteeism* is defined as reported number of work days missing in the past months.
8. *Presenteeism* is defined as accomplishing less while at work due to physical or emotional health.
9. *Barriers to a healthy lifestyle* are defined as reasons for not exercising and unhealthy eating scores.
10. *Effective weight management* is defined as tailored program based on health risks, barriers to exercise and eating habits, preferred types of exercise and types of professional help requested.
11. *Stage of Change and Self-Efficacy* is defined as a total from a number of responses pertaining to confidence in performing activities as well as moving from Stages of Change in Prochaska's individual level Stages of Change.

Hypotheses

1. Nursing home employees who are overweight / obese will report :
 - a. Higher rate and intensity of MSD pain in back, shoulder, hip and knee.
 - b. Report higher rate of chronic conditions.
2. Nursing home employees who lose at least 3% of weight will:
 - a. Have a decrease in the reported MSD pain rate and intensity.
 - b. Improve physical and social health, general well being and chronic conditions.
 - c. Improve work productivity as indicated by self-reported absenteeism and presenteeism.
3. There will be positive relationship between losing 3% of body weight and weight loss self efficacy scale and exercise self efficacy scale.
4. Identification of workplace, individual and environmental barriers to physical activity and healthy eating are essential for proposing an effective weight management program at the workplace.

Significance

In 2008, healthcare had provided about 14 million jobs for wage and salary workers, with about 23% of these jobs accounting for nursing care facilities. It is also projected that these health care jobs will generate another 3.2 million for wage and salary workers between the years of 2008-2018, mostly based upon the rapid growth in the elderly populations.³⁵ Lack of job control and significant increases in job demand and patient loads put nursing home employees at an increase risk for stress and burnout. The risk factors such as stress and burnout put individuals at an even higher risk for unhealthy weight-gain, musculoskeletal disease (MSD) and chronic disease such as diabetes and heart disease. In early as 2004, reported weight gain in the workplace has caused annual health care costs related to obesity to exceed \$92 billion³⁶ as a result of increased sick days, decreased productivity in the workplace and limited mobility.²⁵ Understanding and identifying

the sources contributing to professional burnout and job stress may allow for developing strategies to overcome these negative health outcomes.

The present study was designed to address the prevalence of obesity and chronic conditions, poor health behaviors, as well as the relationship of MSD pain to other chronic disease and reported health measures in overweight and obese nursing home staff. Furthermore, this weight loss study may reveal useful strategies and a helpful approach to weight loss interventions designed to be more fitting for those in the workplace with increased job demand and stressful work environments.

CHAPTER 3: Review of Literature

This review will examine literature in the following areas:

- i. The relationship between overweight/obese adults and MSD
- ii. Nursing home employees and the related health conditions affecting them
- iii. Identifying chronic health conditions and other co-morbidities in overweight and obese populations
- iv. Weight loss of at least 3% of body weight on prevalence of reported MSD, chronic disease and improvements in absenteeism and presenteeism
- v. A comparison of the strategies and effectiveness of worksite health promotion programs including the utilization of Tran theoretical Stage of Change as part of a weight loss program
- vi. An overview of the assessment tools identified and used for this research such as the Diabetes Risk Score and Food Liking Survey
- vii. Summary

I. The relationship between overweight/obese adults and MSD

In recent years, MSD has become an increasingly chronic health risk in nursing home employees due to increased patient load and indispensable shift work.³⁷⁻⁴² MSD puts a significant amount of strain on the lower back, as well as knee, shoulders and wrist.¹⁵ Knee osteoarthritis, another form of MSD, is a common degenerative disease of the joints, which in time can lead to pain, stiffness, immobility, and possible joint replacement therapy.⁴³ There is no cure to musculoskeletal pain, but weight reduction and proper body mechanics can help to prevent the onset and duration of the problem.¹⁴ Reportedly, adults 45 years of age or less tend to find low back pain as the most common cause of activity limitation. Knee and hip pain account for a great deal of activity limitation, especially those in the older adult overweight population. In a major study, Andersen et al. (2003), compared the relationship between BMI to knee and hip pain in elderly adults 60 years and older. They reported the prevalence for knee,

hip, and back pain as 21%, 14%, and 22% respectively, with an increase in prevalence of reported MSD pain with an increase in BMI.¹⁵

Moreover, Messier et al 2000, focused on MSD-reported pain in a six-month pilot study for a weight loss in older obese adults with knee osteoarthritis (OA). From the analysis, exercise combined with weight loss can improve pain, disability, and performance. Messier et al. (2004) evaluated the effect of weight loss to MSD in overweight/obese adults aged 60 and older. This study compared the affects of MSD on physical function and weight loss in 4 different groups: healthy lifestyle group (control), diet modification, exercise modification and diet plus exercise groups. The diet plus exercise group had significant improvements in self-reported physical function, 6-minute walk distance, stair climb, and knee pain ($p < .05$). This study suggests those who followed a healthy diet plus exercise had significantly greater improvements of decreased reported pain and physical dysfunction.³⁸⁻³⁹

Hooper et al. (2005) evaluated the prevalence of reported painful musculoskeletal (MSK) conditions in obese individuals before and after weight loss with bariatric surgery. At baseline 100% of subjects reported pain to be associated with MSK conditions. At follow up, participants lost on average 41 ± 15 kg, with an average drop in BMI from 51 to 36. Parallel to the drop in weight, reported pain due to MSK conditions dropped to 23% from a previously reported 100%. A more recent study by Roffey et al. (2011) included 46 obese adults (mean BMI 44.7 ± 7.6) from a tertiary care academic hospital who reported recent low back pain (LBP) of any duration (acute, sub-acute or chronic) for past 12 months. The weight loss intervention consisted of twenty-six weekly, 3-hour meetings followed by twenty-six monthly meetings consisting of various information on healthy dietary and exercise practices developed and managed by a team of dietitians, physicians, exercise specialists and nurses. Participants started with meal replacement packets that weaned into specialized assigned diets consisting of 1200-1500

calories/day and encouraged to engage in exercise practices of 60-90 minutes/day. The numerical pain scale (NPS) was used to assess participants' pain severity and recorded for weeks 1, 14 and 53. At Week 53 there tended to be a drop in NPS ($p=.07$) with a significant weight loss ($p=.0005$).⁴⁴ The researchers concluded that a 12-month non-surgical weight loss and exercise promotion program managed by a team of health care providers is a successful way to decrease weight as well as onset pain severity.

In summary, additional weight may put extra load on the musculoskeletal system, causing a loss of alignment and increased effort needed to accomplish everyday tasks. Losing weight will reduce the strain on the musculoskeletal system and reduce the associated pain and disability. This review provided an understanding with regard to the prevalence of MSD pain in overweight and obese individuals and effectiveness of losing weight in improving the MSD pain.

II. Nursing home employees and the related health conditions affecting them

The number of overweight and obese adults in the nursing home worksite environment has increased^{20,45} due to a number of predisposing factors.⁶ Health care workers who are involved in rotating shifts, especially night shifts may be at increased risk for the development of the metabolic syndrome (visceral obesity, dyslipidemia, abnormal blood pressure and serum glucose levels) on the basis of unfavorable effects of sleep deprivation and stressful and demanding job condition.⁴⁶⁻⁴⁷ An increase in shift work, long hours and poor dietary habits are barriers to healthy living for employees^{17,48-50}

The United States is an aging population, which has increased the patient load in nursing home facilities caring for elderly residents. This significant increase in the patient load, causes nursing home employees to face progressively more stressful jobs²⁰ vigorous shift work and increased workload which can inadvertently lead to sleep problems, decreased productivity,

and poor quality of life.^{27-28,37,53} Takahashi and colleagues (2006) evaluated the relationship between MSD and sleep deprivation in nursing home employees. Employees who reported MSD symptoms tended to have higher reports of sleep disturbances. The researchers also found that increased physical and strenuous work was associated with sleep disturbances.³⁷ More specifically; arm pain was significantly related to fatigue and lack of sleep in nursing home work. Moreover, arm pain specifically and sleepiness showed a significant relationship to increased levels of workload.⁵¹

The unpredictable and dynamic shift work and shift pattern changes have been additional threats to employee health and well-being. Ruggiero (2011) and Wilson (2002) found that individuals have different ways of adapting to shift pattern changes. For example, changing shift length can stress circadian rhythm, sleep factors, and social domestic factors of an individual.²⁷ These changes in shift patterns have been found to influence physical, social, and emotional changes in one's behavior.^{27,54}

Nursing home employees are faced with increased levels of stress in the workplace, which is showing to be declining the health of the employees.⁵⁵⁻⁵⁶ A prospective cohort study of 6,935 middle aged men with no previous history of myocardial infarction (MI) over 12 years has shown a direct linkage to stress and cardiovascular (Rosengren et al, 1991). The study surveyed and evaluated questions relating to stress- tension, irritability or anxiety and sleep disturbance; men who reported stress or stressful work environments within the first 1-5 years had higher reports of coronary artery disease than did men with no reported stress. Although nursing home staff is able to adjust to shift work and stressors, research finds this variability in shift pattern adaptation still affects sleep patterns and health concerns. In another prospective study, Yoo et al. (2011) compared level of job stress in female law enforcement officers (LEO) through a self-reported data collection. In comparison to demographically similar respondents from the CDC BRFSS,

female LEO felt more stressed at their jobs and showed higher risk of hypercholesterolemia and diabetes.⁵⁶ These results suggest working environments, stressors in the work place, and high demanding jobs (such as nursing home staff, LEO's and manufacturing workers) amplify health concerns as well as may lead to other health related conditions.⁵⁸

Long hours and constant changes in shift patterns have been linked to patterns of poor eating habits^{20,29} due to increased patient load and decreased break time. For example, in an experimental study, Oliver et al. (2000) found emotionally stressed eaters with longer working hours and shift patterns consumed more high-fat, sweet foods than did unemotional, stressed eaters. Moreover extended shift work can alter eating patterns and cause inactivity, increasing risk of overweight and unhealthy lifestyle behaviors. For example, an experimental feeding study of 68 non-obese, nonsmoking volunteers highlight how stress influenced dietary selection and healthfulness and performance at work.⁵⁹ Participants came to the lab after 4 hours of fasting, consumed a buffet meal, and then presented a 10-minute speech on 1 of 10 topics of their choice. Of the participants, 15.7% of men and 16.6% of the women perceived stress manipulation during the study. The stressed eaters tended to eat higher amounts of sweet fatty foods than healthier choices, as well as relating high-fat snack food intake to be consumed more than energy dense snack foods. This research also found restrained, highly stressed eaters tended to eat more under negative emotional states.⁵⁹ The researchers also found that 1) stress can change food choices from healthy to less healthier options, and 2) females were more apt to increase their dietary intake to more unhealthier food choices when stressed. Results from this study and others also found those individuals who increase their dietary intake when stressed tended to be restrained eaters and substituted these foods in their diet because it "made them feel better."⁶⁰

Dietary intake and poor eating patterns can also be influenced by other factors, such as environment, genetics and social modeling. Taste preferences can be connected to genetic factors through oral sensations for these high-fat, sweet and salty high caloric foods.⁶¹⁻⁶⁴ Some people prefer higher levels of sweet and fatty foods to reach a most favorable liking than do others.⁶⁵

In addition to these previous issues, there are other concerns for the significant and predicted growth in the older population over the next 50 years, and how this will have a significant impact in terms of supply and demand of health care workers, especially health care workers providing service at the nursing homes. Furthermore, nursing home staff must be equipped with skills to be able to provide the demanded services of the older population. Since the increase in patient load, nursing home environments have been faced with many barriers when it comes to practicing healthy behaviors such as healthy diets and physical activity.

With an increase in patient load, workers suffer from possible pain and limited mobility due to the constant moving and lifting of patients- which inadvertently leads to limitations to exercise and healthy eating patterns.⁶⁶ Engst et al (2005) reported significant reduction in the number of injuries and discomfort for neck, back, shoulders, hands and arms for nursing care staff following the implementation and utilization of overhead lifts. Vieira et al (2006) also reported that improvements in working conditions such as increases in lifting devices, improvising biomedical training and having an adequate set up for lifting and moving patient will lead in reduction of low back injuries and improved overall performance and energy.

Results from Engst, Oliver, Rosengren, Ruggiero, and Takahashi demonstrate a significantly negative relationship between overweight, MSD pain, stressful work environments, and lack of sleep, and when these factors such as stress and stressful working conditions, overweight, and

unhealthy practices are combined some of these related conditions affecting them can be seen at a higher risk.^{51,54,57,59,67}

III. Identifying chronic health conditions and other co-morbidities in overweight and obese populations

Recent research suggests that long-term obesity from childhood to adulthood is related to higher mortality risk for disease such as atherosclerotic cerebrovascular disease, chronic disease and colorectal cancer.⁷¹⁻⁷²

As an aging population, individuals' health is at a steady decline. Overweight and obese individuals are at higher risk for Type 2 Diabetes, Hypertension, Cardiovascular Disease, Musculoskeletal Disease and Stroke, all of which are influenced by diet and exercise.⁷⁰ For example, in a cross-sectional study of adolescents ages 10-24, Shah et al. (2010), found adolescents who were obese or obese with Type 2 Diabetes were at higher risk than those non-obese adolescents to having predisposed chronic health conditions, such as cardiovascular disease and high blood pressure. Shah and colleagues also evaluated the diastolic function as it related to progression of heart failure, and determined that those individuals who were obese/obese with Type 2 Diabetes were at a higher risk than healthy weight adolescents for premature heart failure.

Overweight is only one of the many major determinants of disease risk from unhealthy lifestyle practices such as: smoking, unhealthy eating patterns and physical inactivity which go hand in hand with unhealthy weight control behaviors.⁷³ There is relationship between poor working environments such as lack of job control, high physical demand and stressful work environments and the inability to make positive lifestyle changes such as increase physical activity, quit smoking and practicing healthy eating.⁷⁴ Patient load, shift work and time

constraints have all been linked to sedentary lifestyle, sedentary lifestyle puts one at risk for weight gain and chronic disease risk.⁷⁴

The U.S. Prevention Services Task Force evaluated the effectiveness of exercise as preventative medicine and recommended physical activity counseling as routine part of clinical practice. Studies show that an increase in physical activity can decrease the risk of chronic disease and obesity, especially amongst sedentary employees.⁷⁴⁻⁷⁵ These sedentary behaviors are now being understood as 'social norms' of the worksite, inhibiting the ability of the workers to want to participate in physical activity while at work.²⁰ For example, workers may feel that by just standing long hours on foot, they do need any other activity or consider that the exercise routine for the day.²⁰ This then may be understood as the 'social norm' of the facility and a worker will not exercise after leaving work.

Some initiatives have been originated to changed these 'social norms' and improve chronic health conditions. For example, Jensen et al (2004) found significant improvements in diastolic blood pressure, total cholesterol, triglycerides, physical performance and overall health in the elderly by administering a program that included a prudent diet, increased physical activity and behavior modification. Faghri et al, instituted a walking program at workplace, encouraging employees to increase the number of steps they take and while at work. They reported, reduction in body weight as well as blood pressure.⁷⁶⁻⁷⁷

In 2011, VanDenKerkhof and colleagues (2011) looked at diet, chronic widespread pain (CWP) and lifestyle and how these three factors affect risk for cancer and cardiovascular disease (CVD). Participants were followed from birth (1958) to age 45. The recorded factors such as unhealthy diet and health risk recorded at ages 33 and 42. With a total of 8572 participants completing the study, 12% reported CWP. Women who reported the CWP were more likely than women who did not consume an unhealthy diet and fatty food intake⁷⁸ to have

significantly higher BMI's, higher reported physical exertion at work, and were more likely to be unemployed.

In 2008, the Behavioral Factor Risk Surveillance System (BRFSS) examined in a cross-sectional survey the relationship of rest/sleep and its effects for cardiovascular disease (CVD), diabetes mellitus (DM), and obesity in a multiethnic national representative sample of 414,509 participants. Sleep was categorized in four groups for self-reported insufficient sleep ranging from 0, 1-13, 14-29, or 30 days with five outcomes of either: CVD, coronary heart disease, stroke, DM or obesity as reported by doctor and self-reported cardiovascular problems. Results show those persons who reported any insufficient sleep compared to those who had sufficient sleep, had a more significant association with the above variables in separate analysis.⁷⁹

The results of these findings suggest that modification of unhealthy behaviors can improve at risk for premature and chronic disease outcomes. Improvements in multiple health risks for smoking, unhealthy eating practices, and lack of physical activity can improve the lifestyle and health of various populations.⁷⁸⁻⁷⁹

III. Weight loss of at least 3-5% of body weight on prevalence of reported MSD, chronic disease and improvements in absenteeism and presenteeism

The majority of Americans' are overweight, and overweight individuals use health care services at higher rates than those of normal weight (an average of 10% to 36% higher).⁸⁰ In efforts to control for obesity and chronic disease, a worksite health promotion program is an ideal investment to make due to the rising cost of health care services and the large speculation in health insurance that employers make. Worksite promotion programs are at an increased need due to lost performance and days at work, as well as barriers to social, emotional and physical health. Worksite health promotion programs can reduce health risk and chronic disease

for over hundreds of millions of occupational workers in the U.S.⁸⁰ as well as cut back health care service costs. For example, Gates et al. (2008) found that employees who were classified with a BMI of 35 or higher had greater limitations at work, displaying a 4.1% decrease in the ability to perform normal work than those with a BMI < 30.¹⁷ Employees with a BMI higher than 35 were found to be 1.18% less likely than other employees to be productive at work with an annual cost of \$506.00 worth of lost work per employee. Also in 2008, the estimated health care costs related to obesity were \$147 billion.⁶ With the increased health care costs, decreased productivity of worksite employees, a WHP that targets multiple health risks as well as targets employees in promoting weight management will help in preventing and controlling obesity, health care costs, and overall health of the employee.

There are many ways to target the obesity epidemic, but recent research has found supporting evidence that it can be effected to target those in the workplace.⁸¹ For worksite health promotion programs (WHP) to work, they should include strong evidence to convince employers of the benefits of a program, relevant and acceptable knowledge to the employees of the program, tailoring the program to meet the needs of the population, as well as promoting strong models to support behavior modification.⁸² A program that tailors the needs of the individual has shown to positively influence the involvement of the participant in the program. A tailored WHP that includes nutritional counseling and one on one consultation with a health educator is more effective in improving general health and well-being.⁸³ Briley et al (1992), found that worksite health promotion programs involving health educators such as registered dietitians can improve weight reductions and lower cholesterol for employees in high-stress occupations. These programs can be beneficial in maintaining a positive atmosphere and attitudes, as well as better productivity in the workplace and overall improvements in a healthy lifestyle.⁸⁴

Recent literature suggest a weight loss of at least 3 percent or more in body weight will improve diabetes risk, the risk for MSD prevalence and pain, as well as lead to improvements in chronic disease.⁸⁵ Obesity has become a major risk factor for the early onset and duration of many chronic disease including diabetes, hypertension, high cholesterol, stroke and MSD. For example, TeMorenga and colleagues (2011) compared two low-fat weight loss diets in 83 overweight or obese women. The two diets used were either: high fiber or high protein diet for 8 weeks. Calorie intakes were reduced to ensure a 0.5 – 1.0kg weight decrease per week. Both groups lost a considerable amount of weight (-4.5 kg with high protein diet, and -2.5 kg with high fiber diet) which produced a reduction in waist circumference, total and LDL cholesterol, fasting blood glucose and blood pressure. Results indicated that both groups lost weight, with a larger amount of weight loss observed on the high protein group, which had a significant decrease in diastolic blood pressure as compared to the high fiber group.⁸⁶

Obesity can cut an average life expectancy of Americans' by as much as 5%.⁸⁷ Even as little as 2-5%⁸⁸ weight loss can show short-term effects on MSD pain and frequency. For example Larsson et al. (2004) evaluated MSD-reported pain after a 64 week weight reduction program. Of the participants who lost at least 5% of weight, functional limitations and perceived pain from MSD improved significantly.⁴¹ This research suggests that even a modest decrease in weight can cause a positive change in MSD pain as well as functional mobility.

Proper techniques and improvements in MSD prevention can provide additional benefits including decreased nursing staff turnover, decreased sick days, decreased administrative costs, more productive workers, and increased self-confidence among worksite employees. For example, Finkelstein et al (2005) found a direct linkage to overweight and attributable medical expenditures and absenteeism. Medical and absenteeism costs for a health care firm of 1000 people are estimated to be 285,000 dollars per year. Moreover, 30% of total costs result from

absenteeism in the workplace.²⁵ Mills et al (2007) found through a quasi-experimental design, that participants who completed a multi-component worksite health promotion program reported improvements in work productivity, decreased absenteeism, and a positive return on investment.⁸⁹

IV. A comparison of the strategies and effectiveness of worksite health promotion programs including the utilization of Self-Efficacy and the Tran theoretical Stage of Change Model as part of a weight loss program

Growing evidence has supported the efforts for worksite health promotion programs in reducing weight gain and adjusting poor lifestyle and health behaviors. Worksite health promotions are at higher demands due to the increase in aging population leading to demanding working conditions, as well as increased risk for chronic disease. Worksites are a perfect environment to reach individuals, since workers spend a great deal of their daily awake time at work. Developing a health promotion program in the worksite offers countless opportunities for interventions in the workplace such as behavior modification, weight loss, smoking cessation and stress management.^{81,90-92} Kelsey and colleagues (2006) found through a health promotion intervention in the workplace encouraging positive strategies such as engaging in relaxation exercise, meditation, keeping a journal, and keeping a positive emotional state can improve health and physical exercise encouragement.⁹²

Worksite health promotion should target behavioral management, coping conditions, life skills and positive self-efficacy for improvement of overweight and obesity as well as worker productivity. Since the 'one size fits all' approach is unable to target each individual concern of the workforce, a tailored health promotion program should focus on the overall risk factors and chronic health conditions, as well as the participants feelings about health behavior and modification. Without a tailored approach to weight loss, worksite promotion programs may not be able to target negative worker norms. These predicted negative worker norms of nursing

home staff include: unpredictable working schedules and increased patients load, as well as stressful in and out of work lifestyle conditions and lack of sleep/relaxation.

A worksite health promotion program will have greater success with the proper use of educational models, establishing levels of readiness each individual is undergoing, as well as engaging and encouraging your audience. Identifying and using the proper models in health promotion is also important for the educational delivery to the audience. Such models and counseling techniques used for an effective program is motivational interviewing, self-efficacy as an approach to weight loss, and the stage of change model.

Motivational Interviewing

Motivational interviewing (MI) was developed and tested by Robert Miller and has been used as a strategy to help individuals gain sufficient motivation to make a change as well as establish the reasons for not changing healthy lifestyle choices and desired behaviors.⁹³ MI recognizes that individuals approach changes in their life at different levels of readiness to make a change. MI is non-judgmental or confrontational, but lets the individual or audience engage in behavior change when they are ready to do so. MI has been used as a tool in counseling to treat individuals for diet, weight loss, smoking, gambling and medication adherence.⁹³ In a recent study; West et al. (2007) used motivational interviewing in an 18-month experiment to see if it improved weight loss in overweight white and black women with type II diabetes. Women in the MI group lost significantly more weight at the 6 month and 18 month follow-up, with significant improvements in the A1C levels at the 6-month mark but not the 18 month mark. These previous findings ⁹³⁻⁹⁴ suggest the use of MI for weight loss can help to motivate participants to approach their own individual level for change in their life.

Self Efficacy and its approach to weight loss

Bandura and colleagues have established that an individual's self-efficacy plays a major role in how goals, tasks, and challenges are approached. One's motivational level and feelings of self-worth can be challenged in goal revision.⁹⁴⁻⁹⁶ For example, Neumark-Sztainer et al, (2002) measured self efficacy through surveys and anthropometric data, with an objective to focus on work related concerns, behaviors of eating habits and weight concerns. This study found that intervention preventions addressing broad spectrums of weight related disorders can enhance skill development for behavioral changes.⁹⁸ Also, the increase of self efficacy and support from others in an intervention program will help with one's motivational change. Wamsteker et al (2005), evaluated the beliefs about causes, consequences, time line and control of obesity; and if these are predictors of weight loss after an 8 week low calorie diet. The results found that less weight reductions were associated with poor self efficacy and that weight loss had a 'physical origin' and 'beyond behavioral control'.⁹⁹ Those persons who perceived themselves to be better able to control their weight, who did not attribute their being overweight to a physical origin, and who experiences more self efficacy with respect to eating behavior lost significantly more weight. This study indicates that the outcome of dietary interventions improved when adjusting ones beliefs and self efficacy.⁹⁹

Studies are finding that performance feedback and causal attributions and positive reinforcement interactively influence one's self-efficacy and goal revision. Tolli et al. (2008) studied 198 undergraduate students who participated in a 2-hour study in regards to self-efficacy. The students were asked to complete a computerized anagram task in which participants formed words from groups of scrambled letters, and each student was told that these anagrams may have none, one or many solutions. This uncertainty helped to form ambiguity regarding one's performance. Students were given a performance target for the first,

second and final section. Also, students were able to set goals for themselves before each anagram, and were able to be revised upon after the first feedback session. Lastly, self-efficacy on performance was measured prior to each set of 10. For the results, interaction of attributions and feedback influenced change in self-efficacy over time, self-efficacy corresponded to a change in personal goal level over time, and interactions of attributions and feedback influence changed in personal goal level over time. This research proved the importance of an individual's self-efficacy in the goal revision process as it is a critical factor in goal revision.¹⁰⁰

Self-efficacy can be used for many counseling techniques in various intervention programs for weight loss and eating.¹⁰¹ Counselors can use self-efficacy to determine where one's motivational level is for practicing good eating and exercising behaviors. Self-efficacy has been modeled after social learning theory and used to help to control health behaviors, and has likewise been used in the past as a weight control behavior.¹⁰² Similarly, Roach et al (2003), used the concepts of self-efficacy to develop an intervention to increase self-efficacy for weight loss in a 12-week program designed for young adult college students. Certain methods to increase self-efficacy like making a food diary were provided during each of the 12, one-hour nutrition sessions. At post-intervention, self-efficacy for weight loss and eating improved significantly in the experimental group as well as improvements in healthier eating behaviors.¹⁰³ This research along with others have found a linkage between the roles of using and increasing self-efficacy to influence weight and eating behaviors, also known as weight loss self-efficacy (WLSE) and eating self-efficacy (ESE).¹⁰⁴⁻¹⁰⁶

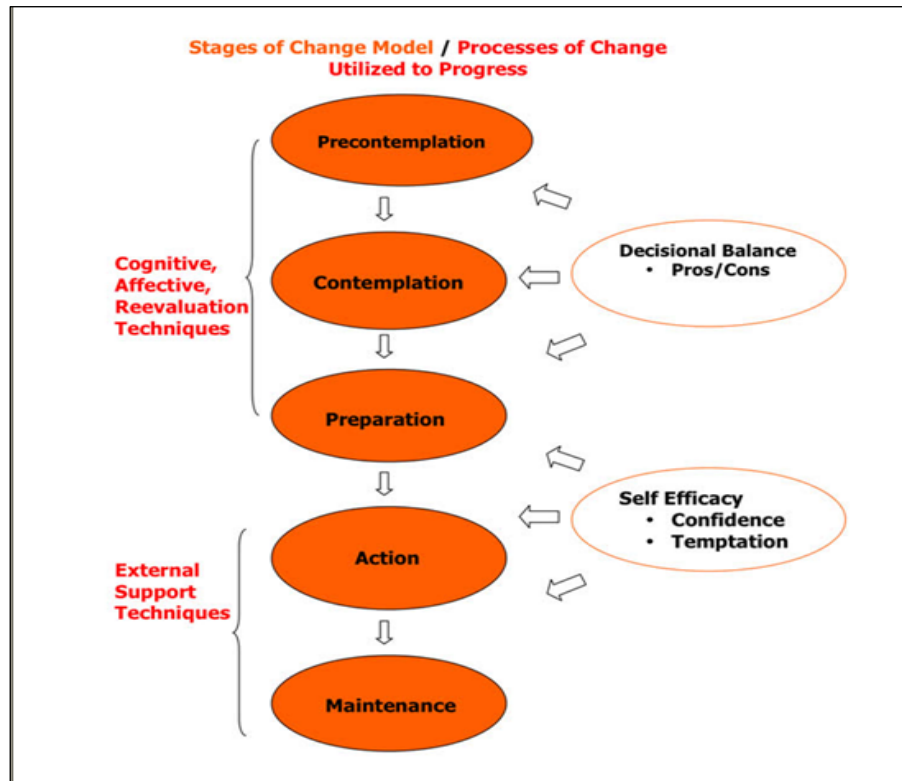
Stage of Change and Its approach to weight loss

Bandura et al (1995) found that one's self-efficacy is a belief in his or her ability to succeed in a particular situation. Bandura described these beliefs as determinants of how people "think, behave, and feel"⁹⁵⁻⁹⁷ and that people have an easy ability to set the goals they

want to accomplish and behaviors in which to change. Combining the approach of increasing one's self efficacy for motivation, James Prochaska et al (1997) recommend that by referring to one's decisional balance concerning change (weighing the pros and cons), we can focus on one's situation specific confidence (confidence for change, and the ability to not relapse) and self-efficacy (motivation and self worth) to tailor a behavioral change for an individual.¹⁰⁷

Prochaska developed the Trans-theoretical Stage of Change model (Figure 3.1), which at the time was implemented in a program for smoking cessation.¹⁰⁷⁻¹⁰⁹ Prochaska and researchers found that each individual is at a certain stage of behavior change in their life, of these there are 5 categories: 1) Pre-contemplation - "people are not intending to take action in the foreseeable future, usually measured as the next 6 months," 2) Contemplation - "people are intending to change in the next 6 months," 3) Preparation - "people are intending to take action in the immediate future, usually measured as the next month," 4) Action - "people have made specific overt modifications in their life styles within the past 6 months," and lastly 5) Maintenance - "people are working to prevent relapse," a stage which is estimated to last "from 6 months to about 5 years." Prochaska and colleagues also found another stage of change for certain individuals, which is called Termination - "individuals have zero temptation and 100% self-efficacy, in which they are sure they will not return to their old unhealthy habit as a way of coping."¹⁰⁷⁻¹⁰⁹

Figure 3.1
Stages of Change Model



This model is proposed for the educational practices in regards to educational and supportive role in counseling for our study.⁹⁰ Weight loss and nutrition interventions' major component is the type and timing of the educational components. By using the SOC and self-efficacy for educational challenges in goal revision, self-worth, and behavior modification during intervention will aid in the improvements of education, dietary and exercise practices.

V. Barriers to weight loss and effectiveness of workplace intervention

An important framework to a successful intervention is by understanding the barriers and facilitators for an effective weight loss intervention. By understanding the barriers in which the educating team face, as well as the participant's who receive the information, the more powerful and successful of the intervention. Engaging and providing structure to the educational material

and framework as the main point of focus is more crucial in delivering and engaging the audience, without this ability to do so program goals may not be understood and unrealistic expectations may be set.¹¹⁰ Without proper delivery of program goals and educational materials as the primary focus of the intervention, poor-self efficacy^{94,111} and lack of confidence may occur, leaving the audience with the inability to lose weight and maintain healthy lifestyle behaviors.¹¹⁰

Building a framework of knowledge about health and nutrition information, the affects of poor health behaviors, and providing the knowledge for the ability to apply this new information will only help with motivation to make a behavior change. In a recent study, Colkesen et al. (2011) found that used a type of worksite health risk assessment (HRA) on tailored feedback and educational components would be a 'valuable component in workplace health promotion programs.'¹¹²

Fukumoto and colleagues examined two types of health promotion programs involving nutrition based-health education, exercise and group dynamics in a Japanese community of adults showing one of more risks of metabolic syndrome (MS). The nutritional components of this promotion program also known as the "initiation process" focused on seven "lifestyle intervention courses,' concentrating on group lectures, one-on-one consultation, and group discussions. Topics examined during the educational sessions focused on MS, nutrition, exercise and behavior modification. These topics were further discussed during the last of the seven courses to touch upon their recent experiences and hurdles they had in applying this learned information. After the educational component, participants were given a survey and goal completion exercise, which then helped to divide them into two groups: either a 5 month intervention program for health change or a 5 month lifestyle program with a 6 month enhancing program. The enhancing program allowed for participants to apply these behaviors in life, while

receiving a leaflet of general information pertaining to voluntary exercise. Results at one year follow up showed both groups to be similar to the initiation procedure, and that health promotion and education are the most important and beneficial means of improvement in lifestyle change and behavior modification.¹¹³ This lifestyle program benefitted each participant's ability to identify their poor eating habits, review of their lifestyle habits and set concrete goals, aiding in positive self-efficacy.¹¹¹ Participants also were able to set goals and reach these goals, while being able to revise or adjust goals when met with the education they acquired through the program. Individuals were able to gain the knowledge, power, and ability to enable a change in lifestyle behavior.

In summary, the use of structured up to date information from primary sources, the ability to engage the audience and solid understanding of the programs goals will able a weight loss program in providing a positive outcome. Being able to increase the confidence in the audience as well as tailoring the educational material to this audience will aid in realistic goal setting and a positive weight loss.

VI. Summary

This previous review assessed literature related to an overview of health promotion as it related to obesity, chronic disease risk and MSD in the workplace. This review suggests that nursing home staff may be at a higher risk for overweight and obesity due to long working hours, lack of nutrition and physical education, time constraints and stressful working environments. Using the Diabetes Risk Score as well as a participant survey and nutritional education will help to ensure a tailored multi-faceted approach to worksite wellness. A tailored approach that engages the individual participate in their own goal making and positive self-efficacy will link a positive relationship to understand the knowledge, beliefs, attitudes, and

needs of the population. These goals may, in turn, help to successfully evaluate each participant for an effective worksite intervention.

****CHAPTER 4: Methods

Design:

This cross-sectional study was conducted in four long-term nursing home facilities located in the North East region of the United States.

Participants:

A total of 99 nursing home staff participated in this “Behavioral Modification Weight Loss Program (BWMP).”

Inclusion Criteria:

1. Part or full-time employees at the facility
2. At least 18 years and older
3. Be overweight or obese and at risk for type 2 diabetes based on diabetes risk score (DRS)
4. Agree to participate in the 16 weeks weight loss program with three months follow-up (for a total program of 28 weeks).

Exclusion Criteria:

- 1- Pregnant or lactating at the time of the intervention,
- 2- Lost 20 pounds or more within the past 6 months,
- 3- Have type 1 diabetes,
- 4- Taking supplements to increase weight loss (i.e. *Hydroxycut*, *Slimquick*)
- 5- Have cancer and been treated with radiation or chemotherapy in the past 5 years,

6- Individuals who have or plan to have weight loss surgery during the study period

7- Have known history of heart disease, stroke.

All of the participants signed an informed consent form approved by the University of Connecticut Institutional Review Board (see appendix A).

Measurements

Diabetes Risk Score: The diabetes risk score evaluates an individual's risk based on weight, age, physical activity, gender (being women), and family history of diabetes. A score of 10 or more indicates an individual at high risk for diabetes. This test was used as screening tool to identify those at high risk for type 2 Diabetes. For most research, it is time consuming and expensive to assess the risk for obesity and chronic disease. The Diabetes Risk Score has been developed by Lindstrom and Tuomilehto (2003) to gather all the necessary information to interpret the risk for Type 2 Diabetes in a simple method. These authors sampled a random population of men and women age 24-64 years, from the National Population Register in 1987 as well as 1992, and followed this population for ten years. With the information gathered through this ten-year trial, a multivariate logistic regression analysis was used to interpret a given score. With each individual score, a total score of 10 or higher was marked as the "Diabetes Risk Score." This score was then further tested on an independent population of adults in 1992 with a 5-year follow-up, which results found that this tool is an easy, accessible, inexpensive and reliable tool to identify individuals at risk for Type 2 Diabetes.¹¹⁴

Franciosi and colleagues reported that a cut-off of 9 on the DRS detects subjects with glucose abnormalities at 45% specificity, and 77% sensitivity. In their study, the DRS identified 83% of cases with type 2 diabetes and 57% of cases with intolerance to glucose.³⁴ (See Appendix B).

Participant Questionnaire: A standardized questionnaire, adapted from the study at the CPH-NEW (Center for the Promotion of Health in the New England Workplaces) was distributed to all participating employees at baseline, week 16th and 28th. The questionnaire obtained baseline information on demographics, general health status, history of systemic disease, tobacco and alcohol consumption, and included a weight loss self efficacy scale (WLSE) and exercise self efficacy scale (ESE), stage of change for physical activity, eating habits, weight management, overall healthy lifestyle, and one's preference for exercise (Appendix C). A truncated version of this survey (time-varying and dependent variables only) was repeated at the end of the program and three months afterwards, along with repeat measurements of weight, waist and hip circumferences, and blood pressure.

Weight Loss Self-Efficacy (WLSE): WLSE was measured by using the instrument developed by Clark and colleagues.¹¹⁵ These questions present 20 situations and ask respondents to rate their resistance to eating in each one, using a 5 point Likert-type scale ranging from 1 (not confident) to 4 (very confident) with 5 (Does not apply). The situational factors consist of: Negative Emotions (eg, eating when sad or anxious), Availability (eg, eating when food is readily available, such as at a party), Social Pressure (eg, eating food when others are encouraging eating), Physical Discomfort (eg, eating when in pain or physical fatigue), and Positive Activities (I can resist eating while watching TV). The scale provides one global scale and five subscales. The scale has been validated and the internal consistency has been reported to be between 0.70-0.90.¹¹⁵ The five sub-scales have inter-correlation with each other (r values ranging from 0.39 to 0.66). WLSE was assessed at the beginning (Session 1), midpoint (Session 8), and end (Session 16) of the program.

Exercise Preference: The approach used by Booth et al¹¹⁶ (1997) was used for this study. Participants were to choose their preferred activity or activities from a list of eight different

activities (walking, swimming, team sports, racquet sports, jogging, gym, aerobics, cycling) or “other.” These activities have been found to account for most leisure-time physical activities in a group of 1,232 Australian men and women who were identified as insufficiently physically active and were separated based on age for those 18 to 39, 40 to 59, and 60 to 78 years.¹¹⁶ Participants were asked what type of assistance they would prefer if they were to exercise more or to take up exercise including, advice from a health professional, group exercise, advice over the phone, watching a video tape on how to exercise, reading a book on how to exercise, be provided with a simple exercise pamphlet or no assistance. The survey will sought subject endorsements of 19 reasons for not exercising (more). These barrier response options are based on those used in an earlier study: no time, poor health, no company, can’t afford, too old, injury, not sporty, no facilities, need rest, children, no motivation, fear of injury, do not enjoy, no equipment, lack of persistence, too fat, and no energy.¹¹⁶⁻¹¹⁷

Exercise Self Efficacy (ESE): ESE was measured by using the instrument developed by Clark and colleagues.¹¹⁵ These questions present 11 situations and ask respondents to rate their confidence to exercise in each one, using a 5-point Likert-type scale ranging from 1 (not confident) to 4 (very confident) with 5 (Does not apply). The scale relies on decisional balance and one’s motivational level and feelings of self-worth. ESE will be assessed at the beginning (Session 1), midpoint (Session 8), and end (Session 16) of the program.

Stage of Change (SOC): This portion of the questionnaire examined readiness to change different behaviors which was based on the Stage of Change Model¹⁰⁷⁻¹⁰⁹ and presented 7 situations and ask respondents to rate their ability to perform this task, using a 5-point Likert-type scale ranging from 1 (No present interest in make a change) to 5 (Already do this regularly 6+ months)

Musculoskeletal Disease (MSD): MSD was measured by two questions pertaining to *how often* and *how long* does the pain last in 4 anatomical areas, using a 5-point Likert-type scale.

Physical Activity: Three questions were used to measured level of physical activity (mild, moderate a vigorous) for at least 30 minutes per day and were presented using a 5-point Likert-type scale ranging from 1 (0 days active) to 5 (5 days or more).

Waist/Hip Measurements: Waist and hip measurements were performed by trained health educators. The waist was measured below the lowest rib and above the navel, which was the smallest circumference of the waist. Health educators would identify by touch the location of the hip bone and measure below this region in the widest area of the hips. For reliability and precision, health educators took at least 2 measurements per participant. The waist-hip ratio (WHR) is used as a measurement of obesity, which in turn is a possible indicator of other more serious health conditions. Waist hip ratios were identified by dividing the waist by the hip; a ratio of 0.8 or higher for women, and 1.0 or higher for men marks central adiposity.

Blood Pressure: Blood pressure was recorded for each survey and weigh-in, in which a health educator was trained to perform. Participants whose blood pressure was hypertensive (systolic blood pressure above 140 mmHg and diastolic above 90 mmHg) were asked to consult with a doctor before starting the program.

Barriers to Healthy Eating: This portion of the questionnaire examined 4 questions pertaining to eating habits: how often: do you eat breakfast, do you eat snack foods (high-fat and sugary types), do you add salt to your salty foods, and consume alcohol. Responses were based upon a 4 point Likert-type scale ranging from 1 (everyday) to 4 (seldom or never). For responses to alcohol consumption, rating went in reverse: 1 (seldom/never) to 5 (21+ drinks/week).

Program Assessment: Participants were asked to provide several types of program ratings on two occasions: midway through the program (Session 8) and at the last session (Session 16).⁷⁶ These items covered general satisfaction, program flexibility, and perceived effectiveness (see Figure 4.2).

Program Satisfaction: Eight adjective pairs were used to assess satisfaction with the health educator (pleasant/ unpleasant, helpful/unhelpful, very motivating/not very motivating, actively involved/passively involved, valuable/worthless) and program materials (helpful/unhelpful, interesting/boring, very motivating/not very motivating).⁷⁶ Participants will be asked to respond on a five-point scale between each adjective pair.

Perceived Program Flexibility: Program flexibility was measured twice during the program using a five-point scale (strongly agree to strongly disagree). The items in question will be "the dietary suggestions are rigid and limiting," "the weekly weight goals are too difficult," "the weekly exercise recommendations are too difficult to follow," "the program has too many rules and regulations," "monitoring my exercise regimen is tedious," and "monitoring my food intake is tedious."

Perceived Effectiveness: Each participant was asked to use a five-point scale to rate the extent to which they agree with two statements about program effectiveness: "the program is helping me to lose weight" and "the program is likely to help others lose weight." (Two comparable items in the baseline questionnaire will obtain expected effectiveness prior to the program's initiation).

Figure 4.2

Short Assessment Survey

Helpful	1	2	3	4	5	Unhelpful
Interesting	1	2	3	4	5	Boring
Very Motivating	1	2	3	4	5	Not Very Motivating

Procedures:**A. Recruitment**

Recruitment was performed at four centers. Each center's characteristics and employee numbers were comparable. Four weeks prior to the program kick off, the research team met with the center's administrators to plan program promotion, kick off time and availability of private room for screening and measurements. Flyers were developed and distributed to all employees and posted on paychecks and mailboxes 4 weeks prior to kick-off. Announcements were also made by the front desk one-week prior to the kick off as well as during the kick off week to encourage participation.

B. Screening Procedure

Interested employees were asked first to complete the Diabetes Risk Score (DRS) for eligibility for the program. Participants were considered for the program if they scored a 10 or higher. A score of 8-9 was also considered based upon an elevated waist circumference and BMI. For example, if a participant scored a 9 on the DRS because they practiced good lifestyle behaviors (fruit and vegetable consumption and physical activity, no problems with blood pressure or glucose levels), but their BMI was a 35 or higher, and their waist/hip ratio exceeded 1.0 for males and females, they were still considered for the program

Once the DRS was completed and an employee was considered eligible, each participant received a program packet containing: Overview of the program, Consent form, Contract, Release form, Registration form, Survey, Weekly logs, and the weigh-in schedules.

Baseline data: At the first meeting, all of the participants who had gone through the screening and signed the informed consent form approved by the Institutional Review Board signed a contract committing to the entire 16-week intervention. Participants were provided ample time

to read the consent form and the opportunity to ask questions. They also signed a contract committing to the 16 weeks program with a three months follow-up. The contract indicated the total and weekly weight loss goals based on the participant's baseline body mass index. The goal was to lose 1.5 pounds per week for those participants 20% or more overweight and one pound per week for those less than 20% overweight. After signing the consent form and the contract, each participant completed the survey and measurements of body weight, waist, hip, and blood pressure were made. Each measurement was taken at least twice to ensure accuracy and precision. BMI and waist/hip ratio were calculated later. Each participant was provided with a package containing weekly logs, and an action plan and weigh-in schedules.

Weight Loss Consultations: All of the participants received a 1-hour one-on-one session which involved motivational interviewing on the importance of weight loss, teaching them how to lose weight in general and provide personalized weight loss methods, mainly based on National Diabetes Educational Program Handbook (Small Steps Big Rewards), and losing 1-1.5 lbs per week is a modest rate of loss that should be attainable if they follow the guidance. They were provided a copy of the NDEP handbook during the consultations and explained how they should be used. Each participant also provided with 16 weekly logs to record their eating behavior frequency and exercise frequency on a daily basis based on NDEP Handbook (Small Steps Big Rewards). The logs were collected weekly to measure exercise frequency and caloric intake. Study investigators were available to answer questions during weekly data collections as well as by the phone or email. Each participant was provided with a phone number that they could call anytime they have specific question regarding the program or their consultation.

Weekly Logs: The weekly logs were given to participants as a daily diary to record physical activity amount and type, fast food meals, meals eaten in front of T.V. and fruit vegetable and soda servings. Also participants were asked to weight themselves at home once a week at the

exact same day and time. Weekly logs were submitted each Monday after program implementation and were recorded for analysis.

Action Plan (AP): was a companion to the NDEP “Small Steps, Big Rewards” manual with sections that should be completed by participants prior to consultation. This AP encouraged participants to think about the effect of their weight on their health and wellbeing, as well as helped to set small, realistic, measureable, and achievable goals. The AP also focused on setting these goals, and providing small steps to achieve these goals. Participants were encouraged to read over the AP and answer relevant question related to their lifestyle and set individualized goals prior to the consultations. The consultations were schedule within the next 7 days and each participant received a reminder card.

Take Home Education Packet: Each participant received nutrition and physical activity handouts and educational worksheets. The nutrition handouts were on the following topics: the Food Guide for Diabetes, Portion Control Worksheet, Farmers Market Fresh, Beverage Profile, Food Label Reading Newsletter, Grocery Shopping Newsletter, The Plate Method, Stop & Think, and Physical Activity. The worksheet provided educational information regarding calorie counting and portion size, the amount of calories and sugar in the foods we eat /drink, tips on how to read a food label as well as shop for lean foods in the grocery store. The Physical Activity handouts provide information regarding how to start an exercise program, increasing activity during daily activities and safe exercising.

C. Weigh-ins

Centers were notified a day before weigh-ins to remind participants that the health educators would be at their site. Weigh-ins were performed at the baseline, week 8, week 16 and week 28.

Measurements were recorded and participants were given a certificate of completion as well as certificate of meeting their goals. Participants' survey and diabetes risk score were repeated at week 16 and 28th.

Program evaluation, Program satisfaction, flexibility and educator evaluations were performed at week 8 and 16th.

All of the data analysis was performed comparing pre (baseline) and post (week 28th).

Data Analysis:

Data were analyzed using SPSS software version 18.0. Descriptive and correlational statistics, as well as Chi Square and frequency analysis were used to analyze reported MSD rate and pain, general health, chronic health conditions, energy level, absenteeism, presenteeism and barriers to healthy lifestyle such as WLSE, ESE, and SOC. Descriptive analysis responses were reported as percentages and frequency histograms.

Improvements: For evaluation of changes from the baseline (pre) to the follow-up (post) data, the responses were dichotomized based on "improvement" or "no improvement." For example, if a participant's general health improved from fair to good or excellent, it was considered "improvement" and was coded as "1." If the participant's responses remained the same or moved backward at the post intervention, it was considered "not improved" and was coded "0." If a participant's response was at the highest level (5 for general health) at baseline and stayed at 5, it was coded as "improvement or 1" to consider for the ceiling effect.

MSD Analysis: An individual's responses to questions related to MSD were categorized as: MSD Pain Magnitude (MPM) in each anatomical area, MSD Pain Frequency (MPF) in each anatomical area as follows:

- MSD Pain Magnitude (MPM): The responses to these questions were categorized as pain lasting “Less than 1 hour each time (1), More than 1 hour (2), More than 1 day (3), or More than 1 week at a time (4).”
- MSD Pain Frequency (MPF): The responses to these questions were categorized as having pain “Once in the last 3 months (1), Monthly (2), Once a week (3), or Every day (4).”

For both MPM and MPF improvements were calculated based on changes from worse to better and responses were categorized as no improvement (0) and improvement (1) as indicated above. For example: those who responded at baseline with a response of 4, but responded at follow-up with a 3 or less, were classified as “Improved” and given a 1, those who did not or stayed the same were given a 0 for “Not improved.”

- Data for magnitude and frequency of pain were also reported for each separately based on real responses pre-post as percentages.

Association between MSD pain with Social and Physical health: Participant’s responses to the question: “to what extent has any back or knee problem interfere with your normal social activities with family, friend, neighbors or groups?” was ranked based on: Not at all (1), A little bit (2), Moderately (3), Quite a bit (4), Extremely (5) for the evaluation of the association of MSD pain and social health.

Association between MSD for MPM and MPF improvements and physical health was evaluated by responses to a series of two questions addressing: limitations to moderate activity and climbing several flights of stairs.

Association of MSD pain with level of physical activity: Participants’ response to the questions 1) “to what extent you were limited in your work or other regular activities as a result of any knee or back pain,” responses were classified as [Not at all (1), Slightly limited (2),

Moderately limited (3), Very limited (4), Unable to work or do other regular activities (5)]; 2) “In general, during the past 4 weeks, how much did any back or knee pains interfere with your normal work (Include both work outside the home and housework)?,” responses were classified as [Not at all (1), A little bit (2), Moderately (3), Quite a bit (4), Extremely (5)]. For the following questions responses were based on: Yes, limits a lot (1), Yes, limits a little (2), No, does not limit at all (3). “Does your health limit you in moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf” and “Does your health limit you in climbing several flights of stairs? Improvements were calculated in ascending order.

Current level of physical activity (mild, moderate and vigorous) ranging from 0-5 or more days was also evaluated.

For all of the responses improvements were based on comparing baseline and follow-up data. Coding was in descending order, for example, those who marked a 5 at baseline, but marked a 4 or less at follow-up, were coded with a 1 for improvement. Those who went in reverse or stayed the same at follow-up were given a 0 for “not improved.” Participants who also responded at baseline and then again at follow-up with a “not at all” response were also coded as a 1 for “Improvement.”

General well being and Energy Level were reported based on three questions addressing self reported general health, energy level and difficulty performing daily activities.

General well being was reported for frequency of responses for the following questions: “Do you have difficulty doing any of the following activities,” participants must check all that apply: Walking across a small room, walking up a flight of stairs, walking for ten minutes, moderate physical activity for 20 minutes, participating in strenuous activity for 20 minutes and none of the above. A poor general health was marked as the top three frequently reported answers, not including a response of “none of the above” and was recorded for pre-post descriptive data

analysis. **Energy level** was reported based on response to two questions 1)“in general, how you think your energy level is: Excellent (1), Very good (2), Good (3), Fair (4) or Poor (5). Those who responded to “poor” at baseline, but marked “good” at follow-up were classified as “improved.” And 2) “In an average week, how many times does your energy level prevent you from doing what you want,” participants were given four choices: “5 or more times (1), 3 to 4 times (2), 1 to 2 times (3) or Never (4). Responses for improvement were classified in ascending order. Responses for descriptive data were classified as a “yes” to any reported energy limitation to the previous responses and were put into a table for pre-post data analysis.

Chronic health conditions was based on self reported and response to questions as having (yes) or not having (no) any of the four health conditions: “high blood sugar or diabetes, high blood pressure, elevated cholesterol or low back disease or spine problems.” Correlation analyses were used to explore the relationship between reported MSD and weight, energy level, chronic conditions and general well being.

Presenteeism was based on the following two questions: “During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular activities as a result of your physical health?” and “During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?” Responses to these two questions were measured by two sub-questions: “*Accomplished less than you would like*” and “*Were limited in the kind of work or other activities.*” Responses to both sub-questions were classified as: All the time (1), Most of the time (2), Some of the time (3), A little of the time (4) None of the time (5). Improvement was considered by moving from higher to lower categories at the completion of the program. Descriptive data was classified as a “yes” to reporting any limitation to emotional and physical health limitations for presenteeism for pre-post data analysis.

Absenteeism was measured by asking the number of days off work due to illness in the past month.

Effect of weight loss on MSD and other related variables: Further analyses were performed to evaluate the effect of losing at least 3% of body weight on reported MSD and other variables. Chi Square Analysis was used to determine the relationship between Effective Weight loss Programs and improvements in variables described above.

Weight Loss Self-Efficacy (WLSE): Data were reported as mean \pm SD. Data was analyzed comparing those who lost at least 3% of their weight and those who did not.

Exercise self- efficacy (ESE): Data were reported as mean \pm SD. Data was analyzed comparing those who lost at least 3% of their weight and those who did not.

Exercise habits: participants were provided with series of questions regarding reasons for not exercising and the top 3 reported general reasons for not exercising are reported. In addition participation to any types of mild, moderate and vigorous physical activity pre-post was also evaluated.

Eating habits was measured through series of questions regarding healthy eating practices (frequency of snaking, eating whole grain, eating breakfast, eating fried food, red meat, etc.). An eating score was calculated based on these responses with the highest possible score of 36 and the lowest possible score of 9. A mean \pm SD is reported.

Global Readiness to Change: Scores of 1- 5 were prearranged based on responses for each question range from pre contemplation=1 (No present interest in making a change), contemplation=2 (not to change in the next month), preparation=3 (plan to change in the next month), action=4 (doing it for more than a month), and maintenance=5 (doing it regularly for

more than 6 months). A global score was calculated for each individual based on the responses to all the questions. The score ranged from 7= not ready to change to 35 ready to change. Data are reported as mean \pm SD pre and post. Data was analyzed comparing those who lost at least 3% of their weight and those who did not.

Program evaluations were taken at the 8, 16 and the 28 week follow-up. Scores were based upon a series of questions addressing the program materials and the health educator in the format of a Likert-scale ranging from 1 being the best possible score to a 5 being the worst possible score.

CHAPTER 5: Results***

1. Pre-post intervention study sample characteristics

A total of 99 participants participated in this “Behavioral Modification Weight Loss Program (BWMP)”. Participants’ characteristics (Demographics, Educational level and Job description) are presented in table 5.1.

Table 5.1:
Demographics of Overweight and Obese Worksite Employees

Participant’s Demographics (n= 99)		
Gender	Male	9.2 %
	Female	90.8 %
Age (years)	Range: 19-72 yrs	46.93 ± 11.28
Education	Less than High School	7.2 %
	High School	40.2 %
	College/Professional	45.4
	Post-Graduate	7.2 %
Race	Hispanic (Answered Yes)	5.8 %
	White	48.4 %
	African American / Black	40.4 %
	Other (Asian, American Indian/ Alaska Native, Native Hawaiian/ Pacific Islander, Preferred not to respond)	5.0 %

A total of 73 participants completed the program with a 453.2 lb net weight loss at post-intervention. On average, weight loss per individual was approximately 8 pounds. For individuals who lost at least 3% of their body weight, the net weight loss was 316.4 lbs compared to those who didn’t lose at least 3% of weight was 136.8 lbs. Overall 45.8% of participants lost at least 3% of their body weight.

Table 5.2 depicts characteristics for Biometrics (height, weight, BMI, waist-hip ratio).

Table 5.2: Biometrics
Overall Health Descriptive Data

Biometrics		
	PRE (n= 99)	POST (n= 73)
Height (in) (Mean \pm SEM)	64.30 \pm .302	64.32 \pm .342
Weight (lb) (Mean \pm SEM)	204.82 \pm 4.38	199.88 \pm 4.59*
BMI (Mean \pm SEM)	34.82 \pm .710	34.01 \pm .792*
Waist-Hip Ratio (W/H) (Mean \pm SEM)	0.90836 \pm 0.006	0.86785 \pm 0.009*
Waist (in) (Mean \pm SEM)	41.8 \pm .559	39.9 \pm .678*

*: P values less than .05

- A. Specific Aim 1: To evaluate the frequency (MPF) and magnitude (MPM) of pain in four anatomical areas in a group of nursing home staff who are overweight and obese, furthermore to evaluate the number of reported improvements with a 3 % weight loss:

According to chi square analysis for change in pain in those who lost $\geq 3\%$ versus those who lost $\leq 3\%$, here a description without repeating the table. Improvements were based on those individuals who improved on the above variables with a 3% weight loss. Results were reported in two columns: either improvement with under a 3% weight loss or improvement with/over a 3% weight loss.

1a1. MSD Pain Frequency (MPF): The frequency of pain is measured below in Table 5.3 for pre to post reports of MPF in four anatomical areas based on 4 responses to this question.

Table 5.3:

Pre-Post Participant's Responses to MSD Frequency of Pain in 4 Anatomical Areas								
Response: How often had you had this problem	Pre: Low Back Pain	Post: Low Back Pain	Pre: Shoulder	Post: Shoulder	Pre: Wrist/ Forearm	Post: Wrist/ Forearm	Pre: Knee	Post: Knee
<i>Once in last 3 months</i>	19.6%	16.1%	11.1%	7.5%	10.3%	3.1%	15.2%	8.3%
<i>Once a month</i>	19.6%	13.2%	4.4%	5.9%	3.4%	3.1%	10.9%	6.9%
<i>Once a Week</i>	19.6%	14.7%	14.4%	19.4%	6.9%	4.5%	15.2%	19.4%
<i>Everyday</i>	7.6%	11.8%	12.2%	11.9%	3.4%	7.5%	13%	9.7%

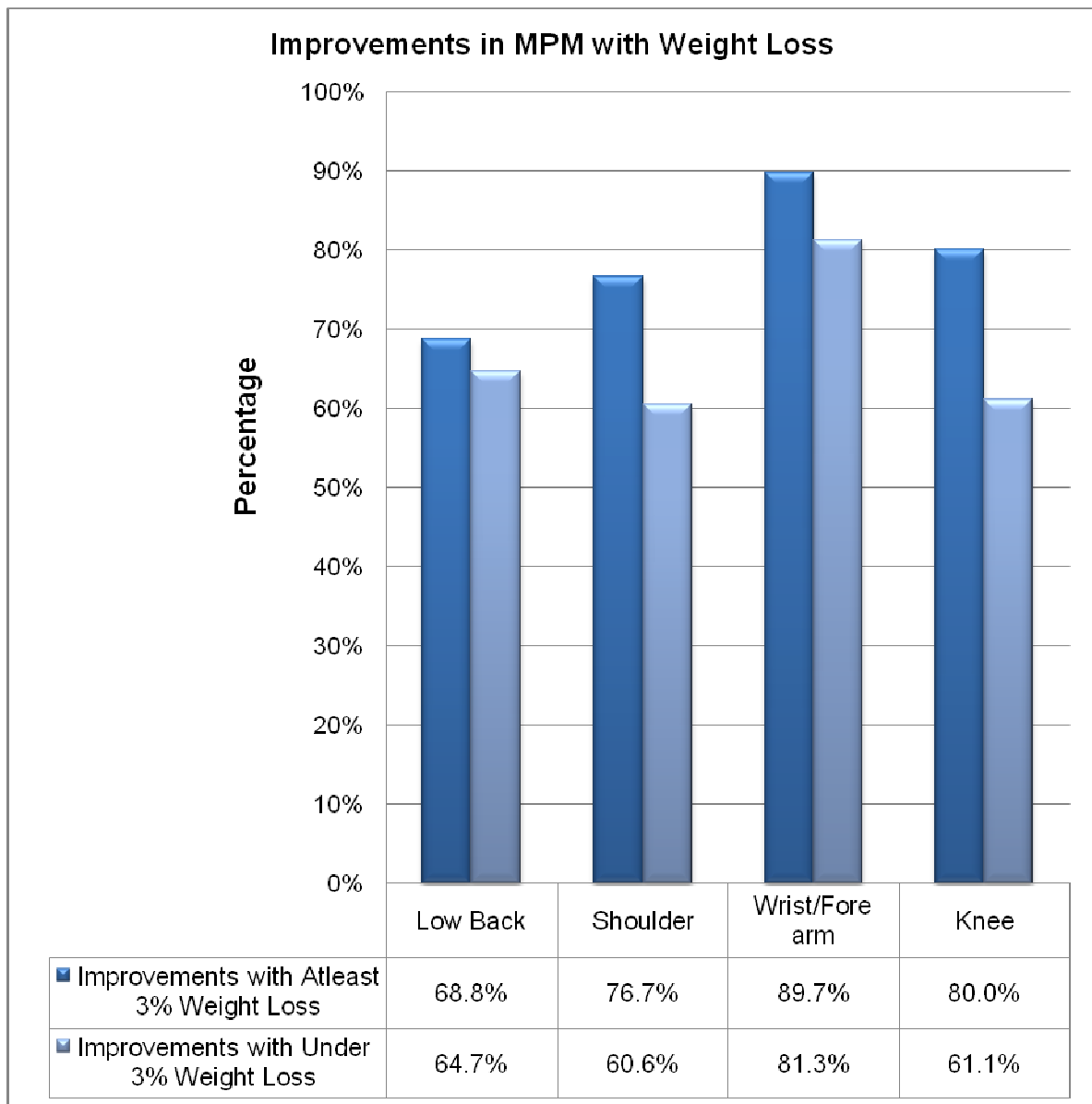
MSD Pain Magnitude (MPM): Table 5.4 measures pre to post MPM in four anatomical areas based on 4 options of responses to this questions.

Table 5.4:

Pre-Post Participant's Responses to MSD Magnitude of Pain in 4 Anatomical Areas								
Response: How long does the pain last	Pre: Low Back Pain	Post: Low Back Pain	Pre: Shoulder	Post: Shoulder	Pre: Wrist/ Forearm	Post: Wrist/ Forearm	Pre: Knee	Post: Knee
<i>Less than 1 hour</i>	17.4%	11.9%	10%	10.6%	4.5%	6.1%	14.3%	9.9%
<i>Greater than 1 hour, less than one day</i>	17.4%	16.5%	13.3%	12.1%	5.6%	3.1%	13.2%	7%
<i>Greater than 1 day, less than 1 week</i>	18.5%	14.9%	6.6%	13.6%	6.8%	3.1%	9.9%	8.4%
<i>Greater than one week</i>	10.9%	5.9%	8.9%	4.5%	3.4%	4.6%	13.2%	14.1%

1b1. Improvements in MPM and MPF: Graph 5.1 and 5.2 depicts the overall improvements from pre-post data analysis which are broken down based on two categories: *below* or *above* a 3% weight loss

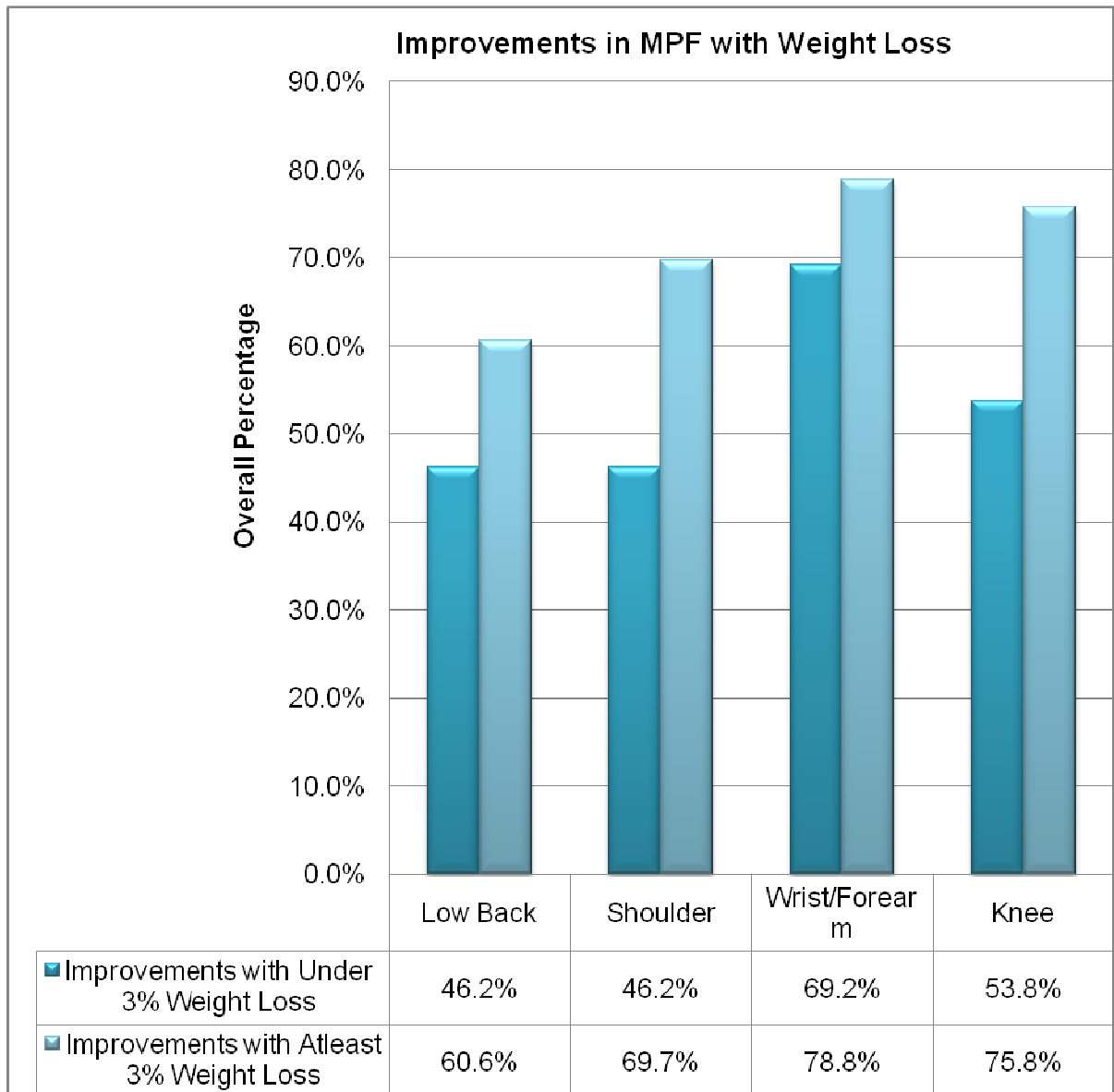
Graph 5.1:
Improvements in MPM based on losing at least 3% of Body Weight and Total Group Together



Note for MPM: p value $\leq .05$ is significant. Results found with 3% weight loss there were significant improvements in Shoulder and Knee pain.

Graph 5.2:

Improvements in MPF based on losing at least 3% of Body Weight and Total Group Together



Note for MPM and MPF: p value $\leq .05$ is significant. Results found with 3% weight loss there were significant improvements in Shoulder and Knee pain.

1c1. Current Level of Physical Activity

Current level of physical activity (mild, moderate and vigorous) ranging from 0 days to 5 or more days is depicted below in Table 5.5.

Table 5.5:

Reported Level of Activity in Overweight/Obese Participants in Daily Intervals			
		Pre	Post
Mild Activity	1-2 days/wk	37.1%	46.4%
	3-4 days/wk	26.8%	27.5%
	More than 5 days/wk	11.3%	14.5%
Moderate Activity	1-2 days/wk	42.4%	44.9%
	3-4 days/wk	20.7%	30.4%
	More than 5 days/wk	3.30%	4.3%
Vigorous Activity	1-2 days/wk	19.6%	30.0%
	3-4 days/wk	9.8%	22.9%
	More than 5 days/wk	1.1%	1.4%

B. Specific Aim 2:To evaluate the co- morbidity of overweight and obesity with other reported chronic conditions such as diabetes, hypertension, elevated cholesterol and low back/spine disease, furthermore to evaluate the percentage of improvements in these conditions with losing at least 3% of body weight.

1a1. Participant's chronic disease was measured by a health educator for systolic and diastolic blood pressure as well as overall scores for Diabetes Risk Score for pre- post- intervention. Self-reported diabetes, hypertension, elevated cholesterol and low back/spine disease were recorded and reported for pre-post data. Participants were also asked to report if taking any medication for the above variables and were reported as percentages for pre to post data. The variables for chronic disease were dichotomized based upon "improvement" and "no improvement." Chi Square Analysis was then performed to compare improvements based on

those individuals who improved on the above variables with a 3% weight loss. Results were reported in two columns: either improvement with under a 3% weight loss or improvement with/over a 3% weight loss. Results are depicted below.

2a1. Intervention effects on measured and self-rated Chronic Disease: According to pre-post measures chronic disease, there were significant improvements ($p \leq .05$) for systolic and diastolic blood pressure and Diabetes Risk Score (Table 5.6). In Table 5.7 we found that the self reported conditions of hypertension and diabetes are consistent with improvements for the measured values below in Table 5.6.

Table 5.6:
Measured Chronic Disease in Overweight and Obese Participants

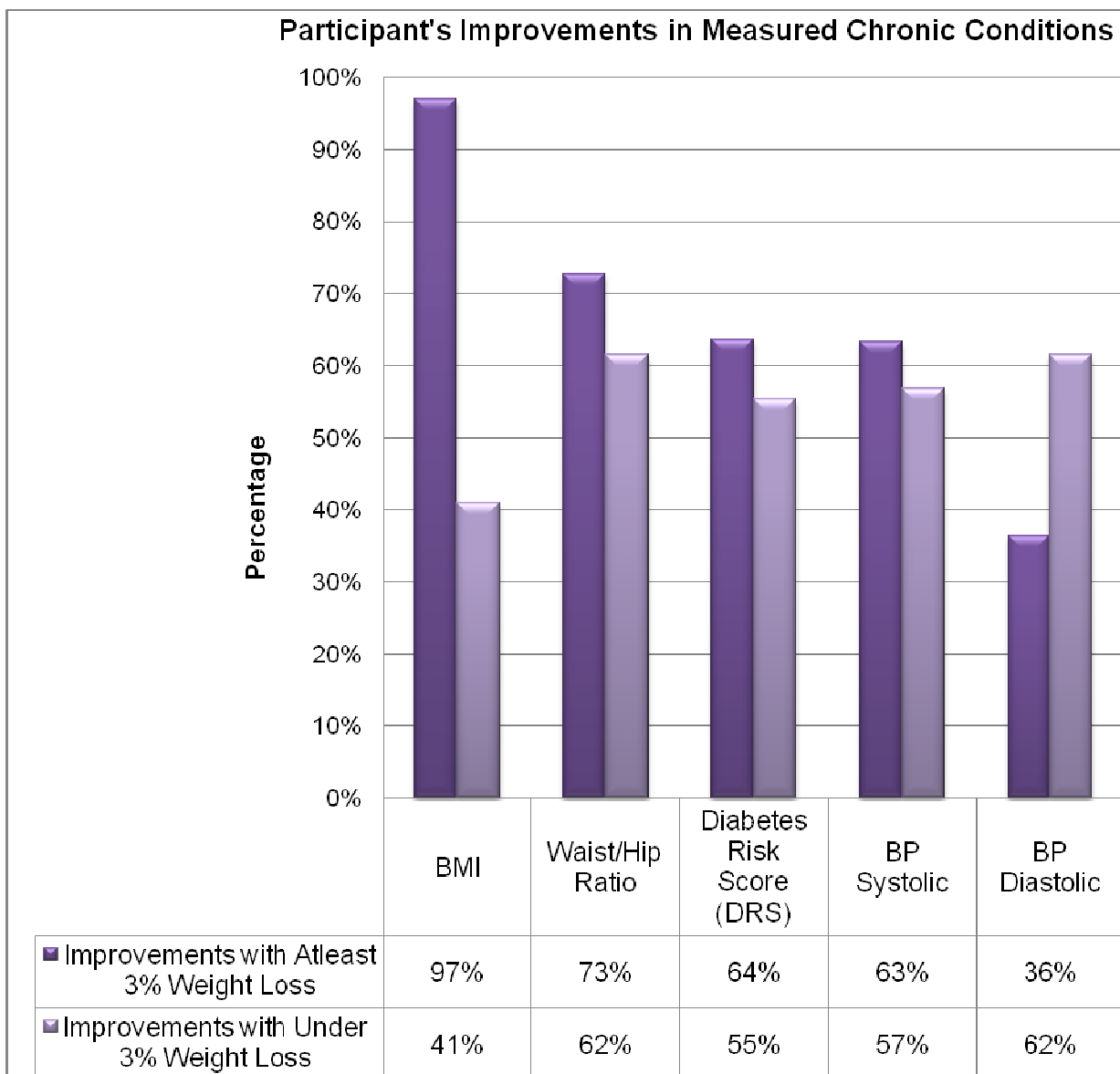
Chronic Disease		
	PRE (n= 99)	POST (n= 73)
Systolic Blood Pressure (mmHg) (Mean \pm SEM)	125.01 \pm 1.522	119.24 \pm 1.559*
Diastolic Blood Pressure (mmHg) (Mean \pm SEM)	77.17 \pm 1.189	75.75 \pm 1.216*
Diabetes Risk Score (Mean \pm SEM)	11.97 \pm .293	10.61 \pm .436*

Table 5.7:
Self-Reported Chronic Disease in Overweight and Obese Participants

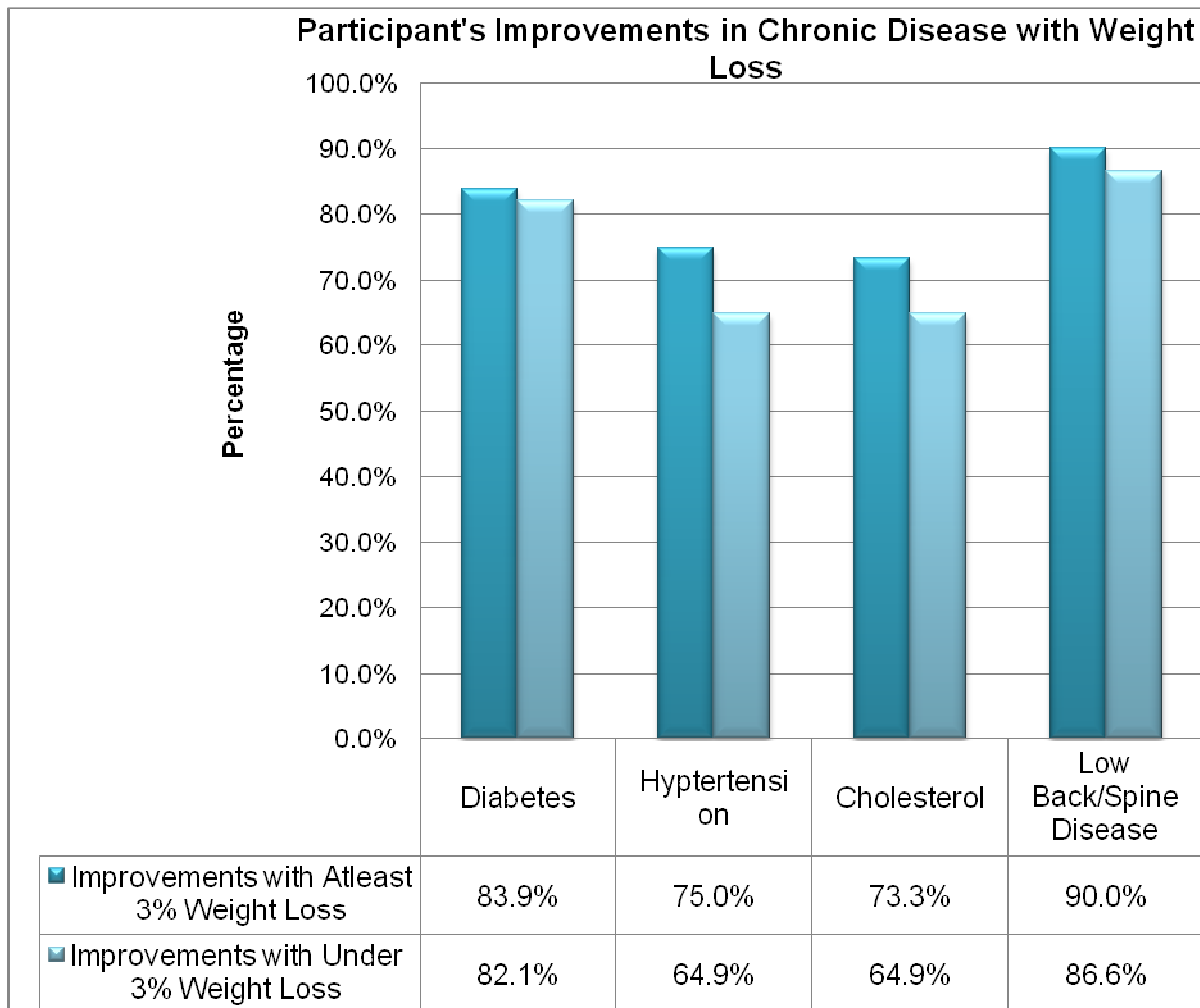
Self-Reported Chronic Disease				
Chronic Disease	Pre: Reported "Yes" to having the disease	Post: Reported "Yes" to having the disease	Pre: Reported "Yes" to being treated/ medication	Post: Reported "Yes" to being treated/ medication
Diabetes	21.5%	16.4%	15%	16.9%
Hypertension	34%	31.9%	35.4%	27.3%
Elevated Cholesterol	36.4%	30.0%	24.3%	24.2%
Spine Disease	9.6%	13.9%	6.5%	9.1%

2a2. Improvements: Individuals were measured for chronic disease of systolic, diastolic and Diabetes Risk Score and also asked to self-report report their chronic disease for diabetes, hypertension, cholesterol and low back/spine problems. For evaluation of changes in response from baseline (pre) to follow-up (post) data, responses were dichotomized based on “improvement” or “no improvement”. Overall improvements were recorded as well as broken down based on a 3% weight loss. Results are depicted below in Graph 5.3 and 5.4.

Graph 5.3:



Graph 5.4:



Note for Improvements in Measured Chronic Conditions: p value $\leq .05$ is significant.

Results found with 3% weight loss there were significant improvements in BMI.

D. Specific Aim 3: To evaluate the effect of losing at least 3% of body weight on reported MSD as well as physical, social, emotional health and general well being.

Descriptive self-reports of social and physical health, as well as general well being were measured based upon responses to several questions accessing the degree to which barriers such as knee and MSD pain interfered with normal social and physical activities. Any response

that referred to a physical or social limitation, as well as responded to general well being was measured as a response of “yes,” and was considered as a limitation. Social, Physical and General Well Being were also measured as a percentage from pre-post for improvements to these barriers. Results were reported in two columns: either improvement with under a 3% weight loss or improvement with/over a 3% weight loss. Lastly, participants were asked to rate a series of questions addressing eating self-efficacy and exercise self-efficacy. These were based upon individual’s levels of self-worth and ability to perform healthy lifestyle changes. The variables for general well being, physical and social health and self-efficacy were all dichotomized based upon “improvement” and “no improvement.” Chi Square Analysis was then performed to compare improvements based on those individuals who improved on the above variables with a 3% weight loss.

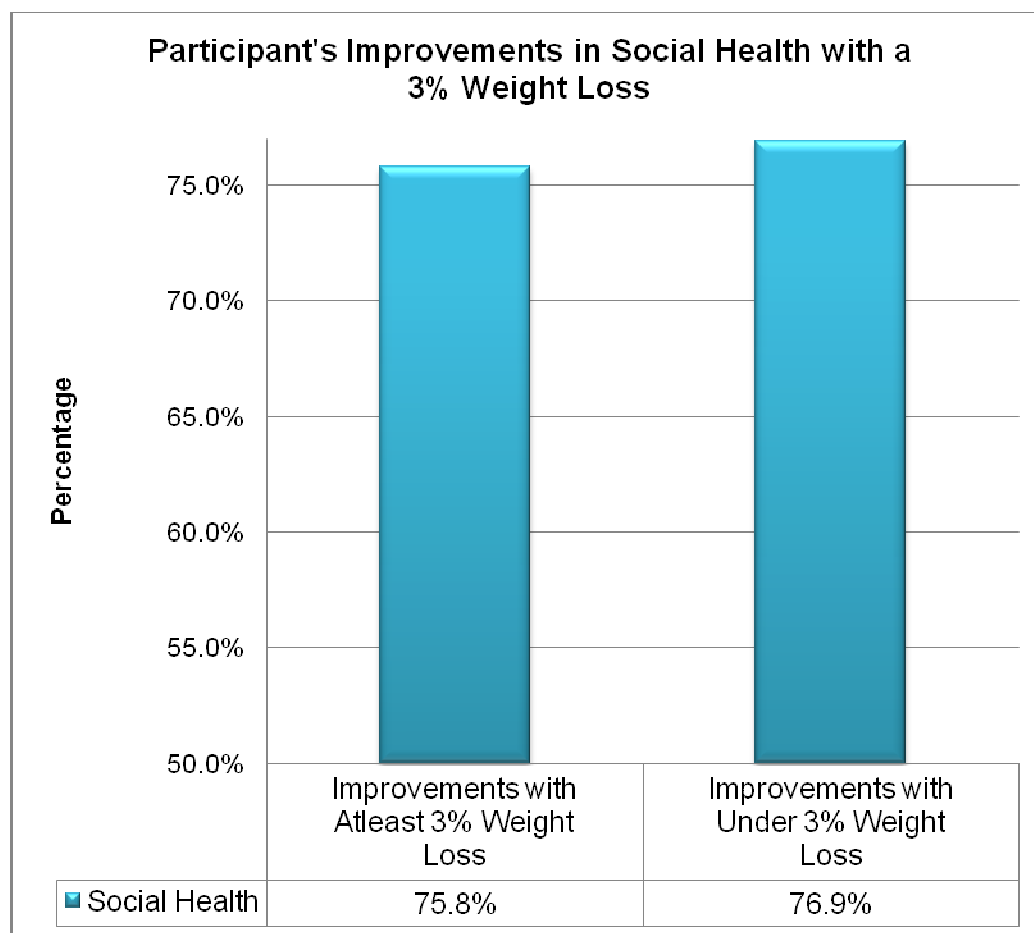
1a1. Descriptive Physical and Social Health: Social and Physical Limitations to health were measured through self-report and depicted below in Table 5.8.

Table 5.8:

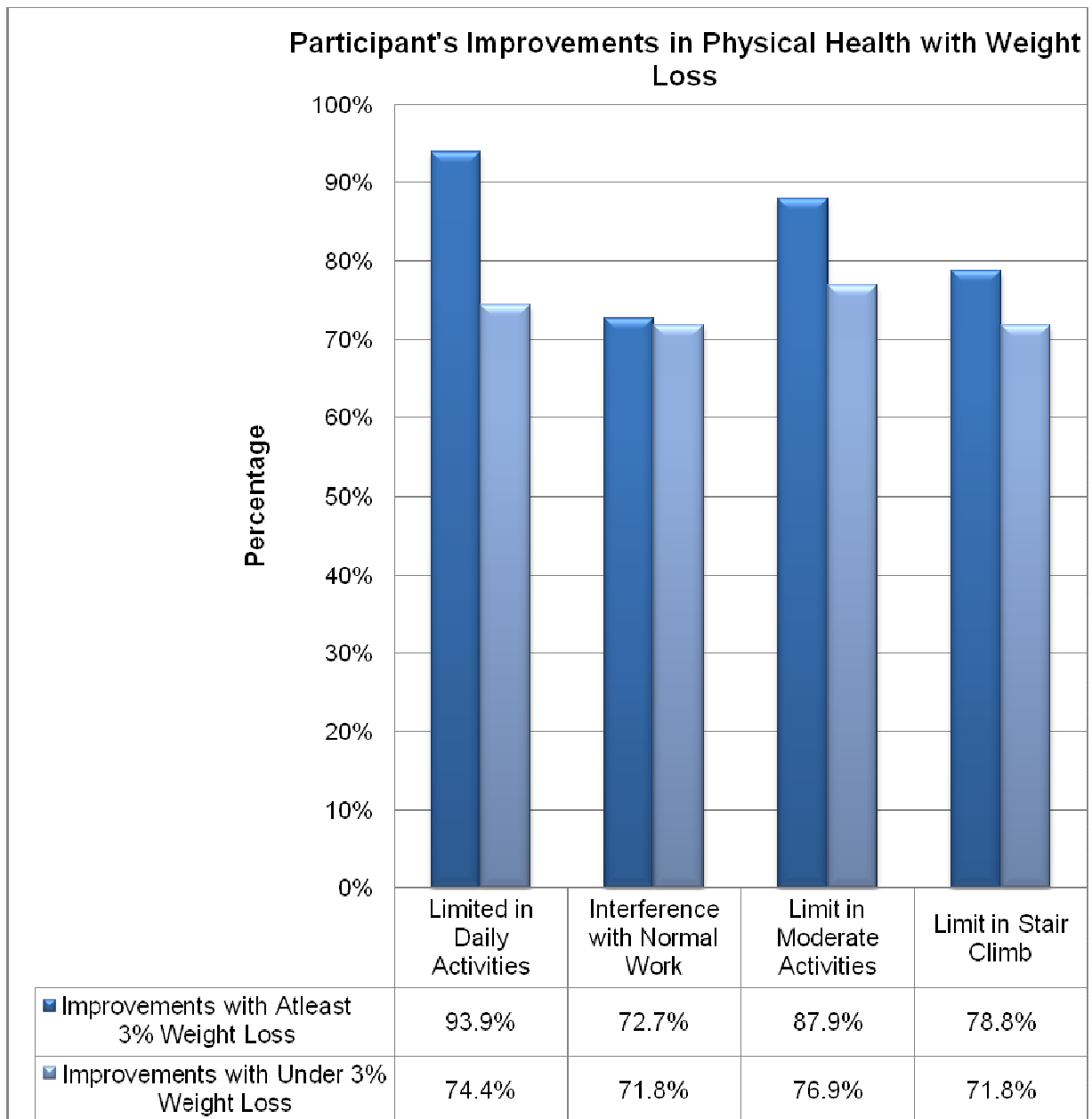
Contributing Factors that Influence Health of Overweight/Obese Participants			
		Pre	Post
Social	Knee problems interference with normal social activities	35.5%	29.2%
	In the past week, did your knee limit you in regular activities?	24.8%	16.6%
Physical	In the Past 4 weeks, did your knee pain interfere with normal work?	33.3%	30.5%
	Physical function and moderate activity limitation?	12.4%	18.1%
	Does your health limit you in climbing several flights of stairs?	26.8%	25.0%

1a2. Improvements: For evaluation of changes in response from baseline (pre) to follow-up (post) data, responses were dichotomized based on “improvement” or “no improvement”. Graphs 5.5 and 5.6 represent the overall improvements of self-reported physical and social limitations to health and furthermore represent overall improvements broken down based on a 3% weight loss in overweight and obese nursing home staff. As found for physical health, limitations to daily activities improved significantly ($p \leq .05$).

Graph 5.5:



Graph 5.6:



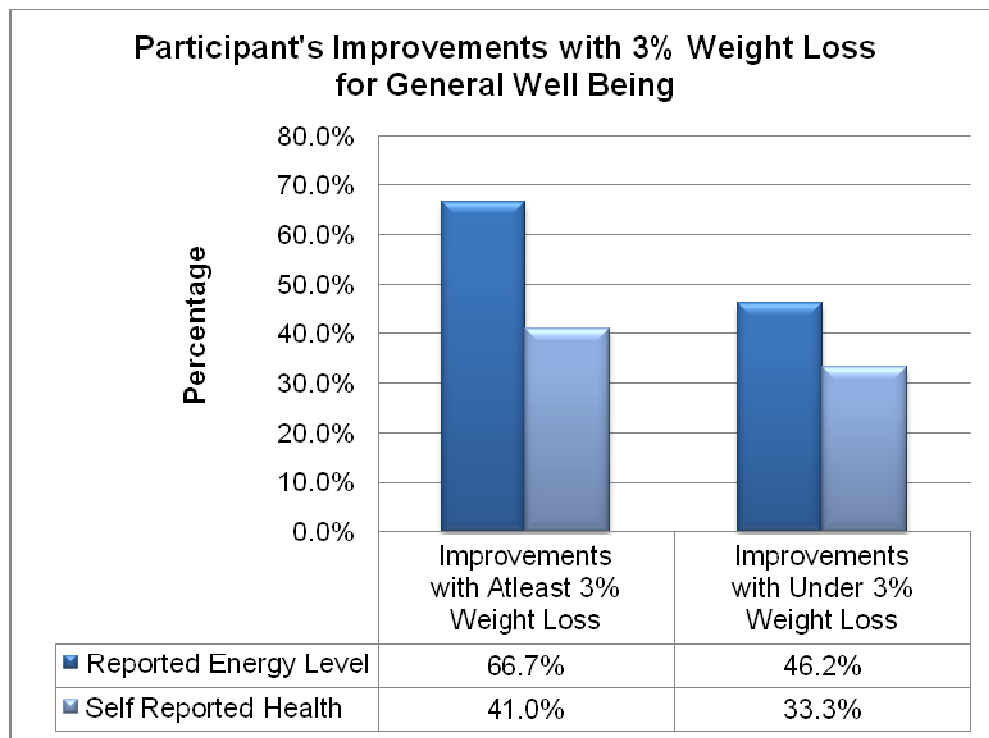
1b1. Descriptive General Well Being: Participants were asked to rate their general level of health and well being based upon questions on the Participant Survey. Results for descriptive pre-post data are depicted below in Table 5.9.

Table 5.9:

Participant's Self-Reported General Well Being and Energy Level			
General Well Being	Do you have problems with the following activities...	Pre	Post
	Participating in strenuous activity for 20 min.	32.3%	34.7%
	Participating in moderate activity for 20 min.	13.1%	11.1%
	Walking up one flight of stairs.	10.1%	11.1%
Energy Level	What would you say your general health is...		
	Reported: Excellent-Good	81.3%	90.3%
	Reported: Fair-Poor	18.7%	9.7%
	In an average week how much does your energy prevent you from doing what you want to do?	64.6%	54.2%

1b2. Improvements for General Well Being: Graph 5.7 represents the overall improvements of self-reported General Well Being and furthermore represents overall improvements broken down based on a 3% weight loss in overweight and obese nursing home staff. As found energy level showed significant improvements for post-intervention ($p \leq .05$) below in Graph 5.7.

Graph 5.7:



1c1. Descriptive Self-Efficacy

Participants were asked a series of questions for eating (ESE) and weight loss self-efficacy (WLSE) that when combined made an overall best possible score of 100 for eating self-efficacy, and 55 for exercising self-efficacy. Overall descriptive scores for pre-post analysis of eating and exercise self-efficacy are depicted below in Table 5.10.

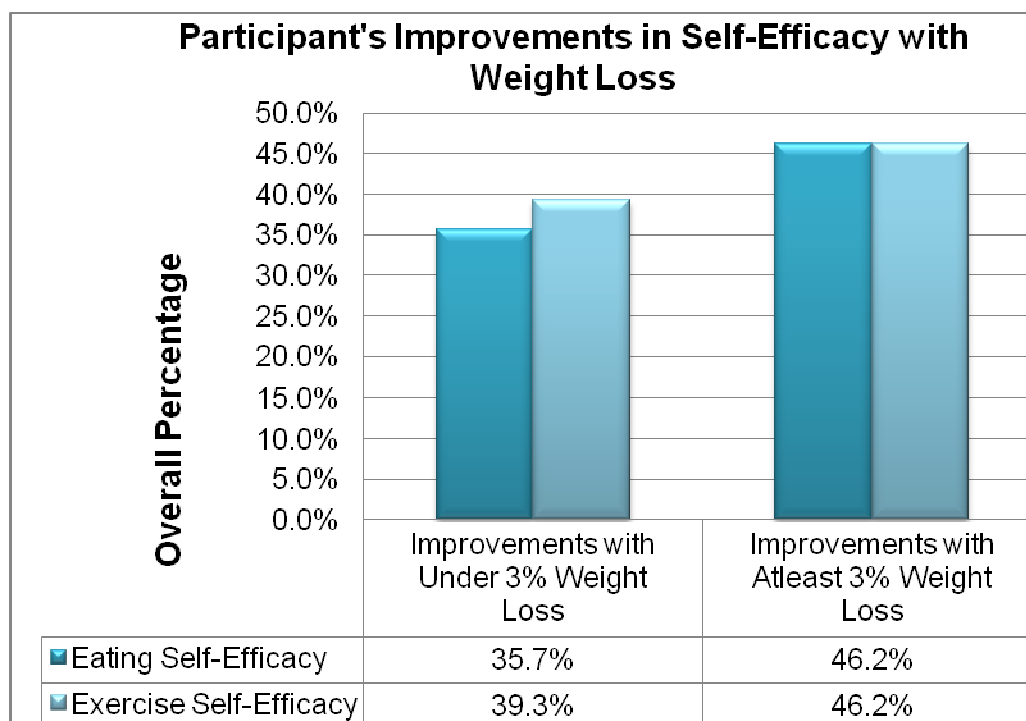
Table 5.10:

Participant's Reported Self-Efficacy	Pre	Post
WLSE (range 11-55) (Mean \pm SD)	31.4 \pm 7.96	30.7 \pm 9.46
ESE (20-100) (Mean \pm SD)	63.7 \pm 11.68	62.7 \pm 14.11

1c2. Improvements in Self-Efficacy

Participant's improvements in eating and exercise self-efficacy are reported below based on overall improvements and improvements with a 3% weight loss. Results are depicted below.

Graph 5.8:



1c3. Correlations of Weight Loss Self-Efficacy (WLSE)

Bivariate Correlational Analysis was used to compare the overall WLSE scores with different levels of physical activity pre and post intervention. Eating Self-Efficacy Scores were correlated with Eating Habits. Results are depicted below in Tables 5.11.

Table 5.11:

Participant's reported WLSE and Level of Physical Activity Correlations		
	Pre Spearman's	POST Spearman's
Mild Activity and WLSE	.079	0.390**
Moderate Activity and WLSE	0.601**	0.421**
Vigorous Activity and WLSE	0.567**	0.505**

* Significant correlations ($p < 0.05$)

** Significant correlations ($p < 0.01$)

E. Specific Aim 4: To depict the improvements in absenteeism and presenteeism pre-post intervention with the effect of losing 3% of body weight.

Presenteeism is characterized as those professionals who come to work but perform below par, which can pose a threat of lower work output and increased employer costs. Absenteeism is the number of sick days. Participants were asked to report their lost productivity as well as general days absent in reference to sick days. The above variables for presenteeism/absenteeism are dichotomized based upon "improvement" and "no improvement." Chi Square Analysis was then performed to compare improvements based on those individuals who improved on the above variables with a 3% weight loss. Results were reported in two columns: either improvement with under a 3% weight loss or improvement with/over a 3% weight loss. Results are depicted below.

1a1. Descriptive statistics: Evaluation of pre-post data for absenteeism and presenteeism are listed below is Table 5.12 and Table 5.13.

Table 5.12:

General Lost Productivity Due to Sick Days		
	Pre	Post
During the past 4 weeks, how many days have you had off due to sickness or MSD pains	1/3 of a day for every 4 weeks	1/8 of a day for every 4 weeks

PRE: The “out of pocket” medical cost for MSD ranged from \$20-\$1200 within a month, while on average each participant was absent from work for one-third of a day.

POST: The “out of pocket” medical cost for MSD ranged from \$10-\$700 within a month, while on average each participant was absent from work for one-eighth of a day.

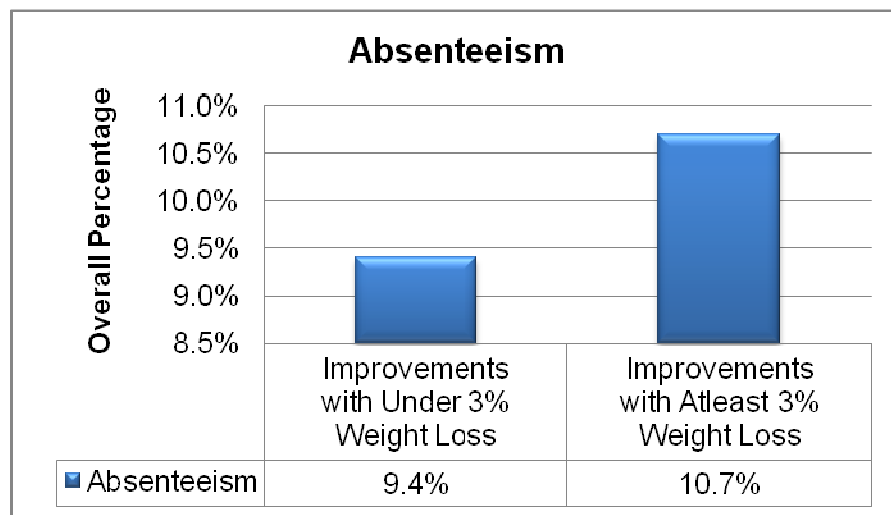
Table 5.13:

Participant’s Reported General Lost Productivity Due to Presenteeism			
		PRE	POST
During the past month, how has your physical health limited you in work activities?	Accomplished less than liked	30.5%	25.0%
	Were limited in the kind of work or activity	25.0%	9.7%
During the past month, how has your emotional health limited you in work activities?	Accomplished less than liked	25.0%	25.0%
	Were limited in the kind of work or activity	17.2%	9.7%

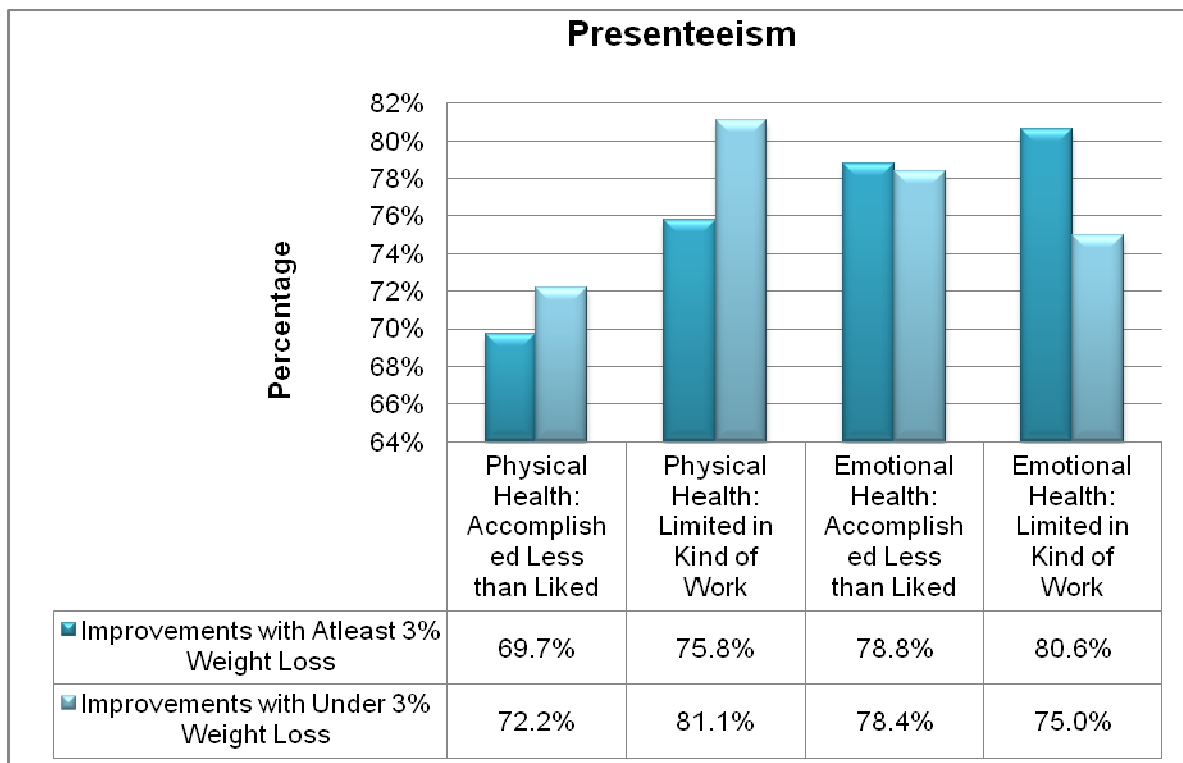
1a2. Improvements: For evaluation of changes in response from baseline (pre) to follow-up (post) data, responses were dichotomized based on “improvement” or “no improvement”.

Graph 5.9 and 5.10 represents the overall improvements of absenteeism and presenteeism.

Graph 5.9:



Graph 5.10:



F. Specific Aim 5: To determine the relationship of self-efficacy for eating and exercise, stages of change, 3 % weight loss and reported MSD pre-post intervention.

Participants' were also asked to rate their level and global readiness of changes based up 7 questions addressing their level and readiness to act as well as willingness to change. The above variables were dichotomized based upon "improvement" and "no improvement." Chi Square Analysis was then performed to compare improvements based on those individuals who improved on the above variables with a 3% weight loss. Results were reported in two columns: either improvement with under a 3% weight loss or improvement with/over a 3% weight loss.

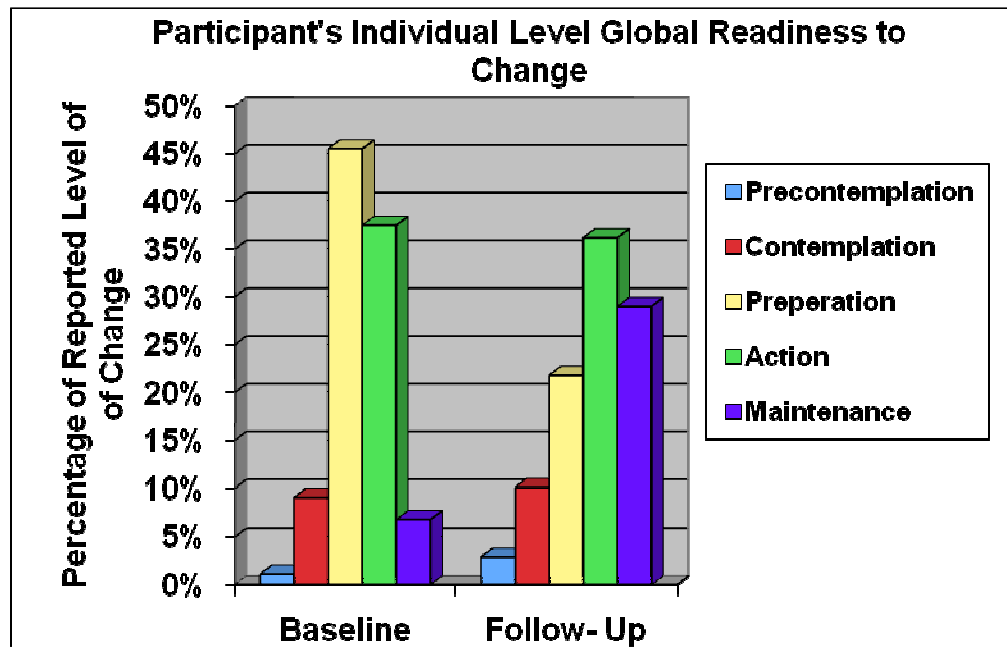
1a1. Descriptive Global Readiness to Change

Results are shown below in table 5.14, as well as Graph 5.11 for overall Stages of Change. The higher the mean score, the closer participant's were to meeting the Action and Maintenance stages of change.

Table 5.14:

Individual Global Readiness to Change for Overweight/Obese Participants	
Overall Range Pre (mean \pm SD)	26.1 \pm 5.0
Overall Range Post (mean \pm SD)	29.13 \pm 6.5

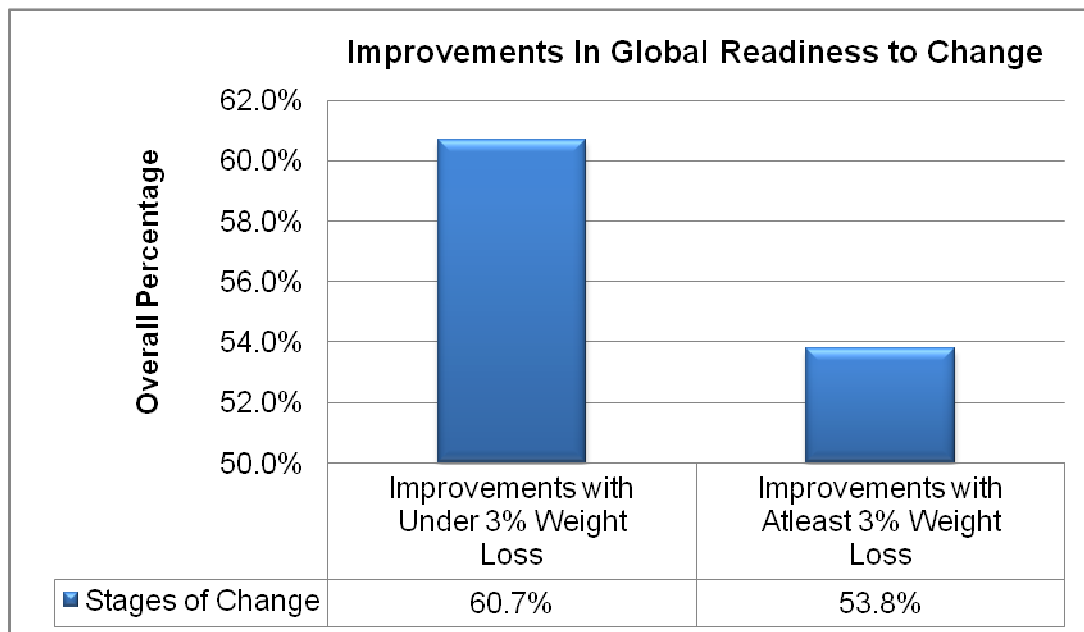
Graph 5.11:



1a2. Improvements for Global Readiness to Change.

Graph 5.12 displays dichotomized improvements based on below or above a 3% weight loss.

Graph 5.12



F. Specific Aim 6:

1a1. Barriers to a healthy management referred to participant's Responses to reasons for not exercising and practicing unhealthy eating habits. Table 5.15 depicts the top three reasons for not exercising, and also measures barriers to eating habits through questioning "*How often*" certain foods are eaten. A total score of 36 was considered the highest and worst possible score, resulting in lack of unhealthy eating habits.

Table 5.15
Reported Responses for Barriers to Healthy Lifestyle Management Practices

Barriers to Healthy Management			
Barriers to Exercise Habits		Pre	Post
	"I never keep it up/persist"	39.4%	23.2%
	"I have no time"	32.3%	20.2%
	"I am too lazy"	28.3%	16.2%
Barriers to Healthy Eating Habits	How many times/ wk do you eat these foods Range 9-36 (36 marks bad eating practices) (mean \pm SD)	23.9 \pm3.7	25.3 \pm 3.9

Responses from participants of suggestions for an effective weight loss program as well as barriers to weight loss are represented below in table 5.16.

Table 5.16
Effective Programs for Weight Loss and Exercise Routines

Effective Weight Loss Programs and Exercise Routines	
Exercise Routines	Walking on a stationary treadmill
	Kayaking
	Exercise Video/ Zumba
Weight Loss Program Motivational Help / Advise	Advice from a health professional
	People to exercise with
	Exercise Video/ Pamphlet

1b1. Evaluation of the program, program educator and materials provided are described below in Tables 5.17, 5.18 and 5.19. Each of the three evaluations consisted of 4 questions to rate the opinion of. An overall score was developed from these 4 questions into one overall score. The higher the score (1 being bad, 5 being excellent) the more satisfied each participant was.

Table 5.17
Participants' Evaluation of the Behavioral Modification Weight Loss Program
Please circle the response that best fits your opinion about the *Health Educator*:

Evaluation				
	Score (1 - 5)	Week 8	Week 16	Week 28
Overall Program Evaluation (Reported as Frequency of Responses)	1	0%	0%	0%
	2	13.3%	6.1%	13.9%
	3	58.4%	59.2%	56.9%
	4	21.6%	32.7%	20.9%
	5	6.7%	2.0%	8.3%

Table 5.18
Participants' Evaluation of the Health Educator:
Please circle the response that best fits your opinion about the *Health Educator*:

Evaluation of Pleasantness				
Health Educator Evaluation (Reported as Frequency of Responses)	Response (1 - 5)	Week 8	Week 16	Week 28
	1	5%	8.2%	15.7%
	2	1.7%	0%	7.2%
	3	5.0%	14.2%	11.4%
	4	38.3%	34.7%	27.1%
	5	50%	42.9%	38.6%

Table 5.19
Participants' Evaluation of the Educational Materials Provided
Please circle the response that best fits your opinion about the *program materials*:

Evaluation				
Educational Material Evaluation (Reported as Frequency of Responses)	Response (1 - 5)	Week 8	Week 16	Week 28
	1	6.9%	4.2%	11.1%
	2	8.6%	4.2%	11.1%
	3	15.5%	23%	27.8%
	4	38%	33.2%	18.1%
	5	31%	35.4%	31.9%

Summary:

Weight loss was seen after the 28-week intervention as well as improvements from pre-post in chronic disease, presenteeism, decreased sick days, MPM and MPF conditions, as well

as general well-being, energy level and overall reported health conditions. Those subjects who lost more than 3% were found to have significant improvements in the above conditions. Correlational analysis found moderate activity improved significantly at post-intervention with the positive correlation to weight loss self-efficacy. In result of self-efficacy for weight loss and eating, there were greater improvements for the 3% weight loss and after a 28-week intervention the global readiness scale graduated from precontemplation and contemplation to the action and maintenance stages after 28 weeks of a weight loss intervention.

Chapter 6: Discussion

The discussion will be based on the proposed hypotheses:

Hypothesis 1: Nursing home employees who are overweight / obese will report higher frequency and magnitude of MSD pain in back, shoulder, hip and knee than the general population.

In referring to the National Institute of Occupational Safety and Health, the prevalence for Upper back and extremity discomfort in adults aged 45-65 due to musculoskeletal pain was 29% respectively and 8% for those with lower back and extremity pain.¹¹⁹ The focus of hypothesis 1 is to see whether there are a high percentage of overweight and obese employees suffering from of MSD pain in 1 of 4 anatomical areas: low back, shoulder, wrist/forearm and knee pain. As for our findings: for intensity of pain: over 66% of participants have reported low back pain to some degree, 42% for shoulder, 24% for wrist/forearm and 54% for knee pain respectively at pre-intervention. For magnitude of pain pre-intervention, 64% reported some magnitude of pain in low back, 39% for shoulder, 20% for wrist/forearm and 51% of employees for knee pain. The majority of participants had reported pain in at least 1-2 of the 4 body regions. More specifically, results found the frequency of pain (MPF) pre-post analysis for self reported low back pain improved as frequent as weekly and monthly when comparing results for the four related responses to each anatomical area: everyday, about once every week, about once every month, one in the last 3 months. Also shoulder, wrist and knee MPF was improved as frequent more so weekly and monthly. For the magnitude of pain (MPM), low back and knee pain was seen with similar results for improvements in reported hourly pain and shoulder reports improved daily and weekly. Comparing these results with the general population, there is higher reported intensity and magnitude of reported pain in this population.

Musculoskeletal conditions often increase after the onset and duration of pain, and often at time results in physical limitations to health. MSD can also put a significant amount of strain on the load bearing joints. Important risk factors that increase the early onset and duration of MSD pain and chronic conditions are age, gender, sedentary lifestyle/ lack of physical activity and anthropometry such as weight.¹²⁰⁻¹²³ In 2005, based on the World Health Organizations, one in two adults have reported MSD conditions which was twice the rate at which chronic circulatory or respiratory conditions, and more than 30% of Americans require some sort of health care due to MSD.¹²¹⁻¹²² The prevalence of MSD increases with age due to increased years at the job and working environments (predispose to heavy lifting and long work hours), as well as age- related degeneration of tissue that surrounds the joints.^{121,125} With this loss in tissue strength there becomes an increase in probability and severity of soft tissue damage and less support for the load bearing joints, leading to chronic and debilitating MSD conditions.^{120-121,125} Physical activity also plays a major role in the prediction of MSD chronic conditions. Lack of physical activity may cause an increase in the susceptibility to injury as well as after injury due to lack of mechanical use on these joints.¹²⁰⁻¹²¹ Lack of physical activity as well as increased weight gain can also affect the chances of developing improper movement and alignment of the bones and muscles,¹²¹⁻¹²³ increased risk for osteoarthritis,¹²⁴ and many more complications. Nursing home employees are faced with these predisposing factors due to the increased load bearing on the joints during extended working hours. Similarly, Mattila et al. (2004) found through a 12-month lifestyle intervention to control for hypertension and its correlation to pain in the previous related anatomical areas, there was a favorable impact that improved disability especially for those with neck pain and shoulder pain. As anticipated, results from our research found that reported MSD pain did decrease post-intervention in all four reported anatomical areas for MPF and MPM pain. It could be postulated that losing weight will lead to lower mechanical strains on the joints and muscles leading to lower rate of reported pain in the joint

and muscles. These improvements in pain can be due to the increase in healthy eating as well as physical activity. Healthy eating combined with physical activity will lead to weight loss as well as strengthening of the muscles around the joints, aiding in pain reduction. Therefore, the previously mentioned risk factors such as anthropometry and physical activity may have improved through this weight loss program resulting in less frequent reports of MSD frequency and magnitude of pain. The results of our study are in agreement with the reported results from other investigators suggesting MSD improvements due to weight loss on these weight bearing regions and increased physical activity will improve mobility and flexion on these load bearing regions.¹²⁶⁻¹²⁷

Hypothesis 2: Nursing home employees who are overweight / obese will report higher rate of chronic conditions.

Chronic disease and chronic conditions such as obesity, diabetes, high blood pressure, etc. are mostly caused by 4 modifiable risk factors: lack of physical activity, poor nutrition, smoking and alcohol consumption.^{6,128} Physical activity helps to control weight, blood sugar balance, risk for cardiac disease and metabolic syndrome, some cancers as well as helps to improve bone strength as well as improves the ability to perform daily activities.¹²⁸ Healthy nutrition such as consuming fruits and vegetables helps to decrease the risk of many cancers and chronic disease as well as control blood sugar and are low in caloric density which helps to control for weight. Tobacco and alcohol consumption can increase the risk of many cancers and chronic disease. In 2007, the CDC rated the prevalence for type 2 diabetes, hypertension and cholesterol in the general population of adults aged 40 or higher as 12%, 31% and 27% respectively. Of our population, the highest reported prevalence of chronic disease were that of type 2 diabetes with 22%, hypertension 34%, and cholesterol 36% of participants reported having this disease. Of our findings, alcohol and tobacco use was of no significance and close to zero reports were given of consumption of these substances. With these results, we can see

that nursing home employees in this study had much higher reported rates for chronic disease when compared to the general population. Evaluating our results, we found significant improvements for self-reported and measured chronic conditions for diabetes risk score (DRS), blood pressure (systolic and diastolic), elevated cholesterol, waist/hip ratios, BMI and low/back spine disease pre-post intervention through this weight loss intervention. As seen in these previous studies¹²⁹⁻¹³² and supporting our research, nursing home employees had higher rates of chronic disease, in which at least one-fourth of the population of participants exhibited self-reported type 2 diabetes, hypertension or elevated cholesterol, and 9.6% was presented with spine/ low back disease and made greater improvements in these conditions after this weight loss intervention. Similar results were found in two previous studies for chronic conditions and DRS.¹²⁶ Touger-Decker et al. (2010) found through a 12-week workplace weight loss program; 137 overweight and obese academic science center employees lost on average 4.82 pounds and found significant improvements for waist circumference, body fat, energy intake, systolic and diastolic blood pressure. Also supporting these previous findings of weight loss and chronic disease improvements, other research has found those who have undergone weight loss surgery, have exhibited better control of their blood sugar and improvements in other chronic disease conditions.¹³⁰⁻¹³²

Hypothesis 3: Nursing home employees who lose at least 3% of weight will have a decrease in the reported frequency and magnitude of pain.

Researchers suggest a significant decrease in weight will lower risk for MSD onset and duration of pain.^{125,127} Other research has found having BMI > 30kg/m² of can increase the risk of joint injury by as much as 4 times that of someone of normal weight.^{67,69} According to our present findings a 3% weight loss resulted in higher reductions in reported pain for low back and wrist at follow up, with significant improvements in shoulder and knee for frequency and

magnitude of pain. In recent, a similar weight loss study reported pain in 9 body regions.⁵³ In this study, Kotowski and colleagues (2010) found in a 12 week weight loss program in 35 overweight women, overall reported pain at pre-intervention was highest in low back, followed by knee, lower leg and foot, hips, shoulders, and upper back. Researchers found significant trends in weight loss and pain reductions in which the weight bearing regions of the body such as lower back, hip and knee had greater reductions in reported pain after weight loss.⁵³ An increase in weight and excess body fat in as little as a year can lead to a quicker onset of neck and shoulder pain in worksite settings where unhealthy dietary practices and indispensable shift work is present.¹³⁵ In our study, MPM and MPF self reports of pain improved more so in each anatomical area with at least a 3% weight loss as compared to those who did not meet the 3% weight loss goal. Our results found the greater the weight loss then the greater the degree to which the reported chronic pain decreased. Nilsen et al. (2011) found similar results in a longitudinal study comparing 30,000 participants in the Nord-Trøndelag Health Study (Norway) in which physical inactivity and higher BMI resulted in increased the risk for chronic low back pain. With our findings, we can suggest that increasing one's physical activity may compensate for the alleviation of chronic pain by strengthening the muscle around the joints even in the absence of weight loss.¹³⁶ Supporting this evidence, our results found those participants who did not meet their weight loss goals of 3% or more still reported alleviation of chronic pain at follow-up, when looking at Graphs 5.1 and 5.2 (both show improvements, over 3% weight loss depicts higher percentage improvements). These results could be due to increased in exercise which then strengthens the muscles around the joints and alleviates the constant impact on the joints, even if dietary changes and weight loss was not present. While those participants who met and exceeded their weight loss goals, reported dietary changes, and decreased their BMI were found to have higher reports of improvements for chronic pain in the four anatomical areas.

Results from research suggest that through a weight loss intervention, a decrease in BMI will improve one's general well being and energy level.¹³⁷⁻¹³⁹ Teri et al. (2011) conducted a physical activity program in a single-blind randomized control trial of 273 community residing low exercising older adults. With this program, researchers provided a physical activity program, a health education program, combined therapy of health promotion education or physical activity or lastly a control. Results depict that the physical activity program significantly improved general well being, self-reported health and strength more so than the other programs or the combined therapy program. Results from this study suggests introducing and motivating participants to perform low levels of physical activity can benefit in overall reported health and health outcomes.¹³⁹ Other research is also looking into weight loss interventions which focus on improvements for reported physical health, sleeping conditions as well as medical costs associated to overweight/obesity. In a recent study focusing on improvements in energy and overall lifestyle behaviors with a decrease in weight and BMI, Morgan et al. (2011) found through a worksite based weight loss program, with a 3-month weight loss program with nutritional knowledge, group-based incentives and an online component improved self-efficacy, waist circumference, BMI, systolic blood pressure, resting heart rate, physical activity as well as physical activity "related cognitions." This study also found significant weight loss and overall improvements in health and health related outcomes.¹⁴⁰

Hypothesis 4: Losing at least 3% of weight will improve physical and social health, general well being and chronic conditions.

Obesity can bring upon negative psychosocial affects such as body dissatisfaction, poor self-esteem and depression.¹⁴¹ Overweight individuals are at higher risk for stronger emotional states due to body dissatisfaction and decreased feelings of self-worth.¹⁴¹ Worksite interventions aiming to increase the physical, social and emotional health of the individual have better turn out

rates for success.¹⁴² During pre-intervention, individuals in the study reported higher percentages of contributing factors that influence general health such as: decreased general well being, lower energy levels and physical and social barriers to health. These results show that participants may lack the knowledge to perform healthy physical activity practices due to the low energy level as well as barriers to healthy lifestyle choices and body dissatisfaction.

For reported physical health evaluated based upon 3% weight loss and improvements, we found significant improvements for improvements in daily activities. Although we did see greater improvements for interference with normal work, limitations in moderate activities and stair climb, there was no overall significance. Our results show the physical health of the participants for all 4 sub-areas improved more for those who met their weight loss goals of at least 3% than those who did not meet their weight loss goals. For social improvements to health, we can see similar improvements for above and below 3% weight loss, with at least 75% reporting overall improvement. These results show that over 75% of participants felt their physical ability and social ability for work and home life improved. This shows that with an increase in weight loss participants are now becoming more productive and working harder in the facility due to increased positive feelings of physical and social health and self-worth, as well as the ability to perform physically and socially at the worksite. Other reported health problems faced in the workplace in which improved with a 3% weight loss were energy level 67% ($p < 0.05$) and self-reported health by 33%.

Khan et al. (2011) compared CVD risk in overweight/obese compared to normal weight women in a cross-sectional analysis for 475 women. Results found that women who were overweight/obese who were metabolically benign had significantly greater rates of subclinical CVD risk than normal weight women.¹⁴⁵ Supporting this evidence, our research found there was improvement in the above four conditions (Diabetes, Hypertension, Cholesterol and Spine/Low

Back problems) with an increase in weight loss, especially with at least 3% weight loss.

Reported chronic disease also improved post-intervention with at least 66.6% of participants improving in the 4 reported chronic diseases with at least 3% weight loss. Also chronic conditions for BMI, waist/hip ratios, DRS, and blood pressure for systolic improved significantly with a weight loss of 3% or more.

Hypothesis 5: Losing at least 3% of body weight will improve work productivity as indicated by self-reported absenteeism and presenteeism.

This population also reported barriers to presenteeism and absenteeism, which can also affect overall performance in and out of work. Overall losing at least 3% of body weight caused a greater increase in improvement for presenteeism and absenteeism in the workplace for decreased sick days, as well as physical and emotional health for accomplishing less than liked and limited in the kind of work. Absenteeism was reported at baseline to missing 1/3 a day's work a month to an improved missing 1/8 a day of work per month.

Ricci et al (2005) reported from a national telephone survey that obese workers showed less productive time at work as compared to normal and overweight adults, as well as cost business employers an extra \$42.29 billion, with an excess of \$11.7 billion more than normal weight workers. Researchers also found that most of this cost was associated with decreased presenteeism and health care costs in the workplace.¹⁴⁷ Adequate knowledge about physical activity and performance may increase the level of awareness to healthy exercise and eating practices as well as increase general self-efficacy to perform these activities.¹⁴⁵ In a study by Sallis et al (1992), researchers found that social learning practices predict behavior and that the determinants of behavior (family support, encourage self-efficacy, friend support and perceived behaviors) all influenced vigorous physical activity changes. This study proves that providing information and the above variables, efforts for improvement in working conditions is possible.¹⁴⁸

Upon these results, performance in the workplace as well as absent days from work improved with a 3% weight loss.

Hypothesis 6: There will be positive relationship between losing 3% of body weight and weight loss self efficacy scale and exercise self efficacy scale.

Prochaska and colleagues has suggest the transtheoretical model (TTM) stages of change to be used in many different health settings.¹⁰⁷⁻¹⁰⁹ The core constructs of these models focus on processes of change, decisional balance, self-efficacy and temptation. The process stages of change are what people use to hide and undo activities in their life to process through the stages of change. Decisional balance refers to one's ability to weigh the pros and cons of a decision to be made. Self-efficacy refers to one's confidence is performing an activity or change, and lastly temptation reflects the urges to practice these unwanted behaviors and actions. The TTM as well as self-efficacy have been used for weight loss (WLSE) and eating habit (ESE) changes^{103,149} as well as were used for our research measurements.

The baseline information of this study population indicated lack of nutritional knowledge and physical activity practices concerning confidence for WLSE and ESE, as well as food habits and food preference for high-fat and salty food products. As expected the confidence for ESE and WLSE as well as overall global readiness scale had improved post- intervention with a 3% weight loss. More participants reported transitioning from the precontemplation, contemplation and preparation stages of change to the action and maintenance stages of change in post-intervention. These results show through this weight loss intervention more people felt positive in the changes they were making as well as being able to practice these good behaviors.

Worksite promotion programs are successful if they target unhealthy lifestyle behaviors and present healthier choice options as well as education for nutrition knowledge and regular meal planning regiments. In a recent worksite program, Sternfeld et al. (2009) used educational

materials, nutritional knowledge, physical activity and healthy meal planning including specific food groups (healthy fats, oils, fruits and vegetables, and information about added sugars on food labels) in a worksite program. Results of this 16- week e-mail program found significant improvement in overall diet and physical activity. Results from our study showed similar results through this WHP program, participants improved on their self-efficacy skills for eating and exercise.¹⁴⁸

Lastly, the three levels for exercise (mild, moderate and vigorous) had an even stronger positive correlation to WLSE at post-intervention. Warner et al. (2011) found similar result for participants with lower support systems and low self-efficacy were less likely to exercise than those with higher support and self-efficacy.¹¹¹ With our findings, self-efficacy for exercise and eating improved with a 3% weight loss. Self-efficacy did improve with positive correlations and significant improvements in weight loss self efficacy at the end of the 28-week intervention. These results can be suggested from the administration of the one-on-one consultations that included motivational interviewing as well as a tailored approach so that the health educators were able to guide each participant into the right direction they needed to take for weight loss and healthy eating motivation. With the guidance from the health educator, specific examples and possible improvements were able to be tailored to each individual with the ability for questions and concerns throughout the program via e-mail, telephone and weigh-ins.

Hypothesis 7: To identify barriers to healthy lifestyle and proposed more efficient weight management intervention for at risk population

Strategic planning for a worksite program for those trying to become more physically active, lead a healthier lifestyle as well as healthier dietary practices can be worthless if the individual is not ready, has barriers to success or not concerned with this type of motivation.¹⁵⁰ At baseline participants were asked to report reasons for not exercising. Of the top three reasons,

participants reported: *I can never keep it up, I have no time, and I am too lazy*. Upon completion of the program, these barriers had become reported less. For barriers in eating habits, participant's reported similar results for pre-post data analysis. This could be due to the fact that we did not change anything in their work environment, such as vending machines or provide healthy snacks daily. Lastly, participants were asked what type of exercise routines and advise they would need to increase their levels of physical activity. Reports from the participants included exercise routines: Walking on a stationary treadmill, kayaking and exercise videos such as Zumba. As far as providing helpful materials, participants reported: advice from a health professional, people to exercise with as guides, or exercise videos/pamphlets that provided helpful information on working out.

By identifying the barriers to make a change as well as developing effective weight loss programs, you can successfully target an audience. Even if an individual understands what is needed and what lifestyle practices are suggested, health educator's still need to identifying the barriers/obstacles to overcome and related concerns of the individuals so that they can successfully make a change. Worksite programs are identifying ways in which to influence a positive change in these individuals for healthier lifestyle practices. In a research study, Booth et al. (1997) suggests by identifying individual specific educational concerns/ knowledge-literacy as well as preference to related activities, advice and social support needed you can foster a better worksite program. These efforts will aid in a more successful turnout for intervention programming.

Participants may have felt under the stress of worker 'social norms' and felt time-constraints and increased workload may have influenced their abilities to perform healthy lifestyle practices and daily exercise routines. For exercise table 5.17 shows individual improvements in each level of activity (mild, moderate, vigorous) post- weight loss prevention program. In the past, research

has found that high-risk occupational worksites to be those which inflict high-stress environments with little break time and increased workload. These situations put workers at higher risk for acquiring chronic disease and decreased productivity. With this previous research findings, our worksite program identified barriers for exercise and eating habits in order to provide useful strategies to identify and target issues for different populations.

Recommendations for designing an effective health promotion program must focus on the individual's needs and responses to what they would prefer. Effective exercise routines and motivational help/ advice are only useful when it meets the needs of the population being administered. Suggestions of workout videos, working with a partner and specific exercise regiments were also addressed during consultation. For participants having concerns about finding exercise buddies as well as exercise regiments, examples were given and barriers were overcome to find a way to perform, such as: asking another individual in the worksite program to go walking with them at lunch break, or purchasing a DVD at the local store to exercise at home. Suggestions of specific workout preferences were also suggested to the participants by the health educator (such as working out while watching TV, taking extra steps at home, or finding ten minutes to take a quick walk), and for those individuals claiming time constraints and a needing to rest after work, sitting in front of the TV while performing arm work-outs as well as cardio and abdominal work-outs were suggested. Participants were given many ideas and options in which to try out and this was found through motivational interviewing as well as questioning the specific interests of the individual. With our results, research found that barriers to exercise improved, but barriers to healthy eating did not. Possible implementation of healthy snacks, changing the vending machines to healthier choices, allowing a longer lunch break to have time to eat prepared foods from home can be useful. Participants also suggested workout videos or guidance from a health educator. Possible implementation of work-out classes either after work or affiliation with nearby gyms/YMCA may help to improve exercise practices.

Suggestions of a buddy system for physical activity after work may also influence participant's abilities to exercise more regularly.

Of the focused population, encouraging self-efficacy for exercise and eating as well as provide healthy lifestyle changes in small steps, a worksite intervention program can decrease overweight MSD pains and symptoms, chronic disease, as well as increase worker productivity.

Limitations

This was a descriptive, exploratory research study to report the prevalence of MSD in over weight and obese nursing home employees. Furthermore we evaluated the effect of losing at least 3% of body weight on improvements in MSD and chronic conditions. Future studies may take a more experimental design approach and use control group. A larger sample size may also increase the effect size and possibly show more improvements.¹⁵¹

Strengths

For this program and other WHP programs, a tailored approach to weight loss is necessary. With the possibility to identify the issues and concerns of the priority population being worked with, one can clearly identify each cofounding factor in their limitations to healthy lifestyles choices. A one-on-one tailored approach to worksite wellness with a 1 hour consultation and access to the health educator by telephone and e-mail enables a large spectrum of possibilities for improvement of the participants.

CHAPTER 7: Conclusion

A worksite promotion program that includes a tailored intervention to worksite wellness as well as a one hour, 1-on-1 consultation and accessibility to a health educator in and outside of the workplace is important to include in a WHP program.

Employees in the workplace are against all odds when being faced with a one size fits all approach. Worksite employees are faced with a number of predisposing factors that enables them to exercise routinely and practice healthy eating habits. In identifying the key factors that make able for a healthy lifestyle change focusing on key models such as the Global Readiness to Change, motivational interviewing and self-efficacy for eating and exercise, we can more easily approach the population at risk and help improve their population's health. In addressing overweight and obesity, a tailored intervention that focuses on the needs per individual as well as the preferences for health education such as pamphlets, CD-ROMs, one-on-one consultation, exercise videos or exercise programs offered at the worksite, we can then develop a successful promotion program.

Barriers to an effective program as well as worksite and lifestyle barriers should all be addressed in the beginning of the programming as well as throughout. By identifying these barriers to change and motivating one for change, we can find an effective worksite promotion program.

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Appendix A:

Consent Form for Participation in a Research Project University of Connecticut

Principal Investigator: Pouran D. Faghri, MD, MS, FACS

Study Title: Incentivized Weight Loss Program for Overweight and Obese Employees at the Workplace

Invitation to Participate

We wish to thank you for taking the time and coming here today. You are invited to participate in a descriptive research study run by the University of Connecticut, funded by the Center for Disease Control.

You are eligible for this study because you are a full or part-time employee of CHCC, at least 18 years old, at high risk for type 2 diabetes as measured by diabetes risk score of 10 or higher, and are willing to comply with the study protocol and a contract.

You may not participate if you are pregnant or lactating, or if you have recently lost more than 20 pounds (within the past 6 months), have type 1 diabetes, are taking weight loss medication, have had chemotherapy or radiation in the past 5 years, have or plan to have weight loss surgery within the study period, have a known history of heart disease, stroke, or type 2 diabetes.

Description of the Program and Procedure

This is a one day descriptive research study, in which we are collecting data on your health, anthropometrics, and attitude and behaviors pertaining to health. As part of your participation you must sign a contract and complete the data collection survey.

Questionnaires: You will also be asked to complete a questionnaire which will ask about your job, your health or other personal characteristics. Completing this questionnaire will take approximately 20 minutes. Upon completion of the survey, anthropometric data collection, and consent form you will receive a \$10.00 monetary incentive for your help in this study.

Risk and Inconveniences

There are no significant risks involving participation in this study. Your personal information will be classified, and it will not be released. As per our filing of your information, the computer database you will be part of will be locked with a password, and your hard copy of this survey will be secured in a safe locked file cabinet.

Benefits

A Pound A Week

Weight Loss Challenge

Diabetes Risk Score

ID #


Name




Variables		Score	Scoring
Age (years)	<input type="checkbox"/> 45 to 54		2
	<input type="checkbox"/> Over 55		3
BMI	<input type="checkbox"/> Over 25 to below 30		1
	<input type="checkbox"/> Over (& equal) 30		3
Waist circumference (cm/inches)	<input type="checkbox"/> Men, < 102cm (< 40 inches)		3
	<input type="checkbox"/> Men, ≥ 102cm (≥ 40 inches)		4
	<input type="checkbox"/> Women, < 88cm (< 34.5 inches)		3
	<input type="checkbox"/> Women, ≥ 88cm (≥ 35 inches)		4
Have you ever used drugs for high blood pressure?	<input type="checkbox"/> No		0
	<input type="checkbox"/> Yes		2
Has a physician or other health care provider ever told you that you have high blood glucose?	<input type="checkbox"/> No		0
	<input type="checkbox"/> Yes		3
Do you exercise or exert yourself in your spare time or at work at least 30 minutes on most days?	<input type="checkbox"/> No		2
	<input type="checkbox"/> Yes		0
How often do you eat vegetables and fruits or berries?	<input type="checkbox"/> Every day		0
	<input type="checkbox"/> Not every day		1
TOTAL Score			



Weight-loss Participant Survey



We thank you in advance for completing this survey. You are completing this survey as part of your participation in the weight-loss program. Please answer all the questions. Remember that all survey responses will be kept *completely confidential*.



For each question, please either fill in the blank or shade the circle that matches your response like this:

Shade circles like this: ☒ Not like this: ☐ ☐

If you change your mind about a response, please mark an X through the wrong answer(s).

Today's Date: / / (Month/Day/Year)

1. What is your current job title?

☐ Administration/Clerical

☐ CNA/GNA

☐ CMA

☐ LPN

☐ RN

☐ Housekeeping/Laundry

☐ Dietician

☐ OT

☐ Recreation

☐ Social Work

☐ Other

If other please specify: _____

2. Gender: ☐ Male ☐ Female

3. Age:

4. Please shade the circle above one number for the highest grade or year of school that you have completed:

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
8 or less	9	10	11	12	13	14	15	16	17 or more
Less than High School		High School (secondary)			College/Professional			Post-Graduate	

5. What is your current marital status?

☐ Married or live with partner
 ☐ Widowed
 ☐ Divorced or separated
 ☐ Single, never married

6. Are you Hispanic? ☐ Yes ☐ No

7. Racial Background (Select all that apply)

☐ African American / Black

☐ Asian (including Indian subcontinent)

☐ White

☐ Prefer not to respond

☐ American Indian / Alaska Native

☐ Native Hawaiian / Other Pacific Islander