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# Examination of pre-diabetes and diabetes perceptions and knowledge using focus groups

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EXAMINATION OF PRE-DIABETES AND DIABETES PERCEPTIONS  
AND KNOWLEDGE USING FOCUS GROUPS

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A Thesis  
Presented to  
the Graduate School of  
Clemson University

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Science  
Food, Nutrition and Culinary Sciences

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by  
Caroline A. Carter  
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Accepted by:  
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## ABSTRACT

Pre-diabetes is a condition that has been identified as an emerging chronic disease threat which is deserving of immediate attention as it precedes type 2 diabetes and it is becoming more common in the United States. The number of individuals with pre-diabetes has been estimated to be 54 million. As the worksite setting provides easy access to a large adult population it was chosen for this research study. A thorough review of prior worksite interventions was conducted followed by a focus group study which used qualitative methods to evaluate health behaviors and diabetes knowledge of employees in a South Carolina textile worksite. The results indicated that future worksite interventions need to address all aspects of an individual's lifestyle to be effective. Researchers will be able to use the results from this study to develop a tailored, diabetes prevention program that meets the specific needs of textile worksite employees in rural South Carolina.

## DEDICATION

I would like to dedicate this work to my mother and father. They have given me love and support over the past 2 years and I could not have reached my goal without them.

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## CHAPTER ONE

### LITERATURE REVIEW

#### Background

Approximately 20.8 million people in the United States have diabetes (1) and of those, 6.2 million are undiagnosed (1,2). Ninety to 95 percent of people with diabetes have type 2 diabetes, which is more common in individuals with a family history of the disease and members of certain ethnic groups (3) such as African American, Hispanic, American Indian, and Alaska Native adults, who are twice as likely as white adults to have diabetes (2). The main environmental risk factors for type 2 diabetes are obesity, physical inactivity, and a high-fat diet rich in saturated fatty acids; with low intakes of dietary fiber, whole-grain cereals, and low-glycemic carbohydrates also associated with increased risk (4). Diabetes can result in macrovascular and microvascular complications which includes heart and blood vessel disease, blindness, kidney failure, and foot ulcers (5).

Pre-diabetes, also called impaired fasting glucose (IFG) or impaired glucose tolerance (IGT), is a condition that occurs when the blood glucose levels are higher than normal but not high enough to be diagnosed as diabetes (6). People with IFG and IGT are at increased risk for developing type 2 diabetes, heart disease and stroke. Pre-diabetes is becoming more common in the United States, according to new estimates provided by the U.S. Department of Health and Human Services (1). In 2003 to 2006,

25.9 percent of U.S. adults aged 20 years or older had IFG, with 35.4 percent of this group being age 60 years and older (7). This suggests that at least 57 million American adults had pre-diabetes in 2007. Those with pre-diabetes are likely to develop type 2 diabetes within 10 years, unless they take preventive action (1).

### Diabetes in South Carolina

Diabetes is the seventh leading cause of death in South Carolina, which ranks third in the nation for rates of diabetes (8). According to the South Carolina Behavior Risk Factor Surveillance System, 9.3% adults were aware they had diabetes in 2002, an estimate of 385,685 people (9). However, approximately the same number of South Carolinians have diabetes but are unaware of it, making an estimated total of 650,000 people in South Carolina who have diabetes. More than 1,000 South Carolinians die from diabetes each year and another 2,000 die from other diseases associated with diabetes such as cardiovascular disease and end-stage renal disease (9).

### Health Promotion Interventions

#### *Diet*

An estimated three out of four Americans die from diseases linked to diet each year (10). These leading causes of death, which include heart disease, high blood pressure, many cancers, diabetes and stroke, are largely preventable through lifestyle

choices which include dietary changes such as eating more fruits and vegetables. In order to promote health and facilitate prevention of these diseases, the Department of Health and Human Services (HHS) and the Department of Agriculture (USDA) have developed and disseminated the Dietary Guidelines for Americans every 5 years since 1980 (11).

Dietary changes can be achieved through worksite interventions. One such intervention was successful in significantly increasing fruit and vegetable consumption and reducing fat intake (12). Another worksite intervention revealed that participants perceived more social support from their colleagues in eating less fat as compared to those in a comparison group (13). However, at 12 months, the attitude and self-efficacy about eating less fat became less optimistic in the intervention group. No significant changes were found on self-reported fat, fruit and vegetable intake (13).

Nutrition interventions are also used to improve conditions such as high glucose tolerance and high cholesterol levels (14,15). In a glucose tolerance study, weight decreased in the group receiving a reduced-fat diet compared to the control group (usual diet); the greatest difference was seen at 1 year (-3.3 kg), diminished at follow-up (-3.2 kg at 2 years and -1.6 kg at 3 years), and was no longer present by 5 years (14). Glucose tolerance improved in patients on the reduced-fat diet and a lower proportion had type 2 diabetes or impaired glucose tolerance at 1 year (47 vs. 67%). However, in following years, there were no differences between groups. Interestingly, 50% of the intervention group maintained lower fasting and 2-h glucose at 5 years compared with control subjects. Performance on a nutrition knowledge questionnaire improved significantly

after a worksite education intervention targeted at lowering cholesterol (15). There was also a reduction in calorie intake and in the percentage of energy intake from total fat, as well as an increase in intake of carbohydrates and proteins. For all employees assessed, there were no changes in mean cholesterol levels or fatty acid composition; however among those with high cholesterol, there was a significant reduction in cholesterol (15).

### *Physical Activity*

Physical inactivity is a risk factor for many diseases, including heart disease, stroke, noninsulin-dependent diabetes mellitus, obesity, colon cancer, and osteoporosis (16). Despite the health benefits of regular physical activity, over half of US adults do not engage in physical activity at levels consistent with public health recommendations (17). The Centers for Disease Control and Prevention (CDC) and the American College of Sports Medicine recommend that adults engage in at least 30 minutes of moderate physical activity on most days and preferably on all days (18). Healthy People 2010 objectives include increasing the proportion of adults who engage regularly in moderate or vigorous activity to at least 50%.

The worksite can be an effective location for increasing physical activity levels among employees (19). Results from a walking program showed a significant increase in participants' physical activity level, as well as a significant decrease in mean body mass index (BMI) (20). However, there was no evidence of the program reducing participants' blood pressure. A pedometer study found that steps/day were inversely related to BMI in all participants and with waist circumference in women (21). There was a low

correlation between steps/day and diastolic blood pressure in the sample. Participants who reported a prior diagnosis of one or more components of metabolic syndrome took fewer steps/day than healthy participants. Also, pedometer-determined steps/day were positively associated with self-reported occupational activity. A study among full-time workers found that both the addition of motivational signs and music was associated with a modest increase in stairwell use in the first three months (22). However, only the addition of music was associated with increased stairwell use beyond 3 months as the use of signs showed a significant decrease in stairwell use between the initial 3-month period and the second observational period.

The transtheoretical model was employed to determine the effect of targeted interventions to increase physical activity in sedentary workers who were divided into subgroups based upon their predetermined stages of change of exercise behaviors (23). After controlling for within group psychosocial factors, perceived exercise benefit and exercise self-efficacy were significantly higher with the exercise intervention group when compared to the control group while perceived exercise barriers were significantly lower than in the control group post-test (23).

### *Lifestyle*

Effective metabolic control of diabetes often requires major changes in lifestyle (24). Many lifestyle intervention studies have been conducted among adults who are at high risk for developing type 2 diabetes (25-30). Following a diabetes prevention intervention which included diet and physical activity, body weight was reduced by 2.3-

37% among participants (25). However, weight among non-participants with impaired glucose tolerance and control subjects increased by 0.5-1.7%. At the 6-year follow-up observation, glucose tolerance was normal in >50% of subjects with pre-intervention impaired glucose tolerance, the accumulated incidence of diabetes was 10.6%, and more than 50% of the diabetic patients were in remission. Additionally, blood pressure, lipids, and hyperinsulinemia were reduced and early insulin responsiveness to glucose loading was retained. Improvement in glucose tolerance was correlated to weight reduction and increased fitness. A study by the Diabetes Prevention Program Research Group assigned participants to placebo, metformin, or a lifestyle-modification group with goals of at least a 7 percent weight loss and at least 150 minutes of physical activity per week. Findings revealed that the incidence of diabetes was lowest in the intensive lifestyle groups (26-28). The intensive lifestyle intervention reduced the incidence of diabetes by 58% (26-27) and 31% in the metformin group (26). Therefore, the lifestyle intervention was significantly more effective than the metformin (26).

Results from a study conducted among Japanese males revealed that the 4-year incidence of diabetes was 9.3% in the control group, and 3.0% in the intervention group (28). Body weight was decreased by 0.39 kg in the control group and 2.18 kg in the intervention group. Subjects with higher fasting plasma glucose at baseline developed diabetes at a higher rate than those with a lower fasting plasma glucose. Higher 2 hour plasma glucose levels and higher BMI values at baseline were also associated with a higher incidence of diabetes, but was not significant. Subjects with a low insulinogenic index developed diabetes at a significantly higher rate than those with normal values (28).

Although the intensive lifestyle modification method used in the Diabetes Prevention Program was essential to study lifestyle change in preventing type 2 diabetes, it is not easily duplicated in community settings (29). The Group Lifestyle Balance (GLB) intervention was a study that incorporated the goals of the Diabetes Prevention Program, while doing so with a group-based program. Nearly half of subjects who participated in the 12 week Group Lifestyle Balance intervention lost at least 5% of their body weight, and ~1/3 lost at least 7%. A total of 87.5% and 66.7% of subjects sustained the 5% and 7% reductions at the 6 month follow up. Similar patterns were observed for improvements in metabolic syndrome parameters with over 1/3 of the population experiencing improvements in one or more component of metabolic syndrome with 73.3% of subjects maintaining this improvement at 6 month follow up. Significant improvements also occurred in waist circumference, blood pressure, triglycerides, and HDL cholesterol levels (29).

The Good Ageing in Lahti (GOAL) program was implemented in a primary health care setting among participants who were at high risk for developing type 2 diabetes. The GOAL program obtained the five key lifestyle objectives from the Diabetes Prevention Study and included group counseling sessions (30). At the 1 year follow-up, diastolic blood pressure, weight, and BMI among men, and waist circumference for both men and women decreased significantly. Mean fasting plasma glucose level increased slightly, with statistical significance only among women. Despite the increase, it remained within normal range. A further analysis showed a significant effect on changes in 2-hour glucose levels: an increase among participants with normal

glucose tolerance at baseline but a decrease among those with baseline impaired glucose tolerance. Twenty percent of participants accomplished at least four of five key objectives at 12 months. However, physical activity and weight loss objectives were attained significantly less frequently than objectives targeting dietary intake.

### Focus Group Studies

Focus group interviewing is a qualitative method of data collection helpful for obtaining descriptions of individuals' perceptions and experiences, and providing insight into the beliefs and attitudes that bring about their behavior (31). This technique consists of a semistructured group session in an informal setting, led by a moderator, to obtain information on a particular topic. The questions are open-ended, and there is no attempt to put experiences and events into predetermined, standardized categories. Instead, the aim is to capture what individuals say in their own words. An important aspect is the interaction of group members to produce a wide range of information, insight, and ideas. Focus groups are particularly important when developing an intervention because they increase the likelihood that the intervention will be accepted, implemented, and maintained by the target population.

Prior to initiating the Health Works for Women intervention, focus groups were conducted with women at worksites in order to better understand their health concerns and barriers to promoting healthy behaviors (19). Concerns were centered on wellness

behaviors (exercise, healthy eating, weight loss, smoking cessation). Women recognized the importance of changing unhealthy behaviors but lacked the skills and information to make changes. Major barriers to change were no time and no willpower. Social support was considered a potential facilitator for change (19). A study involving low-income overweight and obese non Hispanic black women found that personal appearance, fitting in clothes, difficulty playing with their children, and social support were motivating factors for both healthy eating and physical activity (32). Stressful experiences triggered emotional eating and reduced participants' ability to practice these behaviors. Other factors, such as desiring quick results, made it difficult for these mothers to follow recommended healthy lifestyle practices (32).

### *Cardiovascular Disease*

Another qualitative study conducted with women determined the knowledge and awareness of cardiovascular disease risk (33). Most of the participants were aware of the modifiable risk factors for cardiovascular disease. Although they thought they were susceptible, they believed they could overcome the disease. Common barriers to achieving a heart-healthy diet included time and concern about wasting food. Most women had positive attitudes toward physical activity. They reported exercising in the past, but found it difficult to continue when their routine was disrupted. The environmental examination suggested that there were opportunities to be physically active and that healthy foods were available in local food stores (33).

Researchers conducted a focus group study that determined patients' perceptions of cholesterol and cardiovascular disease risk and their reactions to three visual displays representing cardiovascular disease risk (34). All participants were aware that high cholesterol levels adversely affect health. A surprising finding was that many had only recently heard about the subject. Many participants wanted cholesterol information that was understandable and consistent. Participants also acknowledged some association between diet and high cholesterol. Fats were mentioned many times and participants in every group talked about health consequences of saturated fats or benefits of certain oils. Participants stated that factors contributing to high cholesterol levels were chemicals in animal feed, pesticides on plants, and foods that are not natural. Many assumed that the only people affected by cholesterol are overweight and older people. Few participants were familiar with the terms "HDL" and "LDL". Many had only heard of the "good" and "bad" cholesterol. In the two focus groups with the most educated participants, almost all knew their total cholesterol number. Only a few in all focus groups knew their HDL and LDL numbers. Participants declared that cholesterol numbers were not an effective way to understand their risk for cardiovascular disease. Most viewed high cholesterol levels as less serious than high blood pressure because of the perceptions that cholesterol can be controlled while blood pressure cannot. They also believed high blood pressure leads more directly to heart attack and they had received more information from physicians about blood pressure. Participants believed that physicians frequently test cholesterol even if patients are unaware it is being done. Even though doctors never informed them of their numbers, they presumed their cholesterol level was normal. Standard visual

representations showing statistical probabilities of risk were evaluated as confusing and uninspiring. The presentation that provided cardiovascular disease risk-adjusted age was assessed by participants as clear, engaging, memorable, and capable of encouraging people to make healthy changes. However, a few participants were worried that patients might become distressed if their risk is similar to that of an older person (34).

### *Diet*

A focus group study composed of both men and women looked at the attitudes and beliefs of soy food consumers versus nonconsumers (35). Barriers to soy consumption included soy's image, a lack of familiarity with how to prepare soy foods, and a perception that soy foods were an inadequate flavor substitute for animal-based products. Soy food consumers' reported their change was initiated by food intolerances, an increased interest in health, or an adoption of a vegetarian or natural foods lifestyle. Many participants were unaware of the importance of soy, while others described it as "heart healthy," a source of protein, and good for women's health. Some soy consumers were interested in the controversy dealing with breast cancer and soy consumption (35).

### *Worksites*

Worksite health promotion programs are an efficient way to improve the health of a large group of individuals (36). Four worksites used focus groups to identify strategies that would enhance employee participation in a wellness program (37). Employees and managers agreed that walking trails should be marked for distance, and that incentives,

pedometers, and competition would increase use. Employees identified barriers to be: lack of outdoor lighting for late shift workers, short breaks for lunch, and restricted indoor areas for walking. Employees suggested having exercise areas along the walking trail. Managers mentioned fork-lift traffic, short lunch breaks, and injury liability as barriers. They suggested using parking lots for the walking trails and having buddy groups to help motivate employees. All four worksites had break rooms with vending machines, but only one had a cafeteria. Each worksite had snack and beverage vending machines which were frequently used by employees. Although managers and employees agreed that more healthy choices were needed, managers wanted to keep some unhealthy foods available. Employees suggested a change in the food offered at meetings and information about healthier choices when ordering food from restaurants. They all agreed that the most appropriate place to put signs were the break room and cafeteria. Managers thought that a website should be available at work as well as home. However, managers and employees mentioned they would have limited time at work to access the website. Managers suggested that educational materials include success stories and printed information to be sent home. All participants wanted information on healthy recipes. Employees mentioned that they preferred educational materials to include the use of humor, statistics, trivia, weekly health tips, quotes, and simple messages (37).

## Theoretical Framework

Bandura's Social Cognitive Theory provides a framework for explaining complex patterns of behavior change (38). Social Cognitive Theory evolved from research on Social Learning Theory, which asserts that people learn not only from their own experiences, but also by observing the actions of others and the benefits from those actions (39). Social Cognitive Theory posits that human behavior can be explained as "triadic reciprocal causation" which means the three aspects of behavior; the person, the environment, and the behavior itself, affect each other in a dynamic, reciprocal fashion (40). Person factors include cognitions, emotions, and biological events. There are many additional concepts of the Social Cognitive Theory such as behavioral capability which refers to the need to know what to do and how do it in order to perform a behavior; expectations, which are the anticipated results from taking an action; and observational learning, which refers to the process where people learn through the experiences of others. Also important are reinforcements which are responses to behavior that affect whether or not the behavior is repeated. Positive reinforcements occur when something is added after a behavior which increases the likelihood of repeating the behavior while negative reinforcement occurs when something is removed in order to increase the likelihood of a behavior. However, Bandura considers self-efficacy to be the most significant personal factor in behavior change (40). Individuals who doubt their ability to perform are more likely to avoid difficult tasks, set low aspirations, and make minimal

commitment to goals (41). Conversely, those with high self-efficacy approach tasks as challenges, persist when their initial efforts fail, and maintain commitment to goals (41).

Social cognitive theory has been used successfully to guide behavior change in areas such as diet and exercise (41-42). A worksite intervention was designed to address Social Cognitive Theory variables linked to exercise behavior (42). The treatment group attended four 1-hour sessions that addressed the following: use of self-regulation skills, dispelling misconceptions about exercise, identifying the expected outcomes from exercise participation, and teaching how to engage in a safe, effective exercise program. Results showed increases in self-regulation skills, outcome-expectancy values, and self-efficacy for the treatment group. Sixty-seven percent of the treatment group was able to maintain exercise behavior across 12 months, whereas the comparison group declined in exercise participation from 68% to 25% across 12 months. Another study tested the validation of the Heart Healthy Eating Self-efficacy Scale (HHESES) (41). The HHESES, a measure of both self-efficacy and outcome expectancy, was applied among employees in worksite wellness settings and high risk patients treated at a lipid clinic. Worksite employees received nutrition education as self-instruction and patients received more individualized diet instruction. Scores on all subscales were similar for the total samples and for men. The scores for women were also similar for self-efficacy beliefs, but women lipid clinic patients had significantly lower outcome beliefs compared to women in worksite settings (41).

## Statement of Purpose

Approximately 20.8 million people in the United States have diabetes (1), and of those, 6.2 million are undiagnosed (1,2). Ninety to 95 percent of people with diabetes have type 2 diabetes and the main environmental risk factors for this disease are obesity, physical inactivity, and a high-fat diet rich in saturated fatty acids (5). Low intakes of dietary fiber, whole-grain cereals, and low-glycemic carbohydrates have also been shown to be associated with increased risk for type 2 diabetes. Pre-diabetes is becoming more common in the United States and estimates show that at least 57 million American adults had pre-diabetes in 2007 (7). Those with pre-diabetes are likely to develop type 2 diabetes within 10 years, unless they take preventive action (1).

Worksites provide access to 65% of the population aged  $\geq 16$  years, which makes them optimal settings to implement strategies for reducing the prevalence and burden of overweight and obesity (43) which are primary risk factors for pre-diabetes and diabetes. The workplace provides access to employees through existing channels of communication and social support networks (43). These existing systems present an array of opportunities for environmental and policy change that encourage healthy dietary practices and increase physical activity (43), both of which are vital to effective diabetes prevention interventions. It would therefore seem logical to use worksites to implement focused, theoretically sound diabetes prevention programs for individuals identified as having pre-diabetes or at risk of developing pre-diabetes and subsequent diabetes. However, there are many barriers to successful development and implementation.

## Purpose of the Study

The purpose of this study is to use qualitative methods to evaluate health behaviors and diabetes knowledge of employees in a South Carolina textile worksite.

## Research Objectives

The objectives of this study are:

- 1) To assess the need for a South Carolina worksite prediabetes and diabetes education and prevention intervention.
- 2) To use Focus group interviews to assess factors important to the development of an effective diabetes prevention intervention for South Carolina employees.

The specific aims of this project are:

- 1) To determine the prediabetes and diabetes knowledge of the Focus Groups' participants.
- 2) To examine the attitudes, beliefs and perceptions of South Carolina worksite employees toward eating habits, physical activity and weight management.
- 3) To evaluate which personal, environmental and behavioral factors impacting South Carolina worksite participants are important to the development of an effective diabetes education and prevention intervention.

## Implications for Practice

Understanding of the health knowledge and health-related behaviors and barriers of South Carolina textile worksite employees will facilitate the development of a tailored, diabetes prevention program that is feasible and effective.

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## CHAPTER TWO

### WORKSITE INTERVENTIONS FOR CHRONIC DISEASE PREVENTION: A REVIEW OF THE LITERATURE

#### Abstract

Published research on worksite interventions was reviewed to determine the most effective type of chronic disease prevention intervention. Studies were limited to data-based articles published between 1995 and 2007. Twenty articles met the selection criteria and were reviewed and sorted by intervention type. Intervention types were nutrition, physical activity, combined diet and physical activity, and lifestyle interventions that use a behavior change model, weight loss, and disease risk reduction programs. Some reviewed studies with a single behavior focus had unsuccessful outcomes indicating that future worksite interventions need to address all aspects of an individual's lifestyle to be effective.

#### Introduction

Approximately 20.8 million people in the United States have diabetes (1), and of those, 6.2 million are undiagnosed (1,2). Ninety to 95 percent of people with diabetes have type 2 diabetes and the main environmental risk factors for this disease are obesity,

physical inactivity, and a high-fat diet rich in saturated fatty acids (3). Obesity is an alarming health problem in the United States. Since 1976–1980, the prevalence of obesity among U.S. adults has approximately doubled (4). In 2005–2006, more than 34% of adults aged 20 years or older were obese. It has been estimated that the annual medical cost of overweight and obesity in the U.S. is \$117 billion (5, 6). Indirect costs, such as income lost by people unable to work due to illness or disability, accounts for 56 billion dollars of this total cost. Most of the cost associated with obesity are due to type 2 diabetes, coronary heart disease, and hypertension.

More than 100 million Americans spend the majority of their day at the worksite (7). Thus, worksite health promotion programs are an efficient way to improve the health of a large group of individuals (8). Worksite interventions are convenient and accessible for workers and often less expensive than programs available in clinical settings. Opportunities such as policy changes, work structure, benefits, incentives, healthy food offerings, and physical activity can provide healthy options for employees (9).

This article is a review of the literature on chronic disease prevention programs in worksites. The review includes 6 types of worksite interventions: nutrition, physical activity, combined diet and physical activity, interventions that use a behavior change model, weight loss, and disease risk reduction programs.

## Methodology

Between June 12, 2007 and September 1, 2008 the following databases were searched for peer-reviewed research articles: Expanded Academic, Academic OneFile, Medline, and Cinahl Plus. Search terms included worksite health promotion, worksite interventions, worksite physical activity interventions, worksite nutrition interventions, worksite lifestyle interventions, chronic disease prevention interventions, chronic disease prevention, weight loss interventions, and workplace interventions. Use of these search criteria resulted in 212 articles. The remaining articles were reviewed by the author to exclude review articles, non peer reviewed articles, and those not fitting the following inclusion criteria: 1) worksite intervention; 2) chronic disease risk reduction program and; 3) published no earlier than 1995. After following these criteria, 20 studies were selected for inclusion.

## Results

Tables 1.1-1.4 include characteristics of all types of interventions reviewed. These include the following intervention types: nutrition, physical activity, combined physical activity and nutrition, and lifestyle. Details of each intervention are discussed further in the following section.

Table 1.1: Characteristics of Nutrition Interventions

Study	Purpose of Intervention	Type of Worksite/s	Sample Size	Type of Intervention	Length of Intervention	Findings
Byers et. al, 1995 <sup>15</sup>	Cost-benefit assessment of an education program following cholesterol screening	40 small worksites	846 ( 42.8% female and 57.2% male)	Nutrition education	52 weeks	Cholesterol levels differed little between the two intervention groups 6 months after screening; at 12 months those in special intervention had a 6.5% drop in cholesterol and those in the usual intervention had a drop of 3.0%
Braeckman et. al, 1999 <sup>14</sup>	To evaluate a short-term and low-intensity nutrition intervention that focused on promoting low fat dietary habits	4 worksites; predominantly male, blue collar Caucasian workforces	770 male subjects	Low fat diet	12 weeks	Nutrition knowledge scores improved significantly in the intervention group; also a net reduction in intake of total calories and in percentage of energy from total fat; reported intake of carbohydrates and proteins increased; no changes in mean TC <sub>1</sub> level or fatty acid composition; only those with hypercholesterolemia had a reduction in blood cholesterol
Swinburn et. al, 2001 <sup>13</sup>	To determine whether reducing dietary fat would reduce body weight and improve	41 worksites in New Zealand; Participants recruited from a Workforce Diabetes	136 (31.8% female and 68.2% male in the reduced fat group; 20% female and	Low fat diet	52 weeks (5 year follow-up)	Weight decreased in the reduced fat diet group; the greatest difference was at 1 year (3.3 kg) and was no longer present at 5 years; glucose tolerance improved in patients on the reduced fat diet and a lower proportion had type 2

	long-term glycemia in people with glucose intolerance	Survey	80% male in the control diet group			diabetes or impaired glucose tolerance at 1 year but no differences between groups in later years; the more compliant 50% of the intervention group maintained a lower fasting 2 hour glucose at 5 years
Block et. al, 2004 <sup>11</sup>	To apply effective behavior-change principles through technology	A corporate worksite	84 (73% female and 27% male)	Email	12 weeks	There was significant improvement in Stage of Change: 74% of those already not at top had forward movement. There was also a significant increase in fruit and vegetable consumption and significant decrease in intake of fat.
Engbers et. al, 2006 <sup>12</sup>	To present the effects of a worksite environmental intervention on fruit, vegetable and fat intake and determinants of behavior	2 governmental companies	515 (36.9% female 63.1% male in the intervention group; 42.1% female and 57.9% male in the control group)	Making healthy food choices	52 weeks	Intervention subjects perceived more social support from their colleagues for eating less fat; at 12 months the attitude and self-efficacy towards eating less fat became less positive in the intervention group; no effects were found on self-reported fat, fruit, and vegetable intake

Table 1.2: Characteristics of Physical Activity Interventions

<b>Study</b>	<b>Purpose of Intervention</b>	<b>Type of Worksite/s</b>	<b>Sample Size</b>	<b>Type of Intervention</b>	<b>Length of Intervention</b>	<b>Findings</b>
Boutelle et. al, 2001 <sup>17</sup>	To assess the impact on stair use of improving the attractiveness of the stairwell	The University of Minnesota School of Public Health building	Not specified; 700 employees in building; 35,475 observations made	Stair use	8 weeks	More participants used the stairs during the music and artwork intervention than at baseline or when signs alone were used
Coleman et. al, 2001 <sup>18</sup>	To determine whether a culturally relevant health message would promote stair use in a predominantly Hispanic population	3 community locations: an airport, bank, and office building;  1 campus location: the University of Texas at El Paso library	Not specified	Stair use	4 weeks	Stair use increased in response to both individual and family promotion health messages and use varied by intervention site
Bowles et. al, 2002 <sup>23</sup>	To identify perceived barriers reported by participants in a nationwide worksite-based	10 corporations, 10 public health departments, 2 federal sites, and 1 middle	9512	Physical activity self-report	10 weeks	The response rate for completing the questionnaire was 41.47% (N=3945); 57.4% were categorized as sufficiently active for a health benefit; Only the perceived barrier lack of self-motivation was significantly

	physical activity program and determine if perceived barriers are related to current level of physical activity measured as a single-item of self-reported physical activity	school				related to physical activity sufficient to receive a health benefit.
Chan et. al, 2003 <sup>21</sup>	To describe the cross-sectional relationship between an objective measure of walking and general indicators of health and a previous diagnosis of one or more components of the metabolic	5 worksites in Canada where job types were moderately or highly sedentary	182 (86.8% female 13.2% male)	Pedometer steps study	3 days	Steps were 7230±3447 for women and 8265±2849 for men; pedometer steps/day were associated inversely with BMI in all participants and waist circumference in women only; low correlation between BP and steps/day; pedometer steps/day were positively associated with self-reported occupational activity

	syndrome					
Kerr, et. al, 2004 <sup>16</sup>	To assess four sequential environmental interventions: 1) installing new carpet and painting the walls, 2) adding framed artwork on stair landings, 3) displaying motivational signs, and 4) adding a stereo system and playing music in the stairwell	Centers for Disease Control and Prevention, Rhodes Building in Atlanta, GA	554 full time employees; 110 temporary employees (74.2% female and 25.8% male)	Stair use	224 weeks	Both motivational signs and music significantly increased stair use by 8.9% over baseline; the increase in sign use occurred in the first 3 months of the intervention and the increase in music occurred after the first 3 months
Earney et. al, 2004 <sup>19</sup>	To assess the effectiveness of increasing physical activity in the form of walking among employees by publicly posting walking data	Large county health department; Southwestern United States	46 (93.5% female and 6.5% male)	Walking steps	3 weeks	Walking steps were statistically higher during the intervention and in post-intervention period as compared to baseline

Chyou et. al, 2006 <sup>20</sup>	To evaluate the short-term effect of a worksite-based walking incentive program to promote physical activity and well-being among employees	Marshfield Clinic, a large private multispecialty group practice healthcare institution in Marshfield, Wisconsin	191 female subjects	Walking incentive program	20 weeks	Data showed a significant increase in physical activity level and a decrease in mean BMI <sub>2</sub> ; no evidence of incentive program reducing BP <sub>3</sub>
Green et. al, 2007 <sup>22</sup>	To measure the long-term impact on physical activity	10 Group Health facilities	1167 (86% female and 14% male)	Physical activity, frequency, intensity, duration	10 weeks	At 10 weeks, all physical activity measures increased significantly; the proportion of employees meeting the guideline of the Centers for Disease Control and Prevention for physical activity increased from 34% to 48%; at the 6 month follow-up, the frequency of exercising enough to sweat remained significantly increased but other measures of physical activity declined toward baseline

Table 1.3: Characteristics of Diet and Physical Activity Interventions

<b>Study</b>	<b>Purpose of Intervention</b>	<b>Type of Worksite/s</b>	<b>Sample Size</b>	<b>Type of Intervention</b>	<b>Length of Intervention</b>	<b>Findings</b>
Atlantis et. al, 2006 <sup>24</sup>	To investigate the effects of a comprehensive exercise and lifestyle intervention on physical fitness	Casino in Australia	73 (52% female and 48% male)	Exercise and nutrition	24 weeks	No significant effects on body mass or BMI were found; significant improvement in waist circumference and aerobic fitness
White et. al, 2007 <sup>8</sup>	To determine the efficacy of a 12-week worksite wellness program based on recommendations for reducing cardiovascular disease risk	Mid-sized university	50 (84% female and 16% male)	Diet and exercise, to reduce risk factors for coronary heart disease	12 weeks	Significant differences between pre and post intervention measurements of TC, LDL <sub>4</sub> cholesterol, TC/HDL <sub>5</sub> cholesterol ratio, triglycerides, and weight; significant relationship between self-reported level of participation in the diet portion of the program and in improvement in LDL levels

Table 1.4: Characteristics of Lifestyle Interventions

Study	Purpose of Intervention	Type of Worksite/s	Sample Size	Type of Intervention	Length of Intervention	Findings
Glasgow et. al, 1995 <sup>35</sup>	To evaluate the short-term effects of a low intensity worksite heart disease risk reduction program	26 worksites (13 early intervention worksites and 13 delayed intervention worksites); company types included private, public, manufacturing or sales, government, and unionized	263 early intervention employees (30% female and 79% male) and 249 delayed intervention employees (38% female and 62% male)	Heart disease risk reduction program	104 weeks	Early and delayed intervention conditions did not differ in smoking prevalence, dietary intake, or cholesterol levels; variability in outcomes among worksites within each condition
Sorenson et. al, 1998 <sup>25</sup>	To assess the effects of a 2 year integrated health protection worksite	24 manufacturing worksites in Massachusetts	2386 (33% female and 67% male)	Diet and smoking	104 weeks	Significant differences between intervention and control worksites included reductions in the percentage of calories consumed as fat (2.3% vs 1.5% kcal) and increases in servings of fruit and vegetables (10% vs 4% increase);

	intervention on changes in dietary habits and cigarette smoking					the intervention had a significant effect on fiber consumption and no significant effects were observed for smoking cessation
Hoke, C.N., & Franks, S., 2002 <sup>28</sup>	To examine the effect of treatment setting on success in a weight-management program	A medical university, primary care physician's office, or worksite (a small business)	33 (81.8% female and 18.2% male)	Weight management intervention	16 weeks	Results supported the hypothesis that treatment setting affects program success. The worksite was the most effective setting in promoting weight loss
Aldana et al., 2002 <sup>34</sup>	To determine whether participation in a facilitator-based video version of the Coronary Health Improvement Project would improve health behaviors and significantly reduce employee	6 worksites in metropolitan Rockford, Illinois	442 (62.2% female and 37.8% male)	Lifestyle	8 weeks	All sites demonstrated significant and meaningful reductions in body weight, BMI, total cholesterol, LDL cholesterol, triglycerides, and fasting blood glucose; Men demonstrated greater improvements than women, and individuals with higher baseline health risks experienced the greatest reductions in risk

	health risks					
Campbell et. al, 2002 <sup>26</sup>	To assess the effects of the Health Works Women intervention on improving multiple behaviors including nutrition and physical activity among rural female blue-collar employees in North Carolina	9 small to mid-size worksites (2 light manufacturing and 2 apparel and textile)	859 female subjects	Nutrition, physical activity, smoking, and cancer screening	76 weeks	At the 18-month follow-up, the intervention group had increased fruit and vegetable consumption by 0.7 daily servings compared to no change in the delayed group; significant differences in fat intake were observed at 6 months but not at 18 months; the intervention group also demonstrated improvements in strengthening and flexibility exercise compared to the delayed group; the rates of smoking cessation and cancer screening did not differ between study groups

1 TC=Total cholesterol

2 BMI=Body mass index

3 BP=blood pressure

4 LDL=low-density lipoprotein

5 HDL=high-density lipoprotein

## Discussion

### Nutrition Interventions

Leading causes of death, which include heart disease, high blood pressure, many cancers, diabetes and stroke, are largely preventable through lifestyle choices such as eating more fruits and vegetables (10). A 12-week nutrition intervention delivered entirely by email aimed to reduce dietary fat and increase fruit and vegetable intake among employees was conducted at a corporate worksite. Each weekly email included information on nutrition or the relationship between diet and health, dietary tips tailored to the individual and small goals to set for the following week. Results showed a significant increase in fruit and vegetable consumption and a significant decrease in fat intake (11). Another 12-month worksite nutrition intervention consisted of placing informational sheets near food products in a company canteen to encourage healthier food choices (12). It was found that workers perceived more social support from their colleagues in eating less fat. However, at 12 months, the attitude and self-efficacy towards eating less fat became less optimistic in the intervention group. No significant changes were found on self-reported fat, fruit and vegetable intake (9).

Nutrition interventions have also been used to improve metabolic conditions such as high cholesterol and glucose intolerance (13,14). Among New Zealand worksite employees, Boyd et al (2001) found that weight decreased in the reduced-fat diet group compared to the control group (usual diet); the greatest difference was seen at 1 year (-3.3

kg), but diminished at follow-up (-3.2 kg at 2 years and -1.6 kg at 3 years), and was no longer present by 5 years (13). Glucose tolerance improved in participants on the reduced-fat diet and a lower proportion had type 2 diabetes or impaired glucose tolerance at 1 year (47 vs. 67%). Although there were no differences between groups during the following three years, 50% of the intervention group maintained lower fasting and 2-hour glucose at 5 years compared with control subjects. In another worksite nutrition study, Braeckman et al (1999) found that intervention group scores for a nutritional knowledge questionnaire improved significantly after a low-intensity nutrition intervention targeted at lowering cholesterol (14). Additionally, there was a reduction in calorie intake and in the percentage of energy from total fat and an increase in reported intake of carbohydrates and proteins. For all employees assessed, there were no changes in mean cholesterol level or fatty acid composition. The only significant reduction in cholesterol was among participants with high cholesterol (14). In another educational intervention study, worksites were randomly assigned to one of two interventions: a “usual” intervention of five minutes of diet education counseling or a “special” intervention of two hours of behaviorally based education on dietary changes to lower cholesterol (15). Cholesterol levels, measured at baseline, six months and twelve months, showed little difference between the two intervention groups six months after the screening. However, at twelve months those in the special intervention worksites showed a 6.5% drop in cholesterol compared to a 3.0% drop among the usual intervention worksites (15).

## Physical Activity Interventions

*The 2001 Surgeon's Call to Action to Prevent and Decrease Overweight and Obesity* suggested many changes for worksites to implement in order to help decrease the burden of obesity (7). Some of the actions include creating more opportunities for physical activity during the workday and establishment of onsite exercise facilities. Numerous research studies have encouraged the use of stairs as a way for employees to increase their physical activity (16-18). For example, one study used four interventions to increase stair use among employees which included installing new carpet and painting the walls, adding framed artwork on the stair landings, displaying motivational signs, and playing music (16). It was found that both the addition of motivational signs and music appeared to be associated with a modest increase in stairwell use. A similar study involved adding a sign stating "Take the stairs for your health", artwork and music in the stairwell (17). Findings revealed that more participants used the stairs during the music and artwork intervention than when signs alone were used. Coleman and Gonzales (2001) provided culturally relevant health messages to determine whether stair use would increase among a Hispanic community using four intervention sites: an airport, bank, an office building, and a university library (18). The effectiveness of individual and family health messages was also measured. Researchers found that stair use increased in response to both individual and family health promotion signs and use varied by intervention site. Results did not prove that a culturally tailored family promotion message was more effective than an individual promotion message (18).

Many interventions have promoted walking to increase physical activity among employees (19-21). The effectiveness of increasing physical activity among employees by publicly posting walking data (19) was assessed in participants who wore a pedometer and recorded their daily steps for 7 weeks. During a two week baseline period, participants wore a pedometer but had no data posted. The 3-week intervention included posting participant's weekly step counts using code names in a busy location at the worksite. For two weeks after the intervention, data was again not posted. The difference between the baseline steps and those taken during the intervention period was significant. Weekly steps were also significant between baseline and post intervention steps. However, the intervention steps and post intervention steps did not differ suggesting that public posting of physical activity data has the potential to increase walking behavior. Another walking program conducted for 20 weeks resulted in a significant increase in participants' physical activity level, and a significant decrease in mean body mass index (BMI) (20). Surprisingly, even though there a significant decrease in body weight, there was no evidence of the program reducing participants' systolic and diastolic blood pressure. A 3-day pedometer study found that steps/day were inversely related to BMI in all participants and waist circumference in women only (21). There was a low inverse correlation between steps/day and diastolic blood pressure in this sample. Participants who reported a prior diagnosis of one or more components of the metabolic syndrome took fewer steps/day than healthy participants. Also, pedometer-determined steps/day were positively associated with self-reported occupational activity (21).

Some physical activity interventions have used incentives to facilitate behavior change. The American Cancer Society's "Active for Life" was a 10-week physical activity program implemented at ten worksite settings (22). The program's long term impact was measured among employees at six months. Interventions included goal-setting, self-monitoring, incentives, and team competition. Participants set weekly goals for minutes of physical activity and earned a point for each minute. However, participants were scored on goal attainment rather than minutes of exercise. Employees also received extra points for eating at least five servings of fruit and vegetables a day. Self-reported exercise was evaluated by three methods: exercise metabolic equivalents per week (METs), frequency of sweating with exercise, and a stage of change questionnaire. At the end of the program, participants reported significant increases in physical activity, and 75% of those who had been sedentary at baseline were engaging in at least some moderate activity. Unfortunately, at the six month follow-up, physical activity decreased toward baseline levels. March Into May (MIM) was a 10-week physical activity intervention that determined the relationship between perceived barriers and current level of physical activity (23). MIM goals were to encourage employees to engage in moderate physical activity 30 minutes or more on most days of the week and to create a work environment that supports healthy physical activity behaviors. Upon completion of the intervention, participants were administered a physical activity questionnaire that assessed current physical activity level and barriers they encountered during the program. Sufficient physical activity was characterized "as engagement in moderate intensity physical activity 5 or more days a week or vigorous physical activity 3

or more days a week.” Incentives, such as gift certificates and plaques, were given to increase response to the questionnaire. The response rate for completing the questionnaire was 41.47% (N=3945). Respondents who were categorized as sufficiently active for a health benefit accounted for 57.4% of the sample. Lack of self-motivation was the only barrier significantly related to level of physical activity. When lack of self-motivation was a reported barrier, 15% of participants were less likely to be sufficiently active (23).

### Combined Diet and Physical Activity Interventions

Worksite programs combining both diet and physical activity have been effective in reducing risk factors for obesity and coronary heart disease (8,14). The effectiveness of a 12-week wellness program in reducing coronary heart disease risk factors was assessed in a program which followed recommendations from the American Heart Association, American Diabetes Association, and American Cancer Society (8). University employees with at least one cardiovascular disease risk factor participated in the program. Interventions focused on dietary changes, following one of four exercise prescriptions based on individual activity level, and participating in at least four workshops in three months. Significant positive results were observed between baseline and post-intervention for total cholesterol, LDL cholesterol, total cholesterol/HDL cholesterol ratio, triglycerides, and weight. A significant relationship existed between self-reported level of adherence to the diet portion of the program and improvement in

LDL levels. Atlantis et al (2006) determined the efficacy of a worksite intervention targeting obesity and physical inactivity (24). The 24-week intervention included supervised moderate-to-high intensity exercise as well as combined aerobic and weight training. The intervention also included dietary/health education delivered by group seminars and one-on-one counseling. Although there were no significant effects on body weight or body mass index, there were significant improvements in waist circumference and aerobic fitness among employees (24).

## Lifestyle Interventions

### *Interventions Using Behavior Change Models*

There are many behavior change models which have been used to develop interventions for disease prevention and health promotion. These include the social ecological model which takes into account multiple levels of interaction, including the personal, relational (interpersonal), community, and societal interactions and influences on behavior. WellWorks was a 2-year worksite intervention developed on the basis of the social ecological model (25). This intervention included 3 main elements targeting health behavior change: 1) joint worker-management participation in program planning and implementation, 2) consultation by project staff with management on worksite environmental changes, and 3) health education programs targeting individual health behaviors in 24 worksites. WellWorks targeted behaviors such as dietary habits and cigarette smoking. Significant differences were found between intervention and control

worksites in reducing the percentage of calories consumed as fat (2.3% vs 1.5% kcal) and increasing servings of fruits and vegetables (10% vs 4% increase). The intervention also had a significant effect on fiber consumption. However, no significant effects were observed for smoking cessation. The ecological model of change was also used when designing the Health Works for Women intervention (26). Nine small worksites were assigned to either an intervention or a “delayed intervention” group for 18 months. The intervention sites included two strategies: a) individualized computer-tailored health magazines and b) a natural helpers program at the workplace. The delayed intervention worksites were offered a menu of possible health education sessions for their employees on topics not related to study objectives and one individualized tailored magazine. Health behaviors such as physical inactivity, unhealthy diet, smoking, and breast and cervical cancer screening were addressed. At the 18-month follow-up, the intervention group had increased fruit and vegetable consumption by 0.7 daily servings compared to no change in the delayed group. Significant differences in fat intake were observed at 6 months but not at 18 months in the intervention group. This group also demonstrated improvements in strengthening and flexibility exercise compared to the delayed group. However, the rates of smoking cessation and cancer screening did not differ between groups. The tailored messages offered in the intervention group were effective in changing activities such as healthy eating and exercise but they were less effective in smoking cessation and cancer screening activities. The authors suggested that future research activities should focus upon choice as well as positive reinforcers of behavioral changes (26).

### *Weight Loss*

Weight loss has been reported to improve blood pressure, lipid levels, and glucose tolerance among overweight persons with conditions such as hypertension, dyslipidemia, and diabetes (27-28). Oster et al (1999) estimated that a sustained 10% weight loss would reduce the expected years of life with hypertension, hypercholesterolemia, type 2 diabetes, coronary heart disease, and stroke. They also found that lifetime incidence of coronary heart disease and stroke would be reduced and expected lifetime medical care costs of the 5 obesity-related diseases would also decline. A 16-week multidisciplinary cognitive-behavioral weight management program examined the effect of treatment setting on success (28). The program's settings included a medical university (MU), a primary care physician's office (PCP), and a worksite (WS). The average amount of weight loss, body mass index reduction, and number of sessions attended were compared as measures of success. Sessions were taught by a psychologist, a registered dietitian, and an exercise physiologist. The worksite group lost an average of 7.8% of its baseline weight which was almost twice that of the PCP and MU groups. Therefore, the worksite setting appears more effective in promoting changes in weight. Reasons for the worksite having more success than the others include support from group members and spending more time in the environment where weight loss techniques were obtained. The results of this study suggest that employers are making a positive difference when they choose to increase wellness opportunities at the workplace, especially weight loss programs (28).

### *Disease Risk Reduction Programs*

Exercise and dietary interventions have the potential to decrease risk of disease in both worksites as well as the general population (14). The Diabetes Prevention Program included adults who were at high risk for the development of type 2 diabetes (29). Participants were assigned to placebo, the oral hypoglycemic agent - metformin, or lifestyle modification for four years. The lifestyle modification intervention included goals of at least 7 percent weight loss and at least 150 minutes of physical activity per week. The Diabetes Prevention Program Research group found that the incidence of diabetes was lowest in the lifestyle intervention groups (29). The lifestyle intervention reduced the incidence of diabetes by 58% (29-30) as opposed to 31% in the metformin group ( $p < 0.001$ ) (29). Similarly, participants in the Finnish Diabetes Prevention study were advised to reduce weight ( $>5\%$  from baseline weight) and engage in moderate exercise for at least 30 minutes per day (30). The dietary objectives of the program included a total fat intake of less than 30%, a saturated fat intake of less than 10%, and an increase in fiber intake of at least 15 g per 1000 kcal. The cumulative incidence of diabetes after four years was 11 percent in the intervention group and 23 percent in the control group. The reduction in the incidence of diabetes was directly related to changes in lifestyle. The Group Lifestyle Balance (GLB) intervention also used strategies from the Diabetes Prevention Program Intensive Lifestyle Intervention (31). The intervention consisted of 12 weekly sessions, group classes, healthy food choices, emphasis on fat intake and calories, and more emphasis on the pedometer. Nearly half of subjects who participated in a 12 week Group Lifestyle Balance intervention lost at least 5% of their

body weight, and ~1/3 lost at least 7%. A total of 87.5% and 66.7% of subjects sustained the 5% and 7% reductions at the 6 month follow up. Over 1/3 of the population experienced improvements in one or more components of metabolic syndrome, and 73.3% of subjects maintained this improvement at 6 month follow-up. Also noteworthy were significant improvements in waist circumference, blood pressure, triglycerides, and HDL cholesterol levels (31).

Japanese males in a diabetes prevention study were informed that engaging in a healthy lifestyle, particularly maintaining BMI, is the most important way to prevent diabetes (32). Selected participants with impaired glucose tolerance were assigned to a standard diet and exercise intervention (control) to achieve a healthy weight or an intensive intervention (intervention group). The standard intervention group was advised to maintain a body mass index of  $<24 \text{ kg/m}^2$ , while the intensive intervention group aimed for a body mass index of  $<22 \text{ kg/m}^2$  and were given detailed instructions on lifestyle which were repeated every 3-4 months. The 4-year incidence of diabetes was 9.3% in the control group, and 3.0% in the intervention group. Body weight was decreased by 0.39 kg in the control group and 2.18 kg in the intervention group. The Good Ageing in Lahti region (GOAL) program used the lifestyle objectives from the Diabetes Prevention Study (33). At the 1 year follow-up, diastolic blood pressure, weight, and BMI significantly decreased among men and waist circumference decreased among men and women. Mean fasting plasma glucose level increased slightly, although with statistical significance among women. Despite the increase, it remained within normal range. A further analysis showed a significant effect on changes in 2-hour

glucose levels: an increase among participants with normal glucose tolerance at baseline but a decrease among those with baseline impaired glucose tolerance. Twenty percent of participants accomplished at least four of five key objectives at 12 months. However, physical activity and weight loss objectives were attained significantly less frequently than objectives targeting dietary intake (33).

The Coronary Health Improvement Project (CHIP) worksite intervention was created with a goal of reducing atherosclerosis-related diseases. (34). Employees at six worksites received instruction twice a week via 15 CHIP video tapes for 8 weeks. Along with the video instruction, participants were encouraged to follow a plant food-based optimal diet and to walk or exercise at least 30 minutes a day. Significant reductions in body weight, body mass index, total cholesterol, low-density lipoprotein cholesterol, triglycerides, and fasting blood glucose were demonstrated at all worksites. However, men demonstrated greater improvement than women, and participants with higher baseline health risks experienced the greatest reductions in risk. The *Take Heart* worksite heart disease risk reduction program design was based on the Stages of Change Model (35). This intervention, which did not include exercise, assigned early or delayed intervention conditions to twenty six worksites. Intervention activities for employees in the stages of precontemplation and contemplation focused on the risks of high cholesterol and smoking and ways to reduce these risks by changes in nutrition and tobacco use. For employees in the later stages, class topics included how to alter dietary and/or tobacco use behaviors and how to maintain these healthy behaviors. At the conclusion of the *Take Heart* program, neither the early nor the delayed intervention conditions resulted in

changes in smoking rates, dietary intake, and cholesterol levels. This program may be effective with a more intensive or longer term intervention (35).

### Conclusions

The purpose of this review was to examine the state of the literature for worksite interventions published after 1995 which focused upon chronic disease risk prevention, with an added focus on articles which would aid in the development of a pre-diabetes worksite intervention. Five nutrition, 8 physical activity, 2 diet and physical activity, and 5 lifestyle interventions met the selection criteria. Almost all reviewed studies demonstrated risk factor improvement for chronic diseases such as diabetes, obesity, heart disease, and cancer. The length of the interventions varied from 3 days to 224 weeks. All stated sample sizes were greater than 30. However, 2 studies did not specify their sample size. Physiological outcome measures included weight, body mass index, waist circumference, blood pressure, total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, total cholesterol/HDL cholesterol ratio, triglyceride level, and blood glucose level. Psychological outcomes assessed consisted of social support, self-efficacy, attitude, and Stages of Changes. Some interventions used behavioral outcomes such as diet and/or physical activity modifications, smoking cessation, and cancer screening. One study involved used a nutritional knowledge questionnaire. All outcome measures were statistically significant unless noted in Tables 1.1-1.4. Some negative outcomes did occur and one disease risk reduction program had

no success at reducing heart disease risk. Two studies (one nutrition and one physical activity intervention) indicated positive post intervention results that were no longer present at follow-up. Three lifestyle interventions were unsuccessful at promoting smoking cessation.

One nutrition intervention and one lifestyle intervention involved only males and another exercise intervention and lifestyle intervention included only females. Three studies with both male and female participants indicated a difference in outcomes between sexes. One exercise intervention was more beneficial to females and two lifestyle interventions had a more positive impact among men.

This review indicates that worksites provide an opportunity to reduce chronic disease among many individuals. The benefits of a worksite health promotion program include fewer days missed at work, increased productivity, and reduced cost of health care expenditures. Many of the reviewed articles did not have success with all variables examined. However, this is not unexpected. This suggests that future worksite interventions need to clearly identify the outcome measurements and tailor the intervention to be realistic and appropriate to all aspects of an individual's lifestyle to be effective.

The nutrition interventions that were short term had the most success. However, a one year study found a significant reduction in cholesterol among employees receiving behaviorally based nutrition education. Physical activity interventions that were successful included the following goals: increasing stair use and walking steps among employees. Similar to the nutrition interventions, the diet and physical activity

intervention with the shorter intervention period showed better outcomes. The short term lifestyle interventions indicated more positive outcomes.

One limitation of this review is that 13 of the 20 studies reviewed were physical activity or lifestyle worksite interventions. Therefore, there is little data to support the impact of worksite nutrition interventions and combined nutrition and physical activity interventions. Reasons for the results may include that the literature search did not examine articles published prior to 1995, indicating a selection bias. Also, due to lack of worksite lifestyle intervention articles in the literature, five of the lifestyle interventions presented in the discussion were not implemented at worksites. However, they were included to indicate the positive impact of lifestyle interventions that could potentially be adapted to worksites.

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## CHAPTER THREE

### EXAMINATION OF PRE-DIABETES AND DIABETES PERCEPTIONS AND KNOWLEDGE USING FOCUS GROUPS

#### Abstract

Four focus groups were held among employees at a worksite in rural upstate South Carolina, 20 (66.67%) of whom were female. Discussions covered eating and exercise behaviors, weight management, and diabetes knowledge. Data analysis revealed 12 major themes: desired activities, nutritional knowledge, dietary behavior, feelings about exercise, exercise barriers, thoughts about body weight, weight management behavior, barriers to successful weight management, motivations for weight management, support for weight management, knowledge about pre-diabetes and diabetes, and success of worksite diabetes prevention program. Focus group participants gave suggestions on the future development of a diabetes prevention program for their worksite. Recommendations for a diabetes prevention program at this worksite include development of an intervention that incorporates motivational interviewing to assist participants with behavior change, nutrition and diabetes knowledge classes, and cooking classes. A walking incentive program may also be appropriate for this worksite.

## Introduction

Approximately 20.8 million people in the United States have diabetes and of those, 6.2 million are undiagnosed (1,2). Ninety to 95 percent of people with diabetes have type 2 diabetes, which is more common in individuals with a family history of the disease and members of certain ethnic groups such as African American, Hispanic, American Indian, and Alaska Native adults (2, 3). The main environmental risk factors for type 2 diabetes are obesity, physical inactivity, and a high-fat diet rich in saturated fatty acids; with low intakes of dietary fiber, whole-grain cereals, and low-glycemic carbohydrates also associated with increased risk (4) Diabetes can lead complications such as heart and blood vessel disease, blindness, kidney failure, and foot ulcers (5).

Pre-diabetes is a condition that occurs when the blood glucose levels are higher than normal but not high enough to be diagnosed as diabetes (6). It is also called impaired fasting glucose (IFG) or impaired glucose tolerance (IGT). People with IFG and IGT are at increased risk for developing type 2 diabetes, heart disease and stroke. Pre-diabetes is becoming more common in the United States, according to new estimates provided by the U.S. Department of Health and Human Services (1). In 2003 to 2006, 25.9 percent of U.S. adults aged 20 years or older had IFG. 35.4 percent of these adults were 60 years or older (7). This suggests that at least 57 million American adults had pre-diabetes in 2007. Those with pre-diabetes are likely to develop type 2 diabetes within 10 years, unless they take preventive action (1).

More than 100 million Americans spend the majority of their day at the worksite (8). Thus, worksite health promotion programs can be an efficient way to improve the health of a large group of individuals (9). Worksite interventions are convenient and accessible for workers and often less expensive than programs available in clinical settings. Opportunities such as policy changes, work structure, benefits, incentives, healthy food offerings, and physical activity can provide healthy options for employees (10). The purpose of this study was to explore views of employees who are at high risk for diabetes as part of a needs assessment which can then be used to help with the development of a diabetes prevention program to reduce diabetes risk. Research questions included the following: 1) What is the pre-diabetes and diabetes knowledge of the Focus Groups' participants? 2) What are the attitudes, beliefs and perceptions of SC worksite employees toward eating habits, physical activity and weight management? and 3) Which personal, environmental and behavioral factors impacting South Carolina worksite participants are important to the development of an effective diabetes education and prevention intervention?

## Methodology

### Setting

This study was conducted at a fabric manufacturing plant employing approximately 750 employees in rural upstate South Carolina between June and August

2008. All participants, identified by the onsite health care professionals, were considered at risk for developing type 2 diabetes based on their family history or lab results. The employee census consists of a population which is primarily Caucasian or African American, with a minimum of a high school degree. Nursing staff indicated that approximately 80 percent are overweight and 35 percent have diabetes. Focus groups were conducted in a conference room at the plant during the day shift.

### Participant Selection

Twenty-nine employees participated in the four focus groups. Each focus group consisted of 6-9 men and women. Plant nurses, working with research team, recruited participants at the worksite and the first three focus groups were conducted within two days after recruitment. The fourth focus group was recruited and completed to ensure data saturation. The moderator began the sessions by reading aloud the written consent form (see Appendix A) which was approved by Clemson University Institutional Review Board. All recruited participants agreed to participate in the study. The moderator assured the participants there were no correct or incorrect answers, that everyone's opinion was important, and that what was said in the groups was to remain confidential. The moderator was trained on how to make the participants feel comfortable and willing to reveal honest answers. An assistant moderator took notes and tape recorded the sessions which lasted approximately 90 minutes.

## Focus Group Interview Guide

The focus group interview guide (see Appendix D) was organized by the following constructs of Social Cognitive Theory: personal factors, environmental factors, and behavioral factors (11). Social Cognitive Theory posits that human behavior can be explained as “triadic reciprocal causation” which means the three aspects of behavior, the person, the environment, and the behavior itself, affect each other in a dynamic, reciprocal fashion (12). The research team established Content validity of the focus group guide through a literature review of diabetes interventions and by consensus. The moderator and assistant moderator then evaluated and pilot tested the guide among university faculty and students. Because the first three focus groups revealed a saturation of data for some questions but inadequate responses for others, the research team modified the guide for the fourth focus group (see Appendix E). The modifications in the guide included rearrangement of the topics, the addition of relevant information in transition statements, and deletion of questions yielding repeated responses.

## Questionnaires

The research team also used questionnaires to determine participants’ knowledge about pre-diabetes. The questionnaire (see Appendix C) included 4 multiple choice questions and 5 true/false questions. Because the team did not administer the questionnaires on the same day of the first three focus groups were conducted, the total

number of participants who attended all 4 focus group sessions does not match the total number of questionnaires completed due to one participant's absence from the first focus group session. Participants in the fourth focus group completed a demographic questionnaire (see Appendix B) and a diabetes knowledge questionnaire prior to the group discussion.

The moderator and assistant moderator administered a demographic questionnaire to determine the attributes of the focus group participants which included sex, age, race, marital status, occupation, and household income.

### Data Collection and Analysis

Demographic data were analyzed using Statistical Analysis Software (SAS, Version 9.1). The research team used the *The Focus Group Kit* by Morgan and Krueger (13) to guide development of focus group questions, moderation of the focus groups, and analysis of the results. The team also used NUD\*Vivo 7, a software program, to code and organize data analysis, (NVivo, QSR International Pty. Ltd, Melbourne, Australia, 2006). An analysis table (see Appendix F) was used to compare and contrast data from all focus groups. The co-investigator coded key phrases into a framework based on the questioning structure and identified themes and subthemes. The research team discussed and reached agreement on the modification of categories and themes.

## Results

### Demographic Characteristics

The sample of 30 participants was predominantly female (66.67%). Ten (33.33%) participants were 35-44 years of age, with 26.67% aged 45-54, and 30% aged 55-64. The participants were Caucasian (70%), Black (26.67%), and Hispanic (3.33%). The participants were mostly nonsmokers (86.67%) and 90% percent were either married or separated/divorced with only 10% never having been married. The educational attainment for the participants was mostly completion of high school/GED (44.67%) and some college (36.67%). However, 13.33% completed college or graduate/professional school. Sixty percent of the participants were skilled workers and 23.33% had administrative jobs. Eighty percent of the participants household income was <\$50,000. Over half (58.62%) of the participants had only 1 to 2 people living in their household. More than half (60%) of the participants were categorized as obese based on body mass index. Only 16.67% were categorized in the normal body mass index category. The average body mass index was 31.58. Other demographic characteristics can be found in Table 2.1.

Table 2.1: Demographic Characteristics of Participants

<u>Variable</u>	<u>Values</u>	<u>Frequency (Relative Frequency)</u> N=30
Sex	Total Female	20 (66.67%)
	Total Male	10 (33.33%)
	<u>Group 1</u>	
	Female	5
	Male	1
	<u>Group 2</u>	
	Female	6
	Male	2
	<u>Group 3</u>	
	Female	5
	Male	1
	<u>Group 4</u>	
Female	4	
Male	5	
Age Group	25-34	3 (10%)
	35-44	10 (33.33%)
	45-54	8 (26.67%)
	55-64	9 (30%)
Race	Caucasian	21 (70%)
	Black	8 (26.67%)
	Hispanic/Latino	1 (3.33%)
Smoke	Yes	4 (13.33%)
	No	26 (86.67%)
Body Mass Index	Normal	5 (16.67%)
	Overweight	7 (23.33%)
	Obese	18 (60%)
Marital Status	Married	14 (46.67%)
	Separated/divorced	13 (43.33%)
	Never married	3 (10%)
Education	Less than 12 <sup>th</sup> grade	1 (3.33%)
	Completed High School/GED	14 (46.67%)
	Some college	11 (36.67%)
	Completed college	4 (13.33%)
Occupation	Skilled worker	18 (60%)
	Office personnel	2 (6.67%)
	Administration	7 (23.33%)
	Health care professional	1 (3.33%)

	Other	2 (6.67%)
Household Income	\$20,000-29,000	7 (23.33%)
	\$30,000-39,000	9 (30%)
	\$40,000-49,000	8 (26.67%)
	\$50,000-59,000	1 (3.33%)
	\$60,000-69,000	3 (10%)
	\$70,000-79,000	
	>\$80,000	2 (6.67%)
# in household	1	7 (24.14%)
	2	10 (34.48%)
	3	7 (24.14%)
	4	3 (10.34%)
	5	1 (3.45%)
	6	
	7	1 (3.45%)
# under 18 years of age	0	19 (65.52%)
	1	3 (10.34%)
	2	5 (17.24%)
	3	1 (3.45%)
	4	
	5	1 (3.45%)
# over 65 years of age	0	27 (93.10%)
	1	
	2	2 (6.9%)
State of Residence	SC	23 (76.67%)
	GA	7 (23.33%)
Population of residence	Farm	4 (13.33%)
	Town of less than 10,000 people or rural non-farm	11 (36.67%)
	Town or city with 10,000 to 50,000 people or their suburb	13 (43.33%)
	Suburb of city with over 50,000	2 (6.67%)

One participant did not indicate information such as number in household, number in household over age 18, and number in household over 65 years of age. Therefore, the total frequency does not match among all variables in the table.

## Participant Knowledge of Pre-diabetes

Focus group participants had an average score of 5.799/9 on the pre-diabetes knowledge questionnaire. Ninety percent of participants were knowledgeable about the diabetes diet. Sixteen participants (53.3%) identified the fasting plasma glucose level that would classify someone as having pre-diabetes but only 40% were aware of the normal fasting glucose level (<100 mg/dL). More than half incorrectly identified the normal fasting blood glucose level to be between 100-125 mg/dL. Only 36.7% of participants knew an individual with pre-diabetes would most likely develop type 2 diabetes. Eleven participants (36.67%) believed that pre-diabetes would lead to type 1 diabetes. Participants answered more true/false (than multiple choice) questions correctly. However, there were 5 participants who left true/false questions blank and percentages were calculated based on the number of participants who answered the question. Based upon the true/false questions, all participants knew that people with pre-diabetes could avoid developing type 2 diabetes by making diet and exercise lifestyle changes. Twenty participants (76.92%) perceived that people with pre-diabetes usually have no symptoms. Sixty-eight percent knew that 57 million people in the United States have pre-diabetes. Ninety-two percent of participants understood that you should be checked for pre-diabetes if you are overweight and age 45 or older. Twenty participants (76.92%) were aware that 23.6 million people in the United States have diabetes.

## Focus Groups

### *Theoretical Framework and Themes of the Study*

The emerging themes were organized by concepts of Social Cognitive Theory: personal factors, behavioral factors, and environmental factors. Figure 2.1 depicts the relationship among the themes and the following discussion describes the themes and provides examples of descriptive quotes. The focus group data analysis produced 12 major themes: Desired activities, nutritional knowledge, dietary behavior, feelings about exercise, exercise barriers, thoughts about body weight, weight management behavior, barriers to successful weight management, motivations for weight management, support for weight management, knowledge about pre-diabetes and diabetes, and success of worksite diabetes prevention program.

### *Personal Factors-Desired Activities*

Participants valued life activities such as reading, spending time in the yard, sewing, hunting, fishing, riding a four wheeler, playing the piano, working on cars playing with kids or grandchildren, and cooking. Physical activities mentioned included basketball, baseball, badminton, skating, and bowling. When asked to describe a healthy person, consistent statements were made in all four groups. The consensus was that it was someone who is active and eats right. However, 2 groups also portrayed a healthy person as not overweight. All groups mentioned that they take care of their health by walking or participating in some type of exercise and trying to eat healthy.

### *Personal Factors-Nutritional Knowledge*

Participants were knowledgeable about foods considered to be healthy and unhealthy. Healthy foods such as meat, fruit, and vegetables were cited in three groups. Specific meats mentioned were chicken and fish. Other healthy foods listed were dairy products, salad, and grains. Unhealthy foods participants talked about were fast food, fried food, and sweets. In one group, health food was described as “junk food” and “all the good stuff”. Participants in all three groups indicated they needed to consume more fruits and vegetables. Two groups felt they should also consume more fish. Only one group indicated a need to consume more grains. However, one group was concerned whether consuming a lot of fruit could lead to diabetes. All three groups believed their diet needed to consist of less fried foods and fast food. Other unhealthy foods mentioned were starches, sweets, beer, and sweet tea. (Group 4 was not asked nutritional knowledge questions but indicated nutritional knowledge in discussion of healthy foods in vending machines.)

### *Environmental Factors-Dietary Behavior*

Even though appetite and taste were mentioned by respondents, most food influences were environment-related. One group stated their environmental influences to be grandchildren, work, and friends with whom they eat lunch. Participants made the following statement about how their work environment influences their eating habits:

*“I don’t eat as much at work like I do on like Saturday and Sunday because I’m busy (and) not picking up eating when I go by the cookie jar or candy jar.”*

*“you eat a lot of things at work that you don’t eat at home.”*

*“people bring cakes into the break room”*

Employees had many suggestions to help them have healthier eating habits. Two groups mentioned the importance of more time when eating healthy. They believed that it is better to eat small frequent meals but did not have enough time to incorporate this change. One group expressed a concern with what is in food and two groups declared that organic/healthy foods are too expensive. A few participants suggested that having a list of healthy foods would help them eat healthier. Other ideas included; better taste of healthy foods, better work schedule, having someone cook for them, bad news from the doctor, and how to become motivated to eat healthier. Three groups suggested that the worksite have healthier food in the vending machines and provide an onsite cafeteria. One participant stated, “it probably would save them (the worksite) a lot on their insurance too and there wouldn’t be as many unhealthy people out there.”

#### *Personal Factors-Attitudes about Exercise*

Many participants had negative feelings about the word “exercise.” Two groups described it as “hard work”, “sweating”, “pain”, “hot”, “feel tired just thinking about it”, “don’t want to do it”, and “Oh no!” One participant responded with the following statement:

*“I promise myself that at least once a month that I’m going to either get up early enough to walk or exercise or leave early enough to walk or exercise and I lie to myself every month.”*

Although many participants had negative views about exercise, participants from two focus groups described it as getting the heart rate up, walking is the best exercise, and all exercise is done at work and home cleaning. Many participants incorporated physical activity into their daily life. These activities included doing yard work, cleaning the house, and playing with grandchildren. However, one participant indicated uncertainty about the term physical activity because the activity that he/she reported as enjoyable was watching television.

#### *Environmental Factors-Exercise Barriers/Strategies*

Even though many participants engaged in exercise, they experienced many barriers. All focus groups mentioned time as a barrier to exercising. They felt daily activities such as work, taking care of a family member, and living far away from work, prevented them from exercising. Other barriers were health related such as swelling of the ankles and no energy. However, participants suggested many ways to add physical activity into daily life. Suggestions included getting a friend, exercising with family, taking the stairs, setting aside 30 minutes for it, and setting a goal. One participant expressed that exercise takes discipline in the statement, “you have to train your mind”.

When asked how to add physical activity into their workday, two groups felt they did not need to increase their activity level due to the intense physical labor and constant movement associated with their jobs. However, three groups suggested walking during breaks and taking the stairs. Two groups felt they would also benefit from an onsite

fitness center. Participants preferred to receive exercise information by email, handouts, pamphlets, or by viewing bulletin boards throughout the workplace.

#### *Personal Factors-Attitudes about Body Weight*

All groups revealed negative feelings when asked how they felt about their weight. They responded with comments such as, “I want a new body”, “I hate it”, “there could be improvement” and, “I need to lose weight”. One participant mentioned he was comfortable with his weight except when tying his shoes. Another indicated disappointment in the statement, “mine just goes up and up and I promise myself I am going to get rid of those extra pounds but it doesn’t work.”

#### *Behavioral Factors-Weight Management Behavior*

Participants mentioned engaging in many health behaviors to manage their weight. Many had tried diets such as Weight Watchers, the low carbohydrate diet, high energy diet, consuming whole wheat bread, and eating a balanced meal. Two groups’ solution to losing weight was “cutting back on eating”. Some described the low carbohydrate diet as “bad for you”, and “it makes you feel bad all the time”. However, one participant mentioned an unhealthy eating behavior in the comment, “I have tried starving, not eating as much, being hungry all the time but I did that and it’s not a good way to go”. Some participants had also just started to exercise and others mentioned they had no time for it anymore.

### *Personal Factors-Barriers to Successful Weight Management*

Many participants encountered many problems when trying to manage their weight. Three groups mentioned a lack of self-discipline and willpower prevented their success. Other barriers included having a child, lack of motivation, procrastination, and a feeling of deprivation from food.

### *Personal Factors-Motivation for Weight Management*

All groups indicated that being at healthy weight was important. When asked what has helped them to make changes, motivators were mostly health related. Participants indicated they had attempted changes in their lifestyle to prevent the development of diabetes and other chronic diseases. Participants in one group had a family history of diabetes and knew they were also susceptible to the condition. Other things that motivated respondents to manage their weight included wanting to live to see children grown, looking at self, bad news from doctor, and how their clothes fit.

### *Environmental Factors-Support for Weight Management*

Participants stressed the importance of environmental support to achieve a healthy weight. One group mentioned changes in their worksite environment would be beneficial to their health behavior. They preferred to have healthier foods in vending machines and access to a cafeteria with a salad bar. Three groups agreed that weight management counseling was a good approach to help motivate them. When participants were asked what topics they would prefer in a counseling session, three groups suggested putting

together a recipe book. Two groups indicated they would like to receive instruction on reading food labels. Other topics discussed were what to eat and what not to eat and which healthy foods taste good.

#### *Personal Factors-Knowledge about Pre-diabetes and Diabetes*

Most groups believed that weight was related to diabetes. However, one participant made the comment that diabetes is associated with weight “when you have it later in life but not when you are young and not overweight”. All groups indicated diabetes affects major organs in the body such as kidneys, pancreas, and eyes. Two groups mentioned the condition is also accompanied by dizziness and lack of energy. However, there was not a consensus among participants whether diabetes was preventable or not. Respondents indicated a lack of knowledge about diabetes in the comments such as, “What is pre-diabetes?”, and “What is A1C?” All groups believed they needed to be further educated about eating healthy to prevent diabetes. One group specifically wanted to know the relationship between carbohydrates and diabetes. All groups agreed that diabetes would affect their work and lifestyle.

#### *Environmental Factors-Success of Worksite Diabetes Prevention Program*

Two groups indicated a need for an onsite fitness center and cafeteria with salad bar. Participants suggested implementing a program similar to Weight Watchers. Other suggestions included being taught how to prepare healthy meals, being informed about nutrition and exercise, and diabetes education. When asked what would encourage

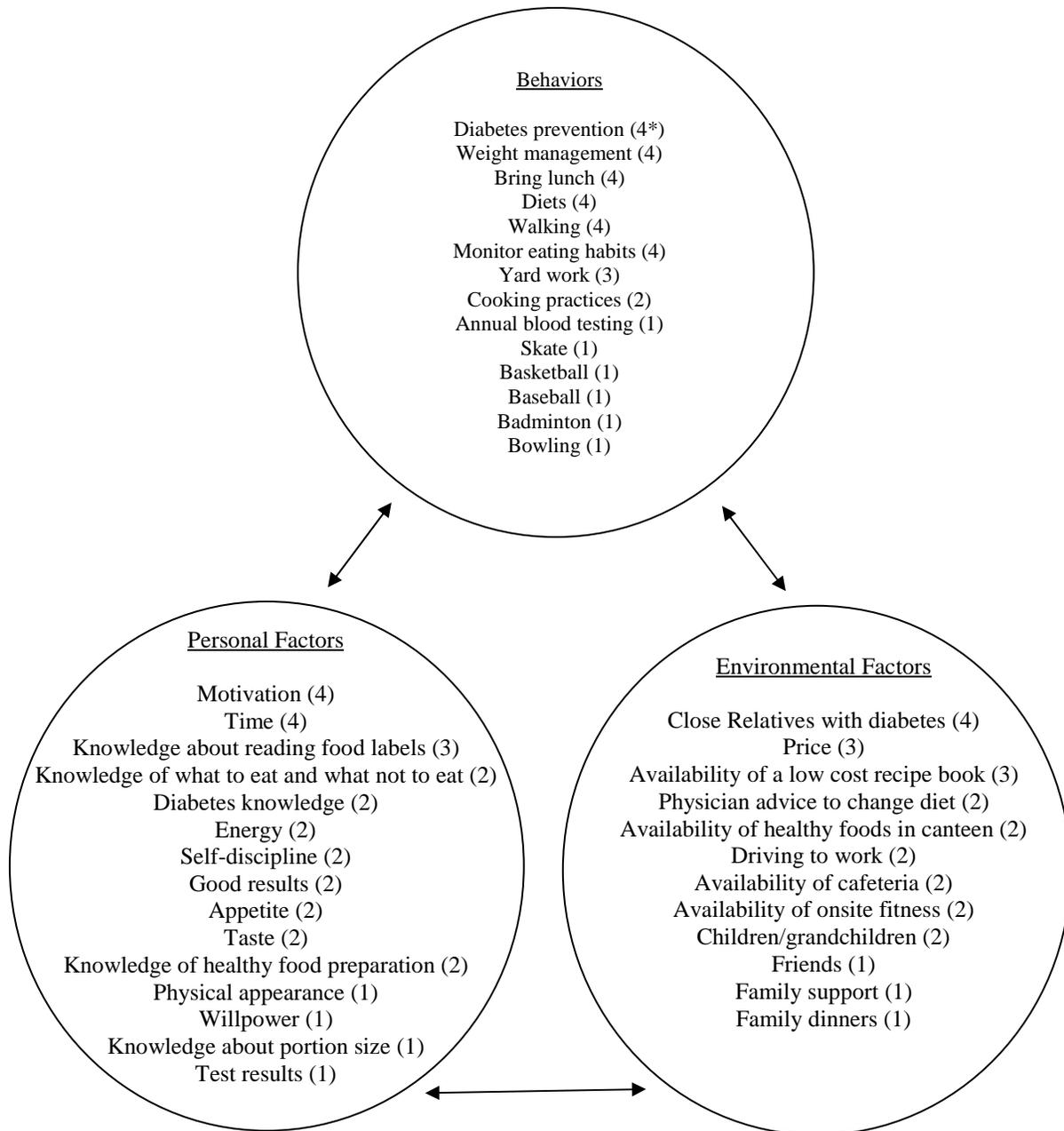
participation in such a program, one group mentioned an affordable recipe book and incentive. Another group discussed the importance of talking to someone who experienced good results as motivation. Participants made the following statements regarding concerns they would want addressed in a diabetes prevention program.

“moral support is a big issue everyone can’t afford Weight Watchers food”

“my biggest problem is self control on that second plate because I am a man and I like to eat if I could control that and get that down to one plate”

Figure 2.1: Diet and Exercise Practices Organized by Social Cognitive Theory

Constructs



\*Number of focus groups in which the theme was mentioned

## Discussion

This study indicates that a diabetes prevention program at this worksite should be a high priority due to the high percentage (60%) of focus group participants identified as obese or overweight (23%). These participants are at high risk for developing diabetes because obesity is a strong risk factor for pre-diabetes and diabetes. The results from the diabetes knowledge questionnaire also indicate the need for diabetes education in a program at this worksite.

Participants appeared to be concerned with nutrition related health issues, including diabetes, hypercholesterolemia, hypertension, and hypertriglyceridemia. This study revealed that the main barriers to healthy eating habits were price, taste, and accessibility at work. Similar to a focus group study by Gates et al (2006), participants discussed the lack of healthy food choices in the vending machines (14). They suggested the addition of a cafeteria and salad bar would improve their eating habits.

Participants were also concerned with barriers they experience to engaging in exercise. Personal barriers such as lack of motivation, lack of energy, and time were mentioned during all focus group session. Participants also expressed the effect external forces have on their behavior such as family, work, and physician advice. Respondents also indicated they would benefit from an onsite exercise facility, although others wondered if everyone would take advantage of this opportunity.

Participants in this study also indicated a lack of knowledge concerning healthy food choices and diabetes and wanted to learn how to read food labels, determine portion

sizes, prepare healthy foods, and stay motivated. They suggested developing a recipe book or implementing a program similar to Weight Watchers. Participants revealed that they could be encouraged to participate by incentives or seeing positive results in previous program completers. Participants were enthusiastic about having a diabetes prevention program at their worksite as a way of addressing these problems and implementing these potential solutions. And as one participant noted, the costs to the company of such a worksite program (or cafeteria or exercise facility) could be offset by savings from the lower healthcare expenses of healthier employees.

Although participants reported engaging in many healthy behaviors, their responses also indicated difficulty with maintaining behavior change. Many participants made statements that indicated there was an inconsistency between attitude and behavior. A worksite program could include behavioral techniques such as motivational interviewing. Motivational interviewing is a method for assisting individuals to work through their ambivalence about behavior change (15), and this intervention has been shown to be effective in promoting changes in diet and physical activity (16). Strategies from the Stanford Chronic Disease Self-Management Program could be incorporated into a future diabetes prevention program at this worksite (17). Classes involve mutual support and success which increase participants' self-efficacy about managing their health as well as maintaining active lives. Other characteristics of a future worksite program may include diabetes and nutritional knowledge classes and cooking classes.

A walking incentive program could also be suitable, especially as all four focus groups expressed enjoyment of walking. "Steps to a Better You" is an example of a

successful worksite walking incentive program that could be modified to meet the needs of this worksite (18). This intervention provided incentive to participants who met minimum physical activity levels as recommended by the Centers for Disease Control and Prevention. Each participant earned a point for every minute spent doing moderate-intensity physical activity. At the end of the program, participants who met their goal received a prize. A modified version of “Steps to a Better You” could separate employees into teams and have a competition to determine which group earns the most points. The winning team could receive prizes such as free gym memberships, gift certificates, or free cooking classes.

Potential limitations of this study include the higher percentage of female participants (67% versus 46% onsite), and percentage of Caucasian participants (70%). Also, although focus group responses are to be confidential, some of the responses given by participants may have been influenced by others’ comments, what is socially acceptable, or a concern of non-confidentiality among participants. While the focus group participants mentioned the impact of family members and others upon their dietary and physical activity behaviors, this study might benefit from including the health behaviors of family members of the participants. Future participant selection could include recruitment of a more equal male to female ratio, targeting employees from different ethnic backgrounds.

## Conclusions

The findings of this study enhance the understanding of the personal, behavioral, and environmental factors that affects health behaviors, especially regarding proper nutrition and exercise, among employees at a worksite in South Carolina. Participants seemed enthusiastic about making changes at their workplace that would help them make positive lifestyle changes. Factors such as time, motivation, energy, price, taste, and nutritional knowledge were identified as barriers that need to be addressed in an intervention at this worksite. Participants also expressed concern with other environmental influences such as work, family, and friends further emphasizing the need for program components that focus on maintaining healthy lifestyle behavior changes. This focus group study was an essential step for the development of a successful diabetes prevention program at this worksite in the future. Using the knowledge gained from this focus group study, future efforts can engage the enthusiasm shown by the participants for a diabetes prevention program while targeting potential barriers to success.

## Implications for Future Research

This focus group study appears to be an essential step to the development of a successful diabetes prevention program at this worksite. Implications for future research include building self-efficacy among program participants by creating successful experiences. Implications for practitioners include assisting participants in behavior

change strategies that are tailored to each individual as well as diabetes knowledge. All study participants indicated they were aware of how to perform healthy behaviors but had difficulty with behavior change.

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## APPENDICES

## Appendix A

### Consent Form for Focus Group Study

#### **Consent Form for Participation in a Research Study Clemson University Examination of Pre-diabetes and Diabetes Perceptions and Knowledge Focus Groups Interview**

##### **Description of the research and your participation**

You are invited to participate in a research study conducted by Dr. Vivian Haley-Zitlin, Principal Investigator and Ms. Caroline Carter (graduate student) from the Department of Food Science and Human Nutrition at Clemson University. The purpose of this research study is to explore the perceptions and knowledge of Glen Raven Custom Fabrics' employees about pre-diabetes and diabetes and the nutrition and exercise related risk factors for pre-diabetes and diabetes.

Your participation will involve explanation of the study and the discussion of topics raised by the moderator. These topics will include health behaviors, such as nutrition and exercise knowledge and practices, which may have an influence on pre-diabetes and diabetes. Pre-diabetes and diabetes related topics will also be discussed.

The group will gather around this table and I will collect opinions on the topics discussed. There are no correct or incorrect answers as all we are looking for is your opinion and comments related to this topic. The interview sessions will be audio tape recorded and a research recorder will take notes during the session. The amount of time required for your participation will be 60-90 minutes.

##### **Risks and discomforts**

There are no known risks associated with this research. You may be uncomfortable discussing some topics and you are free to not answer any questions that you chose. We cannot guarantee that focus group participants will maintain the confidentiality of other participants. We request that participants do respect the privacy and confidentiality of others who take part in the groups.

##### **Potential benefits**

There are no known benefits to you that would result from your participation in this research. However, this research may help us to understand more about the health and nutrition habits and needs of Glen Raven Custom Fabrics employees so that we can help prevent pre-diabetes and diabetes.

##### **Cost**

There is no direct cost to you. You will participate in a drawing for a gift certificate at the end of this session.

**Protection of confidentiality**

We will do everything we can to protect your privacy and whatever you say during the discussion. No full names will be used during the discussion. Only the principal investigator and the graduate student will have access to the tapes, a list with your name and the information you provide. Only members of this research team will handle and transport the tapes with the data and the signed informed consent forms. The tapes, consent forms and a list with the research codes and participant names will be stored in a locked file cabinet in the principal investigator’s office at Clemson University. Tapes and notes containing the data will be destroyed when the research is completed. All data will remain under the investigator’s control, with research information kept on a computer that only the researchers have access. Your identity will not be revealed in any publication that might result from this study.

In rare cases, a research study will be evaluated by an oversight agency, such as the Clemson University Institutional Review Board or the federal Office for Human Research Protections, which would require that we share the information we collect from you. If this happens, the information would only be used to determine if we conducted this study properly and adequately protected your rights as a participant.

**Voluntary participation**

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

**Contact information**

If you have any questions or concerns about this study or if any problems arise, please contact Dr. Vivian Haley-Zitlin at Clemson University at 864-656-7716. If you have any questions or concerns about your rights as a research participant, please contact the Clemson University Office of Research Compliance at 864.656.6460.

**Consent**

I have read this consent form and have been given the opportunity to ask questions. I give my consent to participate in this study.

Participant’s signature: \_\_\_\_\_ Date: \_\_\_\_\_

A copy of this consent form should be given to you.

## Appendix B

### Demographic Questionnaire

PLEASE CHECK THE APPROPRIATE ANSWER FOR THE FOLLOWING:

1. What is your age group? *(please check one)*  
 18-24 years old     25-34 years old     35-44 years old  
 45-54 years old     55-64 years old     65 years old and over
  
2. I would best describe myself as:  Female  Male *(please check one)*  
*(please check one)*  
 Black/African-American     Asian  
 Caucasian     Hispanic/Latino  
 Other *(please describe)* \_\_\_\_\_
  
3. What is your current weight? \_\_\_\_\_ What is your height? \_\_\_\_\_
  
4. Do you smoke cigarettes?  Yes  No. How many cigarettes do you smoke each day? \_\_\_\_\_
  
5. What is your marital status? *(please check one)*  
 Never married     Married  
 Separated/Divorced     Widowed
  
6. What is your highest education level completed? *(please check one)*  
 Less than 12<sup>th</sup> grade  
 Completed High School/GED  
 Some College or Vocational School Training  
 Currently attending college (4 year Bachelor degree)  
 Completed college (4 year Bachelor degree)  
 Currently attending Graduate School (Masters, Ph.D., M.D., etc.)  
 Completed Graduate or Professional School
  
7. Please check the one(s) which apply to you:  
 Employed full-time     Employed part-time
  
- Occupation:  
 Skilled worker     Office personnel  
 Administration     Health care professional  
 other \_\_\_\_\_ *(please specify)*
  
8. What is the approximate level of your household income before taxes? *(please check one)*  
 Under \$9,999     \$10,000 – 19,000  
 \$20,000 – 29,000     \$30,000 – 39,000  
 \$40,000 – 49,000     \$50,000 – 59,000  
 \$60,000 – 69,000     \$70,000 – 79,000  
 Above \$80,000
  
9. Please list the state you are from or that you consider home. \_\_\_\_\_
  
10. Number of people in household: \_\_\_\_\_

11. Number of people in household under 18 years of age: \_\_\_\_\_; over 65 years of age: \_\_\_\_\_

12. Place of residence:

\_\_\_\_\_ Farm

\_\_\_\_\_ Town of less than 10,000 people or rural non-farm

\_\_\_\_\_ Town or city with 10,000 to 50,000 people or their suburb

\_\_\_\_\_ Suburb of city with over 50,000

\_\_\_\_\_ Central city over 50,000

## Appendix C

### Pre-diabetes Knowledge Questionnaire

Please mark the best answer. **(Answers indicated in bold)**

1. A normal fasting blood glucose level is  
 <100 mg/dL.  
 100-125 mg/dL.  
 140-199 mg/dL.  
 >200 mg/dL.
  
2. The diabetes diet is:  
 the way most American people eat.  
 **a healthy diet for most people.**  
 too low in carbohydrate for most people.  
 too high in carbohydrate for most people.
  
3. A person with pre-diabetes has a fasting glucose level elevated to \_\_\_\_mg/dL after an overnight fast but not high enough to be classified as diabetes.  
 140-199 mg/dL  
 **100-125 mg/dL**  
 >200 mg/dL  
 <100 mg/dL
  
4. An individual with pre-diabetes is most likely to develop  
 gestational diabetes.  
 type 1 diabetes.  
 **type 2 diabetes.**  
 drug-induced diabetes.
  
5. Which statements are True or False.  
 People with pre-diabetes can avoid developing type 2 diabetes by making diet and exercise lifestyle changes. **T**  
 People with pre-diabetes often have no symptoms. **T**  
 57 million people in the United States have pre-diabetes. **T**  
 If you are overweight and age 45 or older, you should be checked for pre-diabetes during your next routine medical office visit. **T**  
 23.6 million people in the United States have diabetes. **T**

## Appendix D

### Focus Group Script for Groups 1-3

#### A. Introduction

Welcome. Thanks for coming. My name is Caroline Carter and I am a Clemson graduate student studying food science and human nutrition. I will be the moderator of our discussion today and Dr. Haley will be the transcriber and will take notes.

#### B. Purpose

Today we will be discussing some issues related to your health and diabetes prevention. I'm interested in all of your ideas, comments, and suggestions. There are no right or wrong answers. All comments are welcome. Please feel free to disagree with one another. We would like to have many points of view.

#### C. Procedure

There is a tape recorder to record all responses. All comments are confidential and used for research purposes only. I want this to be a group discussion, so you do not have to wait for me to call on you. Please speak one at a time so that the tape recorder can get everything. We have a lot to cover, so I may change the subject or move ahead. Please stop me if you want to add something.

#### II. Warm-up

Before we get started, I would like everyone to introduce themselves to the group. Please tell us your first name and one thing you like to do in your spare time. Thank you. It seems that many of the things you do are health related.

Introduction:

How would you describe a healthy person?

Transition:

What are some things you do to take care of your health?

Many people think they can improve their health with diet or exercise changes. Let's talk about eating habits.

#### III. Eating habits

A. What are some foods you consider to be healthy?

B. What foods are unhealthy foods?

Probes: What are some foods you think you need to consume more of?  
What foods do you think you need to eat less of?

C. What influences the foods that you decide to eat?

Probes: What input do you have on the foods purchased for you or your family?

Probes: Health conditions? Weight control? Taste preferences? Cost?

Sometimes we do not always eat the way we would like to. Let's talk about some difficulties you experience with eating healthy.

D. What are some things that could help you have/maintain healthier eating habits?

Probe: Are there any barriers to you eating healthy foods?

Do you think that you would be supported at home if you made the change to healthier eating?

E. If someone asked you to suggest how to eat more healthy foods while you are at work at \_\_\_\_\_ what would you suggest?

Probe: What types of healthy foods are in the vending machines?

#### IV. Exercise

*We often hear that we need to increase the amount of exercise that we get....*

A. When you hear the word exercise what comes to mind?

Probe: What sort of physical activities do you enjoy doing?

Probe: What types of barriers have you experienced to exercising?

B. What are some things that could help you add more physical activity into your daily life?

Probes: Can you think of any ways to add exercise into your workday?

What has been helpful in the past?

C. If a program was being put in place to help you increase the exercise that you get – what would be most helpful to you?

Probe: There are a lot of ways that exercise information could be gotten to you.

How would you like to get that information?

#### V. Weight management

*Many of us have difficulty managing our weight. Let's talk about your experience in weight management.*

A. How do you feel about your body weight?

Probe: What are some ways you have tried to influence your weight?

What helped you make the changes that you made?

If unsuccessful, what problems did you have?

- Do you feel that your body weight could be related to developing diabetes?
- B. What are some things that you feel would help you achieve or maintain a healthy body weight?  
Probe: How important is it for you to be at a healthy weight?  
Where do you get your information on weight control?
- C. What do you feel are the benefits of weight management counseling?  
Probe: What are some topics you would want included the counseling sessions?

VI. Diabetes knowledge/awareness

We all know diabetes is a serious condition and that the term “Pre-diabetes” is used for what used to be called “borderline diabetes” and that most people with Pre-diabetes develop diabetes within a few years.

- A. Suppose you had one minute to explain to someone what diabetes is, what would you say?

Probe: How do you think diabetes affects your health?  
Is it possible to prevent diabetes if it runs in your family?  
How many people here have a close relative that has diabetes?

- B. Think about the things we have talked about today – healthy eating and exercise habits. What do you think is the most important topic for you to learn more about to prevent diabetes?

Probes: If diabetes is a concern to you have you made any lifestyle changes to help prevent diabetes?  
What changes in your diet, exercise or personal habits have you made? Tell us about them.

What prompted those changes?  
Which ones worked best for you?  
Tell us about the things you tried to do but were unsuccessful.  
Exercising more? Eating less?

- C. If you had diabetes how do you think diabetes or pre-diabetes would affect your life?

Probes: We realize it is hard to stay motivated to prevent a disease you may or may not get, but what would help you to stay motivated to follow a lifestyle that would help you prevent diabetes?

VII. Closing

We have come to the end of our discussion. We are putting together a diabetes prevention program for the \_\_\_\_\_ employees. What advice do you have for us? What would you like to have included in a diabetes prevention program offered at Glen Raven?

What would encourage you to participate?

Is there anything else you would like to add on the topics we have discussed today?

DO A BRIEF RECAP OF THE MAIN POINTS

ASK IF ANYTHING HAS BEEN LEFT OUT.

Thanks for coming. Your comments will be very helpful to me and the intervention we are planning for \_\_\_\_\_.

## Appendix E

### Focus Group Script for Group 4

#### A. Introduction

Welcome. Thanks for coming. My name is Caroline Carter and I am a Clemson graduate student studying food science and human nutrition. I will be the moderator of our discussion today and Dr. Haley will be the transcriber and will take notes.

#### B. Purpose

Today we will be discussing some issues related to your health and diabetes prevention. I'm interested in all of your ideas, comments, and suggestions. There are no right or wrong answers. All comments are welcome. Please feel free to disagree with one another. We would like to have many points of view.

#### C. Procedure

There is a tape recorder to record all responses. All comments are confidential and used for research purposes only. I want this to be a group discussion, so you do not have to wait for me to call on you. Please speak one at a time so that the tape recorder can get everything. We have a lot to cover, so I may change the subject or move ahead. Please stop me if you want to add something.

#### II. Warm-up

Before we get started, I would like everyone to introduce themselves to the group. Please tell us your first name and one thing you like to do in your spare time.

Thank you. It seems that many of the things you do are health related.

Introduction:

How would you describe a healthy person?

Transition:

What are some things you do to take care of your health?

*Many people think they can improve their health with diet or physical activity changes. Let's talk about eating habits.*

#### IV. Eating habits

F. What influences the foods that you decide to eat?

Probes: What input do you have on the foods purchased for you or your family?

Probes: Health conditions? Weight control? Taste preferences? Cost?

Sometimes we do not always eat the way we would like to. Let's talk about some difficulties you experience with eating healthy.

G. What are some things that could help you have/maintain healthier eating habits?

Probe: Are there any barriers to you eating healthy foods?

Do you think that you would be supported at home if you made the change to healthier eating?

H. If someone asked you to suggest how to eat more healthy foods while you are at work at \_\_\_\_\_ what would you suggest?

Probe: What types of healthy foods are in the vending machines?

#### IV. Physical Activity

*We often hear that we need to increase the amount of physical activity that we get....*

*Physical activity is any activity that causes your body to work harder than normal. According to the American College of Sports Medicine, all healthy adults ages 18 to 65 need moderate-intensity aerobic physical activity for at least 30 minutes on five days each week. The Healthy People 2010 goal is to increase this to 30 minutes every day.*

A. When you hear the word physical activity what comes to mind?

Probes: What sort of physical activities do you enjoy doing?

What types of barriers have you experienced to increasing your physical activity?

B. What influences how physically active you are each day?

Probes: Work? Energy? Family?

C. If you do feel you need to get more physical activity, how would you add more physical activity into your daily life?

Probes: Can you think of any ways to add physical activity into your workday?

What has been helpful in the past?

#### VII. Diabetes knowledge/awareness

*We all know diabetes is a serious condition that affects many people.*

A. Suppose you had one minute to explain to someone what diabetes is, what would you say?

Probe: How do you think diabetes affects your health?

Is it possible to prevent diabetes if it runs in your family?

How many people here have a close relative that has diabetes?

B. Think about the things we have talked about today – healthy eating and physical activity. What do you think is the most important topic for you to learn more about to prevent diabetes?

Probes: If diabetes is a concern to you have you made any lifestyle changes to help prevent diabetes?

What changes in your diet, physical activity or personal habits have you made? Tell me about them.

What prompted those changes?

Which ones worked best for you?

Tell me about things you tried but were unsuccessful.

*Pre-diabetes affects 54 million Americans....*

C. How would you describe pre-diabetes?

*Before people develop type 2 diabetes, they almost always have "pre-diabetes". Pre-diabetes is a condition where your blood sugar levels are higher than normal but not high enough to be diagnosed as diabetes. Several risk factors for pre-diabetes have been identified. They include: having a 1st degree relative with diabetes, being overweight or obese, or being physically inactive among others.*

D. If you had pre-diabetes how do you think it would affect your life?

If you had diabetes how do you think it would affect your life?

Probes: We realize it is hard to stay motivated to prevent a disease you may or may not get, but what would help you to stay motivated to follow a lifestyle that would help you prevent diabetes?

#### V. Weight management

*Being overweight influences your risk for pre-diabetes and diabetes. Many of us have difficulty managing our weight. Let's talk about your experience in weight management.*

D. How do you feel about your body weight?

Probe: What are some ways you have tried to influence your weight?

What helped you make the changes that you made?

If unsuccessful, what problems did you have?

Do you feel that your body weight could be related to developing diabetes?

E. What are some things that you feel would help you achieve or maintain a healthy body weight?

Probe: How important is it for you to be at a healthy weight?  
Where do you get your information on weight control?

## VII. Closing

*We have come to the end of our discussion. We are putting together a diabetes prevention program for the \_\_\_\_\_ employees. What advice do you have for us? What would you like to have included in a diabetes prevention program offered at \_\_\_\_\_?*

A. Do you feel that weight management counseling would benefit you?

Probe: What are some topics you would want included?

B. Would a program to help you increase your physical activity be helpful?

Probe: There are a lot of ways information on physical activity can be gotten to you. How would you prefer to get that information?

C. What would encourage you to participate?

Is there anything else you would like to add on the topics we have discussed today?

DO A BRIEF RECAP OF THE MAIN POINTS

ASK IF ANYTHING HAS BEEN LEFT OUT.

Thanks for coming. Your comments will be very helpful to me and the intervention we are planning for \_\_\_\_\_.

Appendix F

Focus Group Analysis Table

**XXXXXX=not asked question**

Question	Group 1	Group 2	Group 3	Group 4
1. hobbies	Read (2)	Read	Read (2)	
		-Spend time in yard	-Spend time in yard	
		-Playing with kids/grandchildren (4)	-Playing with kids/grandchildren	-kids
	-Basketball  -Exercise	-Bowl  -Cook		-sew  -hunt  -play piano  -work on cars  -fish  - 4 wheeling
2. healthy person	-Not overweight	-Not overweight		
	-Active	-Active		-Active  -exercise (3)
	-Eats right	-Eats right	-Eats right	-Well balanced eating
3. Take care of health	-Walk (2)	-Walk (2)	-Walk  -Exercise	-Walk (3)  -skate (2)  -ride bike
	-Watch what eat  -Cook healthy	-Watch what eat	-Try to eat right  -Try to leave food on plate	-try to eat right
4. Healthy foods	-Fruit	-Fruit	-Fruit (2)	XXXXXX
	-Vegetables	-Vegetables	-Vegetables (2)	

	-Meat -Poultry	-Chicken and fish	-Chicken and fish -Fish	
	-Salad	-Dairy products -milk	-Grains	
5. Unhealthy foods	-French fries	-Fast food -Fried food -Double Cheeseburgers	-Steak	XXXXXX
	-Ice Cream -Candy -Soda	-Oreos -Honey bun	-Ice Cream, cake, cookies -Junk food	
6. Need to consume more	-Vegetables	-Vegetables (2)	-Vegetables	XXXXXX
	-Fruits	-Fruits	-Fruits	
	-Fish		-Fish	
			-Grains	
7. Need to consume less	-Fried foods	-Fried foods	-Fast food and fried food -French fries and cheeseburgers	XXXXXX
	-Starches (potatoes, pasta)	-Bread (2)		
		-Sweets (2) -Cupcakes -Honey bun -Chocolate (2) -Skittles		
		-Beer -Sweet tea		
8. Influences foods decide to	-Budget	-Friends go to lunch with	XXXXXX	-When doctor tells you

eat				something is wrong and to eat a lot of fiber
	-Time	-Grandchildren (2)		-Time of year
	-Appetite	-Work (3)		-Appetite -taste -what looks good
9. Input on foods purchased	-A lot	-All- buy groceries (2)	XXXXXX	-100% -single so do it all (2)
	-Total (2)	-Wife buys		-Wife/fiancé does it (2)
10. Things that help have healthier eating habits		-Time (2)-need more time to eat smaller frequent meals	-Better taste of healthy foods	
	-List of healthy foods (2)	-Eat less if eat at table	-Better work schedule	
			-If had someone to cook for us	-Weight Watchers -want someone to help when decide to eat healthier -motivate yourself -bad news from doctor
11. Barriers to healthy eating	-Price	-Price (2)	-Taste	-Price (2)
			-Lazy	-Allergies -depression -single and

				don't have someone to cook for you
12. Would get support from home if made change to eat healthier	-Yes (3)	-Yes	-Eat healthier on weekends when with boyfriend, children, and grandchildren	-Yes (everyone)
		-Hard with kids	-Hard with kids (2)	
			-Only eat good at mamas house (2)  -Don't eat good at mamas house	
13. Do bring lunch or eat out	-All bring lunch	-Bring lunch	-Bring a frozen dinner	-All bring lunch
		-Go out for lunch	-Sometimes bring lunch	
14. How to eat more healthy at _____	-More healthy foods in vending machines	-Bring your lunch	-Cafeteria (2)	-eat not so much pork; eat roast beef, chicken, and liver  -Eat from five food groups  -eat fruit  -drink water  -Better canteen and vending machine (has to be presented to you)  -have coworkers on Weight Watchers and they go over

				point system
			-Read labels	-If see someone else not eating healthy could help them
15. Types of healthy foods are in vending machines	-None (2) -Not really		-None (2) -Not really	-Not much
	-Apples -Juices	-Apple or orange	-100 calorie bags -Animal crackers	-Low fat cookies
	-Nutrigrain bars	Salad (2)	If low fat has a lot of sugar	-Granola bars
	-Milk			
	-Sandwich on wheat			-Turkey on wheat
16. Exercise?	-Hard work	-Walking(2) -Exercise bike	-Sweating, breathing hard -Hot -Pain -Oh no	-Get heart rate up (2) -walking is the best exercise because running is bad on knee joints -walk cycles around rock -do all my exercise here at work and at home cleaning
	-Tired just thinking about it	-Making time to fit exercise in	-Promise myself going to get up early or leave early enough to exercise but never do	
	-Measures heart beat		-Don't want to do it	
			-Takes forever to get where you	

			want to go	
17. Physical activities enjoy	-Walking (2)	-Walking (2)	-Walking	-Walk through the woods and hike
	-Running	-Badminton	-Pushing lawnmower (2)	-Cut grass
	-Ride bike (2)	-Yard work	-Yard work (2)	-Bike  -Going to the gym when can afford it  -Clean house
	-Basketball	-Baseball	-Playing with kids	-Chase nieces and nephews  -Swim and skate 5x week  -Roller skate
			-Watching TV	
18. Barriers to exercising	-Time (2)	-Time	-Time	-Time  -care for mother in law
	-Motivation	-No Energy (2)	-No Energy (3)	-Getting someone to motivate you  -Live 40 miles away and get stiff and tight and don't want to exercise  -Fitness center too far away and gas prices
		-Health		
19. Things to help add more	-Not having to drive to work	-Get a friend	-Time	-With a friend

PA into life		-do it with family		
	-Training mind		-Take the stairs (2)	-Set aside 30 minutes -Set a goal -Weekly planner -Put something on fridge
		-Walk at work or home on treadmill	-Park further away (2)	
20. Ways to add PA into workday	-Walking (2)	-Walk down hall or go down stairs -Walk to car (parking lot is 6 minutes away)	-No because feel like physical labor at work is close to being exercising (2)	-Walk during breaks -Stretch and get up and walk -Used to have exercise here
	-Climbing stairs	-No because constantly moving		
	-Longer break (2)			
21. Most helpful Exercise program	-Have Weight Watchers	-Aerobics	-Onsite facility	XXXXXX
		-Workout room (2)		
22. How prefer to get health info/physical activity info	-Email	-Email	-Having a discussion	
	-Flyer in paycheck	-Bulletin boards	-Bulletin boards	-Hhandout

				-Pamphlet, flyer so can take home
			-Put over microwave	
			-Newsletter in stalls	
			-Newsletter in canteen	
23. How feel about weight	-Failed	-Overweight	-Too much of it	-Too heavy
	-Could be Improvement	-Want to lose weight (2)	-I hate it	-Hate it -Need to lose a few pounds -Hard to lose (want to lose for myself)
	-Want new body	-Gain weight in winter and lose in summer	-Up and down	
			-Up and Up	
			-Comfortable except when tying shoes	
24. Ways have tried to change weight	-Cut back on eating (2)	-Cut back on eating if up a few pounds	-Starving	-Eat balanced meal and bring to work
	-Diet and exercise  -High energy diet and lost 100 lbs	-Weight Watchers  -Weigh everyday to maintain weight (2)	-Carb diet (2)	-Exercise
			-Change breads from white to whole wheat	-Eat on schedule
25. What helped make changes	-Health reasons  -Do not want to have diabetes or any of that stuff	-Want to live to see kids grown	-TV program about low carb diet and see slim guys with good looking girl	-Doctor and look at self  -How clothes fit (2)

		<ul style="list-style-type: none"> <li>-Husband developed adult onset diabetes and try to cook right and eat right</li> <li>-Mom is diabetic</li> <li>-My mama and oldest brother is</li> <li>-My dad was too</li> <li>-Both parents are severe diabetic</li> </ul>		
26. If unsuccessful what problems did have	-Got pregnant and daughter had surgery so couldn't eat right or exercise	-No problems		<ul style="list-style-type: none"> <li>-Time (2)</li> <li>-Cost of gas</li> </ul>
	<ul style="list-style-type: none"> <li>-No motivation</li> <li>-Procrastinating</li> </ul>	-Trying to discipline yourself to cook right	<ul style="list-style-type: none"> <li>-Didn't feel good</li> <li>-No willpower</li> <li>-Hard to stick with anything that you feel deprived</li> <li>-If push yourself not going to lose weight so don't think about it</li> </ul>	<ul style="list-style-type: none"> <li>-Slack</li> <li>-Self discipline (2)</li> </ul>
		<ul style="list-style-type: none"> <li>-Concerned with what is in food (3)</li> <li>-Would like to eat organic but cost too high</li> </ul>		-Healthy foods are more expensive
27. Is weight related to diabetes	-Hereditary so keep checking on it (2)	<ul style="list-style-type: none"> <li>-100%</li> <li>-I think weight has a lot to do</li> </ul>	-Yes I hear a lot of fat people have it	-Everyone agrees

		with it  -When have it later in life but not when young and not overweight		
28. Things to help you achieve/maintain a healthy body weight	-Diet and exercise	-Access to better nutrition in vending machines  -Cafeteria (4)  -Salad bar	-More structure in life  -Habit changing like when hungry at night and eat	-Exercise
	-Knowing the right types of foods to eat and how to prepare your foods  -Program to show how to cook  -A program for diabetics			-Self discipline  -Family support (2)  -Results (is motivation)
29. Importance of being at healthy weight	-Very important  -On a scale from 1 to 10 it's like a 20	-Very important	-Very important (want to live long enough to see kids and grandkids and don't want to be laid up in hospital with someone taking care of us)	-Very important (2)
	-Important health wise	-When start gaining weight feel more sluggish and don't have energy  -When you eat a lot of starchy foods you feel that way	-Have a lot of health issues and they probably would go away if lost some weight	-Good for heart  -Had doctor experience

30. Benefits of weight management counseling	<ul style="list-style-type: none"> <li>-Knowing what to eat and calories</li> <li>-Food Labels (2)</li> <li>-Servings</li> </ul>	<ul style="list-style-type: none"> <li>-Give you motivation</li> <li>-Weight Watchers gives you motivation (2)</li> <li>-It's a mind thing</li> </ul>	<ul style="list-style-type: none"> <li>-Good to sit down and talk about it</li> <li>-Helps to have someone motivate you</li> <li>-New recipes (2)</li> </ul>	
31. Topics you want included in counseling sessions	<ul style="list-style-type: none"> <li>-Portion sizes</li> <li>-What you should eat vs. what you shouldn't</li> </ul>	<ul style="list-style-type: none"> <li>-Food labels</li> <li>-Knowing good fruits to eat and bad fruits to eat</li> <li>-Recipes</li> <li>-Calendar with food groups and daily needs</li> </ul>	<ul style="list-style-type: none"> <li>-New recipes</li> <li>-Something good to your palate (2)</li> </ul>	<ul style="list-style-type: none"> <li>-Put together a recipe book (2)</li> <li>-Guideline point system (have to motivate yourself because decreased portions)</li> </ul>
	<ul style="list-style-type: none"> <li>-If shown to you take in more</li> <li>-Learn better on hands</li> </ul>		<ul style="list-style-type: none"> <li>-Easy realistic exercises that will give results (2)</li> </ul>	<ul style="list-style-type: none"> <li>-How to stay motivated</li> <li>-How to increase sleep</li> </ul>
32. What is diabetes	<ul style="list-style-type: none"> <li>-Eyesight</li> <li>-Kidney failure</li> <li>-Affects major organs in body</li> <li>-Know someone who lost foot</li> <li>-Makes you tired</li> </ul>	<ul style="list-style-type: none"> <li>-A slow killer</li> <li>-Affects major parts of body</li> <li>-Messes up sugar level, makes you tired and anxious</li> <li>-Husband had perfect vision and got where he couldn't see good; affects different parts of</li> </ul>	<ul style="list-style-type: none"> <li>-Diabetes will kill you</li> <li>-Probably in your blood sugar and body doesn't make enough insulin</li> <li>-Affects eyesight, kidneys</li> <li>-Has a lot of adverse affects</li> <li>-Work with a guy</li> </ul>	<ul style="list-style-type: none"> <li>-High sugar</li> <li>-Increase in your blood sugar levels and your pancreas is not working like it should and your liver maybe</li> <li>-Decreased insulin</li> </ul>

	<p>-Get dizzy</p> <p>-Can go into diabetic coma</p>	<p>Body in different ways</p> <p>-Can cause you to go blind</p> <p>-Can destroy kidneys (2)</p>	<p>who's wide open one day and barely walking the next; I guess he's having low sugar to high sugar</p>	
	<p>-Eat the right things, don't eat a lot of sugar or things that cause you to have diabetes</p>	<p>-Don't think people take diabetes seriously</p> <p>-Told me anything let husband have anything in moderation</p>	<p>-It would kill me to have to stick myself</p> <p>-They have it where you don't take a shot</p> <p>-But if not changing eating habits the pump overworks; not as efficient as regular insulin</p>	
<p>33. Is possible to prevent diabetes if runs in family</p>	<p>-By your lifestyle, eating and exercise can keep it under control</p>	<p>-Yes</p> <p>-If you watch your diet and what you eat</p>	<p>-I think it can be if you work hard at it</p>	<p>-Yes (most agree)</p>
		<p>-I don't know if you can prevent it but I know you can control it</p>	<p>-No, always thought it was hereditary</p> <p>-I think it can be treated and not cured</p> <p>-A lot has to do with what type it is; if its hereditary you can prevent it from being so out of control but I don't know if you can prevent it altogether</p>	<p>-Not totally</p> <p>-Don't think its hereditary I have 38 year old friend with it</p> <p>-No not if its hereditary</p> <p>-Mom got it at 76 years old</p>

34. Do have close relatives with diabetes	-All but one have diabetes in family	-All but one has close relative	-Both parents had it  -Dad has it  -Great grandmother had it	-My sister and brother  -My brother  -My mother  -Have a friend who takes 7 pills/day  -My mom takes medicine
35. Most important topic to learn more to prevent diabetes	-Eating habits	-Food groups, overeating carbohydrates and relationship to diabetes  -Went on diet to lower triglycerides and surprised to see everything has sugar in it	-Eating healthy	-Healthy eating  -Too much salt  -Stay away from carbs
		-No canned vegetables unless no salt		-Too much salt
36. If diabetes is concern have made any lifestyle changes	-Exercise  -Watching what eat  -Get blood work done once a year	-Exercising and watching diet  -Already said it in previous question	-Change bread from white to whole wheat  -Cut out bread, eat more fiber, fruits and vegetables but still have weakness for cheeseburger and fries	-Yes (2)  -Cut back on fried foods and sweets  -Started using Splenda instead of sugar and trying not to cook with a lot of fat
			-Quit smoking	

			-No changes -We all know what we should do	-No (3) -Only drink tea and soda
37. What prompted changes	-Test results	XXXXXX	-When started putting on clothes that couldn't go up and didn't want to go higher than already am  -That's one of my motivators and harassment from doctor because have high blood pressure and high cholesterol	-Seeing what others go through, relatives  -Amputations (2)
38. Which ones worked best for you	-Exercising and watching what eat  -Try to watching what eat and stay away from sweets	XXXXXX	-Stuck with the whole wheat bread for 2 months (2)  -Cut out soft drinks and some juice	XXXXXX
39. Things that tried and were unsuccessful	-Started trying to exercise more but took too much time	XXXXXX	-Fad diets  -Restricting yourself from things  -Think it's in quantity because want to have that full feeling  -Everything revolves around food in family so longer linger at table more you are going to eat	-Trying to cut down on the drinks it's hard to do  -Hard to cut down on all the sodas  -Went on a diet and still fat

	-Lazy			
	-Hard to get back in it			
40. How think diabetes would affect life	-Work (2)	-Affects lifestyle in general	-Take more shots and take medicine with you  -More time consuming  -Have to be on routine with shots  -Have to regulate meal times  -Don't think could give myself shot  -Think not eating at same time everyday is responsible for weight gain  -Wife contributes to weight gain because she expects me to eat with her even if I already have eaten	-tremendously  -A lot  -I know someone who has been on insulin since 11 years old, some people get depressed  -Depression in family members (I was a caregiver for mom with diabetes diagnosed at 85 years old and at 94 let her have whatever she wants
41. What would help you stay motivated to follow a lifestyle to prevent diabetes	-What we have been talking about	-Understand what can and can't eat  -Most people don't understand it  -More informed  -A lot of people think if you have	-Grandchildren motivating me to be more healthy	

		diabetes you have to cut out all sugar		
		-Moral support (2)	-Good results	-Somebody to keep you motivated
		-What is pre-diabetes, A1C	-Money motivates a lot of people -Save money on medical bills	
42. What advice do you have for us/What would you want included	-Keep the program simple	-Be informative in all different spectrums what you can eat as far as nutrition and how much time need to spend on exercise	-Gym -Cafeteria -Salad bar -Corporate has fruits sitting out in bowls. I think that would be a good thing to have here if they could provide fresh fruit -Have a bowl sitting out in the canteen (3) -Healthier eating ideas -How could manage out time to get a little exercise in	-Change health foods in snack machines -Serve hot meals -If whole dept took lap 2x/day- probably wouldn't let us do it -There is weight watchers here; lots of people do not want to change -Some people refuse to change
	-Low cost foods that feel a lot of people -Food that you can eat and food you should eat in	-We would love to see weight room and cafeteria so put that in conclusion	-A meeting to hear what causes diabetes and what they are doing to prevent it	-Be taught how to prepare meals, most people don't know -Have a class; teach people

	moderation; different types of foods you can eat but the way of preparing them			how to eat healthy
43. What would encourage you to participate	-Recipe book and have it so people can afford it	-If it was available  -In Elberton could have extra 30 minutes if belonged to gym  -Corporate had gym	XXXXXX	-Plan  -Ask  -Here at work, convenient
	-Incentive	-Would like to see the results of someone who has already done it  -Being in a group like Weight Watchers motivates you a lot  -Newsletter from Weight Watchers gives recipe tips and that motivates you  -Gives you motivation to see people do it		
		-Moral support		
		-Help with self control		