INTENTIONS, ATTITUDES, AND PERCEIVED BEHAVIOR CONTROL TOWARDS HEALTHY NUTRITION BEHAVIORS OF INDIVIDUALS PARTICIPATING IN A GROUP COUNSELING PROGRAM VERSUS THOSE RECEIVING INDIVIDUAL COUNSELING

A thesis submitted to the Kent State University College and Graduate School of Education, Health, and Human Services in partial fulfillment of the requirements for the degree of Master of Science

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INTENTIONS, ATTITUDES, AND PERCEIVED BEHAVIOR CONTROL TOWARDS
HEALTHY NUTRITION BEHAVIORS OF INDIVIDUALS PARTICIPATING IN A
GROUP COUNSELING PROGRAM VERSUS THOSE RECEIVING INDIVIDUAL
COUNSELING (110 pp.)

Director of thesis: Karen L. Gordon. Ph.D.

Objective: The purpose of this study was to examine if a difference exists
between Theory of Planned Behavior (TPB) constructs of intentions, attitudes and
perceived behavior control (PBC) of community members who receive healthy lifestyle
instructions via the format of individual vs. group counseling interventions. Methods:
Sixteen subjects were recruited for each counseling category. Data was collected by
means of a questionnaire. Statistical procedures included repeated measure analysis of
variance and student \( t \)-test with a \( p \)-value of \( \leq 0.05 \). Results: Both individual and group
counseling format subjects had significantly higher TPB construct scores
post-intervention. Group education subjects had significantly greater intentions as
compared to the individual counseling category. However, there was no significant
difference between the categories for PBC and all three subgroups of attitude.
Conclusion: Overall improvements in behavioral constructs were observed following the
participation in existing clinical and non-clinical setting group and individual
interventions.
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CHAPTER I

INTRODUCTION

Across the world, there are presently more than a billion adults who are overweight and some 300 million of them are obese (World Health Organization, 2011). Obesity in the United States (U.S.) has been increasingly cited as a major health issue in recent decades (Anderson et al., 2009). The key causes are a shift in diets towards refined foods high in saturated fats and sugars and a more sedentary lifestyle (Centers for Disease Control and Prevention, 2009a; Pi-Sunyer, 1996; World Health Organization, 2003). Unhealthy diets and physical inactivity are two of the main modifiable risk factors expressed in men and women as elevated blood pressure and blood glucose, abnormal lipids levels and overweight or obesity (also known as intermediate risk factors). These intermediate risk factors have led to chronic diseases such as cardiovascular diseases (CVD), cancer and diabetes (World Health Organization, 2005).

Prevalence of overweight, obesity and related comorbidities are on the rise in the U.S. Results from the 2005-2006 National Health and Nutrition Examination Survey (NHANES) illustrated that an estimated 32.7% of U.S. adults over 20 years are overweight, 34.3% are obese and 5.9% are extremely obese (Centers for Disease Control and Prevention, 2009b). A more recent study reported the overall prevalence of obesity to be at 33.8% (Flegal, Carroll, Ogden, & Curtin, 2010). More specifically for the state of Ohio the 2009 obesity rate stands at 28.8% (Centers for Disease Control and Prevention, 2010a).
In terms of mortality, an estimated 280,000 to 325,000 adults in the United States die each year from causes related to obesity (Allison, Fontaine, Manson, Stevens, & Vanitallie, 1999). Most of the deaths and healthcare costs stem from preventable diseases despite relatively low-tech and economical services that could reduce them (Lambrew, 2007).

The severity of this epidemic has been highlighted in Healthy People 2020, where overweight and obesity have been grouped as leading health indicators for the United States. Progress toward meeting Healthy People 2020 objectives requires: (a) a partnership at the federal, state, and local levels; (b) the use of evidence-based approaches; (c) integrating individual and population-level interventions; and (d) understanding policy (Healthy People 2020, 2011a; Jones, Kreuter, Pritchett, Matulionis, & Hann, 2006). The number of settings, practitioners and audiences for health promotion and wellness programs has been increasing rapidly in the past decade as part of the Healthy People 2020 initiative (Healthy People 2020, 2011b). The increasing prevalence of overweight and obesity and the major health consequences of overweight and obesity highlight the need for improved prevention strategies to overcome these significant public health problems (Fontaine, 2003; Galani & Schneider, 2007).

Targeted interventions could be one of the answers to help resolve the healthcare predicament. Diet therapy does not incur medication-related risk and is available through lifestyle interventions and wellness programs. Lifestyle intervention strategies have led to improvements in metabolic abnormalities like increased body weight, elevated blood pressure and uncontrolled blood glucose (Knowler et al., 2002; Pritchett, Foreyt, &
Mann, 2005; Seung, Lee, Baek, & Namsoo, 2007). Lifestyle interventions through work-site settings have also been successful in increasing health knowledge (Aldana et al., 2005) and improving weight status (Anderson et al., 2009).

The mode of delivery traditionally used for deliverance of lifestyle interventions has been individual counseling. Individual counseling has been utilized successfully in the administration of lifestyle interventions (Cheng, Graziani, & Diamond, 2004; Hardcastle, Taylor, Bailey, & Castle, 2008) but has not been found to be cost effective (Ash et al., 2006). Insurance coverage for individual lifestyle modifications is also limited. Medicare - Part “B” primarily provides coverage for diabetic and renal consultations (Your Guide to Medicare’s Preventive Services, 2011). Coverage of services that involved lifestyle modification (e.g., nutrition counseling) was less than 20% through employer-sponsored health plans (Bondi, Harris, Atkins, French, & Umland, 2006).

For individuals lacking access or readiness to participate in formal medical nutrition therapy, nutrition education through other programs is a viable option (Cheng et al., 2004). Researchers have conducted studies to determine the efficacy of group counseling sessions to deliver healthy nutrition messages. Significant improvements in the treatment group participants were seen when comparing group counseling to a control group (Bagheri, Memarian, & Alhani, 2007) or to a usual care group (Abood, Black, & Feral, 2003; McGrady, Brennan, & Lynch, 2009). There have not been many studies that have compared individual counseling to group counseling. The few studies that have been conducted in U.S. found group counseling to be as effective as individual
counseling for most study variables being measured (Crixell, Schmidt, & Lloyd, 2007; Gillespie, Mattfeldt-Beman, Sawicki, Myers, & Tomazic, 1995), but none of these articles have studied if there is a difference in the attitudes and perception of community members receiving group counseling vs. those receiving individual counseling. Similarly, some other studies have also concluded that group behavior therapy was not inferior to individual behavior therapy; however most of these studies have either been population specific or culturally specific (Ash et al., 2006; Crixell et al., 2007; Gucciardi et al., 2007; Waleekhachonloet, Limwattananon, Limwattananon, & Gross, 2007). Furthermore, majority of these studies that have compared individual to group counseling have not been conducted in the U.S. (Ash et al., 2006; Gucciardi et al., 2007; Waleekhachonloet et al., 2007).

**Problem Statement**

The American Dietetic Association (ADA) stresses the importance of multi-component wellness programs that include the promotion of nutrition education, behavioral counseling and physical activity (ADA position paper, 2006). Previous studies have shown community based interventions having a nutrition component to be of some success in changing health-related behaviors (Burke et al., 2002; Pan et al., 1997; Tuomilehto et al., 2001). Group counseling through the wellness and worksite programs and individual counseling, imparted by dietitians in hospital settings are two major ways of delivering the message of healthy eating and lifestyle change (Anderson et al., 2009; Crixell et al., 2007; Gucciardi, DeMelo, Lee, & Grace, 2007; Harcastle et al., 2008).
A few studies have emphasized the importance of assessing short term outcomes (e.g., attitudes, self-efficacy) as positive changes in these outcomes have been linked to behavior change. The evaluation of individual attitudes and perception based on the constructs of Theory of Planned Behavior (TPB), Social Cognitive Theory (SCT) or other interpersonal level theories were indicative of enrollment motives and program effectiveness (Devine, Brunson, Jastran, & Bisogni, 2006; Gregson et al., 2001). Increased rates of overweight and obesity were associated with distorted eating behaviors and perceptions, which led researchers to conclude screening for these attitudes may facilitate the development and success of obesity treatment programs (Desai, Miller, Staples, & Bravender, 2008).

According to scientists changing behavior requires knowing the audiences theoretical constructs such as TPB constructs intentions, attitudes and perceived behavior control (PBC). The understanding of these constructs serves as a valuable tool in describing the behavioral mechanisms that influence nutrition adherence (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003; Gucciardi et al., 2007). These psychosocial variables that explain and predict dietary behavior (TPB constructs) become important targets for change in nutrition education programs (Armitage & Conner, 2001; Glass & McAtee, 2006).

Also, since the majority of nutrition education is delivered through individual and group counseling formats, this poses the question as to whether there are measurable differences in intentions, attitudes and PBC between the two counseling methods for clients seeking healthy lifestyle recommendations.
Currently, there are limited studies that focus on determining the intentions, attitudes and PBC towards healthy nutrition behaviors between individuals participating in a group counseling program as compared to those receiving individual counseling by a dietitian.

**Purpose Statement**

The purpose of this study was to examine if a difference exists between the intentions, attitudes and PBC of the adult community members who receive healthy lifestyle instructions via the format of individual vs. group counseling interventions.

**Hypotheses**

1. There is a difference in the intentions, attitudes and PBC towards healthy nutrition behaviors between individuals participating in a group counseling program vs. those receiving individual counseling by a dietitian.

2. There is a difference in the intentions, attitudes and PBC of individuals, towards healthy nutrition behaviors after participating in a nutrition intervention.

**Operational Definitions**

- **Individual counseling**: Nutrition guidance provided by a dietitian on an individual basis for the purpose of giving instruction on nutrition and exercise in order to improve overall health.

- **Group counseling program**: Nutrition education and healthy lifestyle instructions imparted by a dietitian for multiple participants in a group setting.
• Intention: Willingness to engage in healthy nutrition behavior measured on a five point Likert scale (Ajzen, 1991, 2002; Sheeran & Orbell, 2000).

• Attitude: Attitude refers to overall evaluation of healthy nutrition behavior measured on a five point Likert scale (Ajzen, 1991, 2002; Sheeran & Orbell, 2000).

• Perceived behavioral control: Perceived behavioral control is the perception of self-control over healthy nutrition behavior measured on a five point Likert scale (Ajzen, 1991, 2002; Sheeran & Orbell, 2000).
CHAPTER II

REVIEW OF LITERATURE

Overview of Leading Causes of Death

Behavioral choices like unhealthy eating and lack of exercise are among the leading contributors to morbidity and mortality in the United States (ADA Position Paper, 2002; O’Donnell, 2004). A substantial number of deaths are being attributed to a limited number of largely preventable behaviors. Mokdad, Marks, Stroup, and Gerberding (2004) estimated that roughly 400,000 deaths now occur annually due to poor diet and physical inactivity. Four of the fifteen leading causes of death are coronary heart diseases (CHD), stroke, type 2 diabetes and some type of cancers (Heron et al., 2009). All four of these leading causes of death in American adult population have been associated with poor nutrition and sedentary lifestyle (McGinnis & Foege, 1993).

An estimated 17 million Americans have CHD and some 81 million American adults have one or more types of CVD. About 13 million deaths occurred due to the underlying cause of CVD in 2006 (American Heart Association, 2010). Data from the National Diabetes Fact Sheet (2011) states that 25.8 million people in the United States (i.e. 8.3% of the population) were affected by diabetes and the risk of death for diabetics was twice as high compared to non-diabetics of similar age. According to scientists the 2010 estimated number of new cancer cases was about 1.5 million and one-third of some 56 thousand deaths expected to occur in 2010 were viewed to be related to sub-optimal lifestyle choices (American Cancer Society, 2010).
**Prevalence of Obesity and Overweight in United States**

The classification of overweight and obesity is based upon Body Mass Index (BMI) parameters. BMI is defined for adults as the weight in kilograms divided by the square of the height in meters (kg/m²). Overweight is defined as a BMI over 25 kg/m² and obesity is defined as a BMI over 30 kg/m² (World Health Organization, 2011).

The overall age-adjusted prevalence of obesity moved upward in the American population from a previous level of 23% (1988-1994) to 34% (32.2% and 35.5% in men and women respectively) in the year 2007-2008. The collective overweight and obesity prevalence was 68% for both genders (Flegal et al., 2010). The occurrence of obesity in children aged 6-to-11 years has more than doubled since the 1960s. The rates have risen dramatically among children and adolescents ages 2-19 years from 5% to 19.6% between 1980 and 2008 in the U.S. (Centers for Disease Control and Prevention, 2010b).

Obesity prevalence has climbed steadily. In 1990 most states had a prevalence of obesity between 10-14%. By 2009, thirty-three states had a prevalence of 25% or greater and nine of those states had an obesity prevalence of 30% or greater (CDC, 2010a). If the current trend continues, it is estimated that 75% of adult Americans will be overweight and 41% would be obese by the year 2015 (Wang & Beydoun, 2007).

Obesity is a major risk factor for all four of the leading causes of death - CHD, certain types of cancer, stroke and type 2 diabetes (Centers for Disease Control and Prevention, 2009c). While many industrialized countries have experienced similar increases, American society has become, characterized by environments that promote
increased food intake, unhealthy foods, and reduced physical activity (Centers for Disease Control and Prevention, 2011).

**Risk Factors of Obesity**

**Modifiable Risk Factors**

**Unhealthy diet and physical inactivity.** The shifts towards highly refined foods and towards meat and dairy products containing high levels of saturated fats along with the adoption of a sedentary lifestyle are some of the key modifiable risk factors responsible for the current obesity epidemic (Popkin, 2001; WHO, 2005). Excess energy intake is a major risk factor because to maintain a normal body weight it is essential to have a balance of calorie input and output. Unhealthy dietary patterns include low intake of fruits and vegetables, unreasonable portion sizes and increased consumption of carbonated beverages (CDC 2009c). Martínez-González, Martínez, Hu, Gibney, and Kearney (1999) found association between high amounts of time spent sitting down and obesity. In addition lower energy expenditure during leisure time was found to be related to higher BMI.

**Non-Modifiable Risk Factors**

**Environment.** Easy access to low quality energy dense foods and reduced physical activity through increased use of motorized transport, technology at home, indulging in passive hobbies and automation of tasks has lead to a significant impact on the health and nutritional status of populations (CDC 2009a; World Health Organization, 2011). Obesogenic and adverse social environments (such as limited access to grocery stores, parks, recreation centers, presence of crime, unpleasant community setting, few
fitness facilities, low neighborhood education) that encourage physical inactivity and unhealthy eating further drive the growing predominance of overweight and obesity (Boehmer, Hoehner, Deshpande, Ramirez, & Brownson, 2007; Harrington & Elliott, 2009; Mobley et al., 2006).

**Genetics.** Studies done with twins and adoption families have indicated that genetic factors account for a substantial portion of variation in human adiposity (Bouchard et al., 1990; Stunkard et al., 1986). Research has shown that a genetic pre-disposition to gain weight because of a thrifty genotype combined with an inactive lifestyle precipitates chronic diseases for instance metabolic syndrome (Zimmet & Thomas, 2003). However, the relationship between genes and environment is interdependent. If there is a genetic predisposition to obesity, the severity of the disease is mainly determined by environmental conditions and the lifestyle choices of the individual (Loos & Bouchard, 2003).

**Consequences of Being Obese and Overweight**

Overweight and obesity are associated with a high number of complications and co-morbidities. Obesity can affect almost all tissues and organs of the body. Medical complications of adiposity include type 2 diabetes mellitus, hypertension, CVD, pulmonary disease and cancer (Villareal, Apovian, Kushner, & Klein, 2005).

Overweight or obesity was the single most important predictor of diabetes followed by lack of exercise and poor diet (Hu et al., 2001). Men and women with abdominal obesity showed a higher risk for diabetes, and hypertension-diabetes comorbidities than those with a normal waist circumference (Hirani, Zaninotto, &
Primatesta, 2008). Central obesity is a key factor in the development of insulin resistance and metabolic syndrome (Krempf & Farnier, 2001). Metabolic syndrome can be defined by a cluster of abnormalities including central obesity, impaired glucose tolerance, type 2 diabetes, dyslipidaemia and hypertension. All components of the metabolic syndrome have been shown to increase the risk of CVD (Lakka et al., 2002). In addition to substantially exacerbating all metabolic cardiac risk factors, the risk of developing stroke increased with severity of being overweight (Field et al., 2001).

People who are obese have shown an increased risk of developing asthma. In a study, participants were followed on average for 21 years to estimate the relative risk of asthma. After adjusting for smoking the researchers found that the risk of asthma increased steadily with BMI (Nystad, Meyer, Nafstad, Tverdal, & Engeland, 2004).

Being obese and overweight appears to have a substantial impact on a person’s functional capacity (problems with mobility and pain) and also significantly lowers Health Related Quality of Life (HRQL) compared to normal BMI patients (Fontaine & Barofsky, 2001; Sach et al., 2007). A large cohort study completed on patients with primary osteoarthritis found that there was a strong association between BMI and later total arthroplasty (surgical replacement of arthritic joint surface) for osteoarthritis of the hip (Flugsrud et al., 2006).

Research aimed at exploring the relations between BMI and colorectal and gallbladder cancer deduced that colon cancer risk augmented with increasing BMI in men, and the risk of gallbladder cancer amplified with increasing BMI in women (Engeland, Tretli, Austad, & Bjørge, 2005). In 2002, about 41,000 new cases of cancer
in the United States were anticipated to be due to obesity (Polednak, 2003). A 2003 report estimated that 14% of deaths from cancer in men and 20% of deaths in women living in the States were due to overweight and obesity (Calle, Rodriguez, Walker-Thurmond, & Thun, 2003).

Several studies showed that above-normal weight (BMI greater than 25.0) was associated with an increased risk of death from any cause (Meyer, Sogaard, Tverdal, & Selmer, 2002; Peeters et al., 2003).

Cost of Obesity Overweight and Related Co-morbidities

The rising prevalence of overweight and obesity in adults and children demonstrates a steadily growing epidemic. In 1990, the direct cost of obesity-associated disease in the US was $US 45.8 billion, and the indirect cost of obesity was estimated to be $US 23.0 billion (Wolf & Colditz, 1994). A study predicted future obesity-related health-care costs for adults using projected prevalence (Census population projections) and published national estimates of per capita excess health-care costs of obesity/overweight. Total health-care costs attributable to obesity/overweight would double every decade to $US 860.7-956.9 billion by 2030, accounting for 16-18% of total US health-care costs (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008).

Co-morbidities related to obesity like diabetes impose a substantial cost burden to society, in particular, to those individuals with diabetes and their families. A study demonstrated that direct medical and indirect expenditures attributable to diabetes in 2002 were estimated at $132 billion (Hogan, Dall, & Nikolov, 2002). Collectively CVD (including stroke), cancer, and diabetes account for approximately two thirds of all deaths
in the United States and about $700 billion in direct and indirect economic costs each year (Eyre, Kahn, & Robertson, 2004).

A concerted effort to increase application of public health and clinical interventions of known efficacy to reduce prevalence of poor diet, and insufficient physical activity— the major risk factors for these diseases— could substantially reduce the human and economic cost of these diseases (Glass & McAtee, 2006).

**Wellness Programs**

Organizational wellness programs are on or off-site services sponsored by organizations which attempt to promote good health or to identify and correct potential health related problems (Wolfe, Parker, & Napier, 1994). In response to the prevalence of chronic diseases, the US government and other groups have introduced prevention programs through wellness centers. Wellness programs through the hospitals may include risk assessment, fitness, health education, and disease management programs. In risk assessment programs, people answer questionnaires about their medical history, and behaviors, or undergo tests to determine how great is their risk of various types of illness such as CVD or cancer (Parks & Steelman, 2008).

Fitness programs may diminish the risk of CVD, reduce risk of injury, or alleviate stress and depression. Health education, nutritional counseling, and stress management programs are another category designed to avoid disease and injury (Wolfe et al., 1994). Disease management programs are intended to promote self-care and manage the demand for health care services. Although wellness programs are demonstrating promise in
helping abate America's health care cost crisis the research is limited when it comes to determining the effectiveness of wellness programs (Parks & Steelman, 2008).

**Successful Interventions Through Wellness Programs**

The “Smart Bodies” school wellness program was conducted in 14 low-income, urban, public elementary schools. The program, a 12-week intervention, included participation in an interactive wellness exhibit and a classroom curriculum that emphasized consumption of fruit and vegetables. The children who attended the program demonstrated improved nutrition knowledge and showed greater confidence that they would be able to choose a healthy fruit snack over a fruit juice (Tuuri et al., 2009).

The “Wellness Within REACH: Mind, Body and Soul” program is part of the broader African American Health Coalition (AAHC). AAHC was developed within Racial and Ethnic Approaches to Community Health (REACH) 2010 initiative funded by the CDC. This initiative develops programs that impart health education to reduce CVD risk factors. The main purpose of the programming was to increase the activity levels of the African American community through no-cost physical activity classes. Certified physical activity experts conducted the exercise classes and a survey conducted with 75 subjects showed that more than half were exercising at least five days per week. Preliminary anecdotal evidence also pointed to the fact that community members were more engaged in healthy behaviors after participating in the program (McKeever, Faddis, Koroloff, & Henn, 2004).

The objective was to improve healthy eating and encourage more physical activity among elementary school children and tribal adults of Cherokee Indians as the rates of
obesity and type 2 diabetes within this ethnic group exceeded the rates for the U.S. and the North Carolina general populations. Three programs were implemented through the REACH initiative—elementary school mentoring, worksite wellness for adults, and church-based health promotion. Overall the programs helped to increase the fruit and vegetable consumption, increase physical activity levels among local children and adults and improve weight status. Some tribal adults also lowered their blood pressure and had better blood sugar control (Bachar et al., 2006).

Zhiiwaapenewin Akino'maagewin: Teaching to Prevent Diabetes (ZATPD) a community based program was developed for the ethnic population of seven First Nations in Northwestern Ontario, Canada. This program targeted not only the schools but also health offices and food stores to have a wider reach. The schools implemented yearlong curriculum for Grades 3 and 4, which used story-telling and participatory activities and the stores were encouraged to stock healthier items. The ZATPD program achieved overall moderate levels of fidelity, dose and reach and demonstrated that implementing a community-based wellness program for diabetes prevention was feasible through participatory research (Rosecrans et al., 2008).

These results demonstrate that it is possible to improve health behaviors and reduce coronary and diabetes risk factors through wellness programming for diverse population groups.

**Lifestyle Interventions**

Lifestyle programs are multi-factorial interventions that are designed for each patient or group of patients according to their factor status and the needs of the subject.
They promote healthy lifestyle habits, dietary counseling, physical activity and behavioral change (Galani & Schneider, 2007). Lifestyle interventions are associated with important health benefits for example modest weight changes, improving blood pressure and reducing risk factors for CHD, diabetes, stroke and cancer (Forlani et al., 2009; Galani & Schneider, 2007; Hardcastle et al., 2008; Knowler et al., 2002; Svetkey et al., 2003; Tuomilehto et al., 2001).

**Successful Lifestyle Interventions**

Multisite Cardiac Lifestyle Intervention Program (MCLIP) examined the relative effectiveness of an insurance sponsored MCLIP for CHD patients of lower socioeconomic status (SES) as compared to a higher SES. The program offered an individual consultation with the nutritionist, group education sessions as well as exercise and stress management classes. At the end of three months results showed that subjects at all SES levels had reported reducing dietary fat to 10% calories from fat, increasing stress management to 5.5 hours per week or more, exercising to 3.5 hours per week or more, improving their lipid profiles and having better weight management (Govil, Weidner, Merritt-Wordert, & Ornish, 2009).

Studies that employed behavior change strategies along with traditional lifestyle recommendations and weight reducing diets for overweight hypertensive subjects were associated with modest blood pressure decreases (Mulrow et al., 2001; Svetkey et al., 2003). Lifestyle changes are considered first line of treatment in type 2 diabetes. A lifestyle intervention study conducted in the clinical setting of diabetic units, established that achieving metabolic control and weight loss of greater that 7% was feasible and
effective through structured behavioral programs (Forlani et al., 2009). Compared with no prevention program, a Diabetes Prevention Program (DPP) lifestyle intervention reduced a high-risk person's 30-year chances of getting diabetes from about 72% to 61%, the chances of a serious complication from about 38% to 30%, and the chances of dying of a complication of diabetes from 13.5% to 11.2%. However, the program used in the DPP study might be too costly to put into practice (Eddy, Schlessinger, & Kahn, 2005).

Intensive behavioral lifestyle interventions for achieving weight loss through dietary modifications and inclusion of progressive physical activity program resulted in significant weight loss (approximately 10%) and in improved cardiac profile (Goodpaster et al., 2010). Several studies conducted in late middle-aged and older subjects (>60 y old) suggest that lifestyle interventions are just as effective in older as in younger subjects (Messier et al., 2004, & Rejeski et al., 2002).

Comprehensive lifestyle intervention research has revealed that specific prevention activities like weight reduction, controlling pre-diabetes and lowering low density lipoprotein cholesterol can greatly benefit the US population (Kahn, Robertson, Smith, & Eddy, 2008).

**Weight Management Interventions**

Weight management is defined as the adoption of healthy and sustainable eating and exercise behaviors indicated for reduced disease risk and improved feelings of energy and well-being (ADA, Position Paper, 1997). Successful weight management requires a lifelong commitment to healthy lifestyle behaviors emphasizing eating practices and physical activity. Individuals in these interventions aim to achieve weight loss through
changes in dietary intake and exercise patterns which decrease caloric intake below energy expenditure. Clinical assessments of factors contributing to weight gain are also a part of weight management and weight loss programming (Williamson et al., 2009). Modest weight loss ranging from as little as 5% to 10% of initial body weight has resulted in clinically significant health benefits for the obese population (Yanovski & Yanovski, 2002).

**Successful Weight Management Interventions**

“Moving Forward” a culturally tailored weight loss program developed for African American breast cancer survivors, showed promise in having an impact towards improving the weight status of the participants (Stolley, Sharp, Oh, & Schiffer, 2009). Rural counties in the United States have higher rates of obesity, sedentary lifestyle and associated chronic diseases than non-rural areas. Cooperative Extension Service offices conducted a study in six medically underserved rural counties demonstrated that weight loss maintenance was possible through telephone or face to face consultation compared to giving an educational leaflet (Perri et al., 2008).

Researchers established that overweight adults diagnosed as having type 2 diabetes experienced significant improvement in HRQL by enrolling in a weight management program that yielded significant weight loss and enhanced physical fitness (Williamson et al., 2009). A dietitian-led weight management program which is still ongoing reported their results for the 123 participants who completed the study. Results showed that attending “Your Choice” program was associated with significant reductions in weight, BMI and systolic blood pressure (Gaynor, Hanna, & Green, 2009).
Short-term weight management programs have shown success in improving quality of life when implemented through wellness programs or family practice settings. Research has been done to determine the efficacy of introducing weight management programs in family practice settings. A study did an assessment of a weight management program designed for primary care setting which was led by obesity specialist dietitians. The intervention practice groups were all trained to run “The Counterweight Program.” For all patients followed up at 12 months, 34% achieved a clinical meaningful weight loss of 5% or more (Laws, 2004).

An eight week weight management program run through a university health clinic focused on nutrition education promoting low-energy dense and high fiber diets and elucidated the beneficial effects of weight loss and reduced cholesterol and triglyceride levels in participating college women (Seung et al., 2007).

**Worksite Interventions**

Health risk awareness services that promote worksite health promotion and disease prevention are important as direct and indirect medical costs such as absenteeism (lost work time), presenteeism (working ill) and disability, are hard for the employers to sustain (Lankford, Kurger, & Bauer, 2009). Many workers have access to these services through their employer’s benefits packages which on occasion include wellness programs. These programs provide services such as nutrition education, weight control programs, physical fitness and stress management - measures which are aimed at lowering health care costs and improving the quality of life (Lambrew, 2007).
The cost-offset hypothesis suggests that services perceived to be important by employees will increase use of these services. This could offset costs in terms of reduced medical expenditures (Kruger, Yore, Bauer, & Khol, 2007; Sturm, 2005). It is not only essential for the employers to provide good health coverage for employees who consume 80% of the health care costs and are at greater risk of health complications but also for employees with few health issues so that they continue to lead healthy lives (Hunnicutt, 2009).

**Successful Worksite Interventions**

Intervention investigations have demonstrated that investments in worksite health promotion programs designed to reduce health risks were effective in providing a substantial reduction in medical costs in terms of decreased absenteeism and fewer life insurance claims (Golaszewski, Snow, Lynch, Yen, & Solomita, 1992; Mills, Kessler, Cooper, & Sullivan, 2007). Hermann-Nickell and Baker (1989) conducted a study to evaluate the effectiveness of a multifactoral weight loss program in a corporate setting. The results indicated that a combination of exercise, behavior modification and nutrition education resulted in eleven participants loosing a total of 94 pounds over an eight-week weight loss program.

Research has shown that worksites that introduced chronic disease prevention programs could improve health related knowledge among participants and significantly lower their body fat, blood pressure, and cholesterol (Aldana et al., 2005). Worksite health promotion program that offered four critical features: a computer program which could tailor advice to subject’s needs, a monitoring function, a personal coach and
opportunities to contact professionals at request, was found to be a promising tool for health promotion (Robroek, Bredt, & Burdorf, 2007).

There is strong evidence of consistent albeit modest outcomes of the effectiveness of worksite nutrition and physical activity interventions for controlling employee overweight and obesity (Anderson et al., 2009).

**Disease Prevention Through the Means of Dietary Changes**

A healthy diet and exercise are important factors in the promotion and maintenance of good health throughout the life cycle (ADA Position Paper, 2006). Healthy people 2020 objectives: NWS-8- Increase the proportion of adults who are at a healthy weight and NWS-9- Reduce the proportion of adults who are obese- shows the focus of professionals on the problems of overweight and obesity (Healthy People 2020, 2011b).

Dietary restraint and a combined dietary restraint plus exercise program provided success in attaining and maintaining weight loss (Vogels & Westerterp-Plantenga, 2005; Wu, Gao, Chen, & van Dam, 2009). Incidence of nonfatal myocardial infarction, coronary death and diabetes were lower among those following a healthy eating pattern in midlife, which was distinguished by a high consumption of fruit and vegetables, polyunsaturated oils and high-fiber bread and breakfast cereals and a low consumption of red meats, saturated fats and refined carbohydrate foods (Brunner et al., 2008). Another study cluster-analyzed data on dietary fat, fiber, protein, carbohydrate, and calorie consumption from the U.S. Cardiovascular Health Study, and examined the relationship of the dietary clusters to outcomes 10 years later. They found that the “healthy diet
“cluster” (relatively high in fiber and carbohydrate and low in fat), had the most years of life and years of healthy life, and the “unhealthy diet cluster” (relatively high in protein and fat, relatively low in carbohydrates and fiber) had the fewest (Diehr & Beresford, 2003).

The healthy dietary characteristics enumerated above are the topics of education implemented through lifestyle intervention and weight management programs (Agur-Collins, Kumanyika, Ten- Have, Adams-Camplbell, 1997; Burke et al., 2002; Hoke & Frank, 2002; Hoy et al., 2009). Moreover, moderate weight loss (5-10%) improves the entire cluster of metabolic abnormalities that increases the risk of CHD and has resulted in clinically significant health benefits for the obese population (Pi-Sunyer, 1996; Yanovski & Yanovski, 2002).

Effective interventions that produce change in personal lifestyles through clinical and community settings are likely to lead to substantial reductions in the incidence and severity of the leading causes of death in the United States (ADA Position Paper, 2006).

**Importance of Nutrition Education**

Nutrition education has been defined as any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition-related behaviors conducive to health and well-being; nutrition education is delivered through multiple venues and involves activities at the individual, community, and policy levels (Contento, 2007). There are three essential components to nutrition education:
1. A motivational component which intends to improve the knowledge and drive to achieve behavior change by addressing individual beliefs, attitudes through effective communication strategies.

2. An action component makes deliberate effort to assist people to take action.

3. An environmental component proposes collaboration between educators and policymakers to provide a supportive built-environment to promote action (Contento, 2008).

Wellness programs, worksite wellness programs and individual interventions are the vehicles that can deliver the first two components of nutrition education. Nutrition education should be broad enough to concentrate on individual’s food preferences, perceptions, beliefs, attitudes, and social norms along with the environmental factors (Contento, 2008).

Researchers have been debating about the relationship of nutrition knowledge to behavior change. Some studies have not observed an association between nutrition knowledge and adoption of more healthy diet practices (Shepherd & Stockley, 1987) or weight control (Allison & Kanders, 1995; Burns, Richman, & Caterson, 1987). However, a number of other studies have reported greater nutrition knowledge and weight loss following nutrition education interventions (Agur-Collins et al., 1997; Bruno, Arnold, Jacobson, Winick, & Wynder, 1983; Jeffery & Wing, 1995; Klohe-Lehman et al., 2006).

Guidance by food and nutrition professionals is needed to promote positive lifestyle changes that are sustainable. Nutrition education suggests a change to a
healthier lifestyle through small incremental steps which would lead to overall success towards improving fitness and dietary quality (Sahyoun, Pratt, & Anderson, 2004). Although it is ideally supplemented with other approaches improving the diet through nutrition education should be seen as a foundation for important public health advances (ADA Position Paper, 1997). Because persons control their own nutrition and food-related behaviors, nutrition education to support individual behavior change must occur before success can be achieved with broader nutrition efforts (Nitzke, Freeland-Graves, & ADA, 2007).

**Intervention Styles for Nutrition Education**

There are three primary modes of delivery for nutrition education modules during lifestyle interventions implemented through wellness, worksite, and hospital centers: individual counseling, group counseling and the combination of the two.

**Individual Counseling**

Individual therapy permits a greater opportunity to address personal and emotional issues (Renjilian et al., 2001). In a study where lifestyle intervention was systematic and intensive, with the study participants receiving detailed, individualized counseling, the lifestyle intervention was more effective than metformin (anti-diabetic drug; Knowler et al., 2002). “Food for Heart Program”- a nutrition education program was conducted using a large urban based family practice. Mode of implementation was through individual counseling and the results showed that this program was effective in reducing the risk for CHD (Cheng et al., 2004).
Research has also shown that individual counseling interventions can be designed so that they can be cost effective (Cheng et al., 2004; Dale et al., 2009). These programs were not conducted and delivered by registered dietitians. However, the research by Dale et al. (2009) had a dietitian and an exercise specialist meet individually with all participants, once, at the inception of the study. Comparison was conducted between an individual counseling intervention and the provision of a health promotion leaflet. Researchers concluded that attending multiple sessions of client-centered counseling in primary care was of interest to people and generally reduced CHD risk (Hardcastle et al., 2008). The average cost of delivering the intervention per patient was between $72.5 and $97.

In a research study, 60 patients were randomly assigned to a group counseling program associated with an initial two-week inpatient period and an individual counseling outpatient program. Results were superior in the individual outpatient program with a mean weight loss at two years of 15.6 and 10.4 kg in men and women respectively (Hakala, Karvetti, & Ronnemaa, 1993). Another study from France showed generally consistent reports with the Hakala et al. study. It reported that one-on one sessions with the nutrition specialist at an outpatient nutrition clinic were successful in producing positive behavior change accompanied by weight loss (Compe, Papoz, & Avignon, 2003). This result demonstrated that individual counseling without being part of a structured program could be effective.

Nevertheless, individual weight loss counseling and healthy lifestyle consultations are not covered by the various insurance agencies. Medicare-Part “B” primarily provides
coverage for diabetic, renal (if not on dialysis) and post transplant consultations (Your Guide to Medicare’s Preventive Services, 2011). Although weight loss is an effective treatment for metabolic syndrome, standard health insurance rarely covers intensive behavioral treatment (Arterburn et al., 2008). The same study also reported that a hypothetical increase in insurance coverage from 10 to 100% led to a threefold increase among women and a sevenfold increase among men in the proportion reporting they were “very interested” in enrolling in a weight management program within the next 30 days. Most participants supported a health plan-sponsored financial incentive program tied to weight loss and 41% believed such a program would motivate them to lose weight.

Insurance reimbursement for obesity does not consistently reflect recent evidence of the benefits of lifestyle modification. Bariatric surgery was covered significantly more than counseling as a behavior modification technique (Tsai, Asch, & Wadden, 2006).

**Group Counseling**

In a number of studies where the mode of intervention was group counseling compared to a control group that received no intervention, the results showed that there were significant improvements in the treatment group participants (Abood et al., 2003; Bagheri et al., 2007; McGrady et al., 2009). Group counseling programs promoted all three dimensions (physical, spiritual and social) of the Quality of Life variable tested in a study (Bagheri et al., 2007). Furthermore group education improved behavior modification, glycemic control and reduced the risks of CVD (Trento et al., 2001, 2002). Behavioral weight loss interventions provided in group settings granted the opportunity of enhanced social support (Arseneau, Mason, Wood, Schwab, & Green, 1994). Studies
have also shown that beneficial effects of group counseling create an environment that helps people accept their disease and facilitate behavior change. Therapeutic factors like group learning and group optimism probably help create this positive environment (Arseneau et al., 1994; Cooper, Booth, & Gill, 2003).

The Healthy Eating and Lifestyle Program (HELP) was adapted from the weekly program employed in Trial of Nonpharmacological Interventions in the Elderly (TONE) weight loss interventions. Modifications were made to the TONE program to reduce the cost of the HELP program. HELP excluded the individual sessions and reduced the number of group sessions offered from 12 to 10 sessions. Even though the HELP program was scaled down from a more intensive program, modest weight loss was seen in phase one which was maintained in phase two with relatively minimum follow-up (Kumanyika et al., 2005).

Group counseling has been shown to be a cost effective approach for teaching lifestyle behavior modification techniques (Ash et al., 2006; Trento et al., 2002). The potential long-term health as well as economic consequences of lifestyle interventions (predominantly implemented through group settings) for diabetic patients were explored and researchers reported that, health benefits could generally be achieved at reasonable costs (Jacobs-van der Bruggen et al., 2009). Moreover lifestyle interventions can be feasible and cost effective through primary care settings because existing resources can be utilized to keep the costs down (McTigue, Conroy, Bigi, Murphy, & McNeil, 2009).

Investigators concluded adding an educational program in addition to restructuring the catering system could translate group nutritional recommendations into
routine clinical practice in secondary prevention of coronary artery disease in the absence of individual counseling by the nutrition team (Aquilani et al., 2002).

Group lifestyle counseling techniques have also been applied successfully in preventing excessive weight gain during pregnancy. Women assigned to an organized, consistent program of intensive dietary and lifestyle counseling gained significantly less weight than did the routine prenatal care group (Asbee et al., 2009). Weight-control intervention trials with group counseling as an educational format delivered over six to twelve months postpartum, helped women return to their pre-pregnancy weight (Leermakers, Anglin, & Wing, 1998; O’Toole, Sawicki, & Artal, 2003).

The Women’s Healthy Lifestyle Project Clinical Trial and The Women On the Move through Activity and Nutrition (WOMAN) studies examined the role of a group lifestyle intervention approach to prevent unfavorable CVD risk factor changes that typically occur as a woman transitions through perimenopause to postmenopause. Modest dietary restrictions and increased leisure physical activity were effective for weight loss and/or weight maintenance and CVD risk factor reduction (Kuller, Simkin-Silverman, Wing, Meilahn, & Ives, 2001; Kuller et al., 2006).

The Trials of Hypertension Prevention (TOHP II), Phase II provided information and behavioral counseling to facilitate sodium reduction. An initial in-person individual meeting, followed by 10 weekly group meetings, followed by four monthly group meetings and additional less frequent group sessions for the remainder of follow-up were conducted. Overall, significant BP reduction over a three to four year period in this large
sample of overweight men and women led to a significant decline in the incidence of hypertension (Lasser et al., 1995).

Participants in two randomized lifestyle intervention - the trials of hypertension prevention phase I (TOHP I) and phase II (TOHP II) - were followed for subsequent cardiovascular outcomes. Both intervention groups of phase I and phase II received information to maintain sodium restricted diets through nutrition education group sessions for 18 and 36-48 months respectively. The results illustrated that dietary sodium reduction and weight loss not only helped to reduce blood pressure (as seen in the original study) but also ostensibly helped to prevent CVD (Cook et al., 2007).

To see the effect of an integrated approach towards the management of metabolic syndrome, a study group received a comprehensive intervention at a specialist center which involved four group sessions aimed at improving lifestyle and 12 cognitive behavioral therapy sessions. The intervention group had lower obesity grades than the control group which received a prescriptive diet from their general practitioner (Melchionda et al., 2006).

**Combination of Group and Individual Counseling**

Some intervention programs have utilized both individual and group counseling in conjunction as modes of delivery (Burke et al., 2002; Hoke & Frank, 2002). There was a significant difference between program and the usual care group for energy intake and intake of total and saturated fat. The usual care group received general information available to public through health agencies while the targeted intervention provided dietary guidance through individual plus group counseling modules (Burke et al., 2002).
Diabetes Prevention Program (DPP) and the Look Ahead Clinical Trials emphasized the need for tailoring the mode of delivery of the intervention according to patient needs (Delahanty & Nathan, 2008). DPP had used only individual counseling to impart nutrition education for acquiring behavioral changes in participants with a high risk for developing type 2 diabetes. Look Ahead study recruited a population of patients who had already developed type 2 diabetes. Even though most of the features of The Look Ahead study and DPP were similar, one of the structural changes that the researcher made was the incorporation of group plus individual format to disseminate information. One of the reasons for the change in modules was that they wanted to take advantage of both the closed group and individual formats. The Look Ahead study is still ongoing and is halfway through its anticipated 12 year duration.

The WISEWOMAN (Well-Integrated Screening and Evaluation for Women Across the Nation), a CVD risk reduction program for under and uninsured women ages 40–64 years emphasized the use of community resources to increase physical activity and improve dietary intake in this population. The enhanced intervention session had a combination of two individual counseling sessions followed by three group counseling sessions. Participation in the enhanced intervention program was associated with substantial improvement in dietary intake and a modest increase in self-reported physical activity as compared to the minimum intervention group (Keyserling et al., 2008).

Dietary intervention trials have also combined the modes of group and individual counseling and compared them with usual care group. The effectiveness of a mediterranean-style diet reducing cardiovascular events was tested. Intervention
participants received three individual dietary counseling sessions from study dietitians within the first three months, followed by additional individual sessions at months six, 12, 18, and 24. Participants also attended six different group sessions focused on behavioral modification and practical aspects of their assigned diets. Dietary intervention participants had greater overall cardiovascular-event-free survival compared with similar patients with myocardial infarction provided with usual care (prevention information through a pamphlet) (Tuttle et al., 2008).

**Group Versus Individual Counseling**

Counseling sessions have been applied to a wide range of chronic diseases to impart education about lifestyle modifications. Modes of behavior therapy have been found to make differences in outcomes for various health behaviors (Waleekhachonloet et al., 2007). Although some reviews comparing group and individual behavior therapy for obesity management have had inconclusive findings due to the uncertainties of extrapolating long-term benefits from short term studies (Avenell et al., 2004).

Nonetheless other studies involving group counseling techniques have been successfully applied to adult and childhood obesity prevention interventions. In the treatment of childhood obesity, a study compared the efficacy of group treatment stressing a health-promoting lifestyle (for both child and parent) with routine one-on-one counseling (for just the child). Children participating in the group treatment for families did better then the children who received individual counseling in terms of change of weight for height (Kalavainen, Korppi, & Nuutinen, 2007).
Renjilian et al. (2001) found that group therapy produced greater weight loss than individual therapy, even among those clients who expressed a preference for individual treatment. While another study concluded that for the purposes of efficient use of resources group counseling would be a better education format (Crixell et al., 2007).

Several other research papers comparing individual to group counseling in adults have determined that group counseling was as effective as individual counseling (Ash et al., 2006; Waleekhachonloet et al., 2007). An eight-week intensive group-based lifestyle intervention based on the constructs of cognitive behavior therapy was carried out in a real-practice environment. Patients were randomized to either a group-based lifestyle intervention, Fat Booters Incorporated (FBI) or to an individual diet counseling treatment or to a control group that only received a booklet. After a period of 12 months the results pointed out that the group therapy was as effective as the individual therapy. Additionally group therapy was found to be more cost effective (Ash et al., 2006).

Overweight adult males with labile blood pressure elevation participated in a 20-week dietary intervention program and received either individual or group counseling sessions. Although the sample size was small, the materials were equally effective in inducing changes in body weight and sodium excretion (Jeffery et al., 1983).

Researchers evaluated the effectiveness of a one-on-one counseling format for a diabetic education program as compared to an individual plus group counseling format. Group classes included approximately five to eight patients and they received six hours of nutrition therapy over three consecutive days. Results demonstrated that patients in
both counseling sessions showed significant improvements in the Theory of Planned Behavior constructs and better nutrition adherence (Gucciardi et al., 2007).

This research was conducted in a rural community and the primary outcomes were weight loss at three months, healthy dieting behavior, intention, perceived behavioral control, attitudes and subjective norm. In conclusion the study provided evidence that group therapy was not inferior to individual therapy and hence could be employed as a first mode of intervention in overweight rural communities (Waleekhachonloet et al., 2007).

However, majority of these studies were not conducted in United States. Also two of these studies were directed towards the rural communities (Gucciardi et al., 2007, & Waleekhachonloet et al., 2007). Only one study was focused at the urban populace in Australia (Ash et al., 2006). Structuring of wellness programs in terms of using individual or group therapy would benefit from studies targeted towards urban populations in primary care settings (McGrady et al., 2009).

**Theory Based Interventions**

Behavioral change theories and models have attempted to explain the reasons behind alterations in individual’s behavioral patterns. These theories cite environmental and personal characteristics as the major factors in behavior determination. Many lifestyle interventions are based on one of the behavior change theories as these models provide a research-based rationale for designing and tailoring nutrition and lifestyle interventions to achieve desired results. An intervention can also be based on one or more theories. These models consist of principles, constructs and variables, which offer
systemic explanations of the human behavior change process (Daddario, 2007). Several theoretical approaches have been successful in eliciting dietary and behavioral changes. 

**Stages of Change Model (The Transtheoretical Model)**

The Transtheoretical Model (TTM) is one of the most commonly cited behavior change models (Glanz & Bishop, 2010). TTM stages form a continuum and also postulate that people at different stages have different needs for counseling and that they cycle through the five stages, namely: ‘Pre-contemplation’ (a healthier lifestyle yet to be considered). ‘Contemplation’ (intends to carry out behavior change within next six months): at these two stages, the need is for cognitive approaches that will make individuals aware of the pros of positive behavior adoption. ‘Preparation’ (intending to modify behaviors, with some steps taken towards that): here the need is for behavioral skills training. ‘Action’ (changed one’s behaviors): at this stage tailored interventions help. ‘Maintenance’ (stabilizing change for over six months and avoiding relapse): here assistance in reinforcement and overcoming barriers is needed. The stage of change framework suggests that intervention programs might be tailored to the individual's stage of readiness (Prochaska & Norcross, 2003).

The stages of change model as applied to weight management therapy could be used to identify people who are ready to change (contemplation-preparation group) their eating habits and physical activity levels (Archie et al., 2007). The Change of Heart Study, a randomized controlled trial sought to compare whether a behavioral intervention (delivering health promotion methods through three counseling sessions), was more effective than normal practice in achieving the target stage (action/maintenance) which
are the last two stages of the transtheoretical model. The results displayed that there was a greater proportion of people in the action/maintenance phase in the intervention group for physical activity and dietary change, the two target behaviors (Steptoe, Kerry, Rink, & Hilton, 2001).

Motivational Interviewing is a client-centered counseling style in which clients are helped to explore and resolve ambivalence towards behavior change (Rollnick & Miller, 1995). This technique imparted according to stages of change of participants showed a trend of increasing knowledge base for an at-risk stroke population even though the intervention was delivered within the limited time allowed in a hospital setting (Green, Haley, Eliasziw, & Hoyte, 2007).

**The Health Belief Model**

The Health Belief Model (HBM) is a psychological model that attempts to explain and predict health behaviors. The HBM is based on the understanding that a person will take a health-related action (for example use a heart healthy diet) if that person:

1. Perceived susceptibility and severity: feels that a negative health condition (i.e., heart disease) can be avoided.
2. Perceived benefits: has a favorable expectation that by adopting a suggested dietary action, he/she will avoid a negative health condition (i.e., high fiber and low fat diet will be effective at preventing heart disease).
3. Self efficacy: believes that he/she can successfully accomplish a recommended health action (i.e., he/she can adhere to the prescribed diet comfortably and with confidence; Janz & Becker, 1984).
Perceptions or beliefs about health-related actions are the key components of the HBM. The HBM constructs were used for the development of methodology and educational materials in an eight week osteoporosis prevention program. The results of the investigation concerning intentions to increase calcium intake after an educational intervention could have positive outcomes when based on a theoretical approach (Tussing & Chapman-Novakofski, 2005).

Nutrition education program based on HBM constructs was effective for type 2 diabetic patients since the perceived susceptibility, severity, and perceived benefits all increased in the intervention group while the perceived barriers reduced (Sharifirad, Entezari, Kamran, & Azadbakht, 2009).

Intervention schemes based on a combined application of the HBM and the Social Cognitive Theory have also been successful. Researchers aimed to increase nutritional knowledge and self-efficacy of post-menopausal women through a 20 week nutrition education program. The results revealed that the intervention had beneficial effects on the dietary intake of the subjects, especially on nutrients related to their bone health (Manios, Moschonis, Katsaroli, Grammatikaki, & Tanagra, 2007). These articles illustrate the importance of the health belief model in examining concepts in preventive medicine and public health fields.

**Cognitive Behavioral Therapy**

Cognitive behavioral therapy (CBT) is based on the idea that thoughts cause feelings and behaviors. The benefit of this fact is that the individual can change the way he/she thinks because an external stimulus is not the cause of that feeling. Cognitive
therapy was first described in terms of the cognitive theory of depression, which sees early life experiences as influencing the development of core beliefs. In CBT attention is drawn to these core beliefs by the therapists as individuals are not fully aware of the significance and influence on current cognitions and behaviors until that is done. Core beliefs lead to the development of dysfunctional assumptions. These are conditional statements in the form ‘If . . . then . . .’, for example, ‘If I do X, then Y will occur’ (Beck, Rush, Shaw, & Emery, 1979; Beck, 1987).

There is evidence that CBT can be used to support health behavior change. Obesity prevention program employed cognitive behavioral techniques (reinforcement and self-monitoring) to develop self control among children between six and twelve years of age. The study uncovered positive changes in emotional and social aspects of obesity-related behaviors and further reduced the total energy intake in these children (Vignolo et al., 2008).

Combining behavioral treatment with diet and exercise is emerging as a useful approach in helping obese individuals lose weight. Research has demonstrated that adding CBT tactics of cognitive skills and relapse prevention to either a low-fat diet or a low-carbohydrate diet produced significantly greater short-term weight loss in obese women compared with diet alone (Rodriguez-Hernandez et al., 2009).

**Theory of Planned Behavior**

The theory of planned behavior (TPB) serves as a comprehensive model for understanding change in both physical and psychosocial health behaviors. According to the TPB, the strength of a person’s intention to perform a given behavior is the
determinant of that behavior change occurring (for behaviors that are at least partially under the person’s control). Intention, in turn, is influenced by attitude towards the behavior (overall evaluation of the behavior), subjective norm (perceived social pressure to perform the behavior) and perceived behavioral control (PBC, perceived control over performing the behavior). Although reviews have demonstrated that compared to other predictor variables subjective norm was the weakest factor to predict intentions (Armitage & Conner, 2001). Underlying attitude, subjective norm and PBC are considered to be specific beliefs, referred to as behavioral beliefs, normative beliefs and control beliefs respectively. Beliefs salient to the individual are held to determine their attitude, subjective norm and PBC. According to the theory, changing behavior requires changing these underlying beliefs (Ajzen, 1991, 2002).

TPB model has been applied to varying age groups and diverse health conditions in an effort to understand the mechanism of behavior change (Blue, 2007; Kelley & Abraham, 2004; Lautenschlager & Smith, 2006). A nutrition education program to increase fruit and vegetable consumption and understanding of gardening among youth (eight-fifteen years of age) subjects employed the TPB model. The theory was successful in explaining the variance in intention and behavior; and attitude was most predictive of pre-survey intention (Lautenschlager & Smith, 2006).

For reducing disability and promoting health among older people through targeted intervention, researchers explored the TPB model. The intervention booklet was aimed at targeting intentions and PBC in relation to healthy eating and increasing activity levels amongst people over 65 years of age. The data supported theory-based interventions to
be successful in increasing PBC and more importantly applicable in outpatient clinic settings (Kelley & Abraham, 2004).

Similarly, the TPB was used to describe the behavioral mechanisms that influenced nutrition adherence in a culturally specific population. An important discovery was that PBC is significantly associated with intentions to adhere to nutrition recommendations. These findings propose that eating behaviors remain largely within the persons control along with suggesting which constructs to target in future for sustained behavior change (Gucciardi et al., 2007). Another investigation examined the relationship between TPB constructs and intention for healthy eating and intention towards being physically active. The results illustrated that the TPB was a useful model to gain insight into the relationship between intentions and beliefs of diabetic patients adopting healthy lifestyle behaviors (Blue, 2007).

Therefore, exploring the intentions and the underlying beliefs about health related behaviors among patients may be an important step in guiding interventions for community-based practice (Blue, 2007; Gucciardi et al., 2007). Attitudes are favorable or unfavorable opinions about a certain behavior, for example “Eating a low fat diet would be easy/difficult or enjoyable/unenjoyable.” The strength of these opinions or beliefs dictate whether an individual will undertake behavior change action (Ajzen, 1991, 2002). Programs geared towards mild to moderately obese women showed that attitude toward exercise and PBC were predictive of intention to exercise and that diet maintenance was predicted by intention (Gardner & Hausenblas, 2004; Mancini, 2001).
The likelihood of an individual taking specific health related action is primarily motivated by his/her perception about the degree of control he/she has over that health related action (Ajzen, 2002). This perception of control also called PBC is believed to moderate the relationship of intention to behavior, that is, intention will convert to behavior when PBC is high (Gardner & Hausenblas, 2004).

Theory and research support the need to assess both short and medium-term outcomes of nutrition education interventions. Short-term outcomes such as attitudes, values, perceptions, knowledge and skills need to be studied as they are important contributors to diet-related behavior (Contento & Balch, 1995). However, outcomes perceived to be valuable by the participants that result from participation in nutrition education programs have not been well documented (Devine et al., 2006).

According to a systematic review by the ADA Evidence Analysis Library Nutrition Counseling Workgroup, further research is needed to evaluate the behavior change theories as applied to nutrition education interventions (Spahn et al., 2010). Another study also recognized the need to assess change in theoretical constructs following individual and group counseling sessions to add strength to the current weak evidence base (Hoddinott, Allan, Avenell, & Britten, 2010).
CHAPTER III

METHODS

The purpose of the research was to determine if there was a difference between the intentions, attitudes and perceived behavioral control (PBC) of community members who received individual counseling for controlling weight and adapting healthy lifestyle behaviors vs. members who were part of a group program receiving healthy weight management education sessions. The research hypotheses were:

1. There is a difference in the intentions, attitudes and PBC towards healthy nutrition behaviors between individuals participating in a group counseling program vs. those receiving individual counseling by a dietitian.
2. There is a difference in the intentions, attitudes and PBC of individuals, towards healthy nutrition behaviors after participating in a nutrition intervention.

Research Design

The study was a quantitative investigation with a two group pretest-posttest design. The two groups were the individual counseling category and the group counseling category and both were tested pre and post intervention. The intervention was nutrition counseling provided either in a group setting or individually by a dietitian. Independent variables were Time (with two levels Pre and Post) and Intervention (with two levels of counseling format -- Individual and Group). Dependent variables were intentions, attitudes and PBC.
Data Collection Instrument

A five page questionnaire (Appendix A) was utilized to collect data. The questionnaire was based on the constructs of Theory of Planned Behavior (TPB). The TPB scales consisted of questions pertaining to subject’s intentions, PBC and attitudes towards healthy lifestyle behaviors. These scales were adapted from Sheeran and Orbell’s application of TPB constructs for an exercise intervention (Sheeran & Orbell, 2000).

The questionnaire consisted of four sections: three sections, with eight questions each, measured the TPB constructs utilizing a five point Likert scale answer format. The minimum score of eight and the maximum score of forty could be obtained for each construct. The first section of the study questionnaire contained questions on intentions. Responses for the intention scale ranged from ‘definitely no’ to ‘definitely yes.’ The second section of the questionnaire was comprised of questions measuring the PBC construct. The responses for the PBC control scale ranged from ‘strongly disagree’ to ‘strongly agree.’ The third section examined the attitudes towards healthy behavior. The attitude section had three responses for each question. The first response ranged from ‘not worthwhile’ to ‘worthwhile’, the second from ‘very easy’ to ‘very difficult’ and the last from ‘unpleasant’ to ‘pleasant.’ The final section collected demographic information such as identifier (last 3 letters of last name and last two digits of birth year to be able to match the pre and the post questionnaires for each subject), age, sex, race, marital status, education, income, exercise information, anthropometrics and medical history.
Sampling

Convenience sampling technique was used for this research. Subjects for the group counseling category were recruited from community members participating in the wellness program “LiteStyle-10 Weeks to a Healthier Body,” at Akron General’s Health & Wellness Center (AGWC) and from Akron General Medical Center’s (AGMC’s) phase II cardiac rehabilitation patient education sessions. Patients receiving one-on-one counseling for weight loss, heart healthy and sugar lowering diet from dietitians at AGMC’s Bariatric and Diabetic centers were recruited for the individual counseling category.

All adult (>18 yrs old) subjects participating in the group and individual counseling sessions were eligible for the study regardless of ethnicity, gender and state of health. Only the subjects attending 80% of the group wellness program and at least two individual counseling sessions or 90 minutes of individual counseling were eligible for the posttest. Subjects who were unable to give consent or were undergoing Bariatric surgery were not eligible for the study.

Structure of the Counseling Programs

Structure of Group Counseling Program

LifeStyles, a medically supervised nutrition, exercise and membership program, at AGWC was created by AGMC as part of their wellness agenda. Under the umbrella of LifeStyles falls the “LiteStyle-10 Weeks to a Healthier Body,” a group wellness program with a five week nutrition education component. The members of this program were
recruited as participants of the group counseling category. They were self-enrolled community members.

The group wellness program subjects participated in all ten one and half-hour weekly educational sessions which included the five week nutrition education module. A registered dietitian provided all instructions for the dietary sessions. The focus of the intervention was to deliver nutritional information geared towards achieving weight loss and healthier lifestyle. The areas of nutrition education addressed by the group program were: think light and eat right dietary guidelines; fire up metabolism through lifestyle changes; easy meal planning (via knowledge of food groups and food labels); super foods; and the art of dining out (Appendix B).

AGMC’s phase II cardiac rehabilitation group patient education sessions were designed to improve patient’s lifestyle and thus quality of life. This program included six 45 minutes sessions titled weight management; dietary guidelines; reading food labels; DASH (Dietary Approaches to Stop Hypertension) diet; Therapeutic Lifestyle Change diet, and dining out. The primary emphasis of the program was on weight management and heart healthy nutrition recommendations delivered by a registered dietitian (Appendix C). The members of this program were also recruited as participants of the group counseling category.

The sessions designed for both group programs were didactic in nature interspersed with questions and answers, and information was presented by means of computerized overhead projection, displays, and paper materials. A detailed outline was distributed at the beginning of each session to provide an overview and for note taking.
Structure of Individual Counseling Sessions

The individual sessions were delivered by the dietitians employed by the Bariatric and Diabetic centers. The nutritionists carried out two consultations for patients of the Bariatric center and a single consultation session for patients of the Diabetic center. The format of consultation was one-on-one with the help of educational materials for both centers. At the Bariatric center individual therapy comprised of a 60 minute initial visit. The subsequent visit was a 30 minute follow-up session. The structure of Diabetic center’s individual therapy consisted of a single 90 minute counseling session. The total counseling time each subject received from both individual therapy sessions was 90 minutes.

Recruitment

Recruitment for the Group Counseling Category

The community members who enrolled in the “LiteStyle-10 Weeks to a Healthier Body program” and AGMC’s phase II cardiac rehabilitation education sessions were recruited for the group counseling category. Subjects were enrolled at the orientation session at the beginning of the AGWC’s group wellness program and at the first 45 minute session of the AGMC’s group cardiac rehab program. The study was explained to the participants and then consent forms (Appendix D) were supplied. The pretest was administered at this time by the researcher.

Recruitment for the Individual Counseling Session

The dietitians of the Bariatric and the Diabetic centers identified the eligible subjects and asked their permission to be approached by the researcher to further explain
and elaborate the research study. The dietitians who ran Bariatric and Diabetic centers assisted the researcher in recruiting subjects. They had been given a clear description of the study by the researcher. Consent forms and the pretest were administered at the time of recruitment by the researcher or dietitian.

**Procedure**

**Procedure - Group Counseling Category**

The Institutional Review Board (IRB) of Kent State University and AGMC approved the project. At the first session of the group programs the dietitian introduced the researcher to the participants. The researcher explained the study and answered any questions regarding the study. Following which subjects received the consent forms. The pretest questionnaire was administered to those participants who wished to participate in the study and had signed the consent forms. Next, the subjects attended the “LiteStyle-10 Weeks to a Healthier Body program” which included a five week nutrition education component. The participants of the phase II cardiac rehabilitation program attended the six week group education sessions. The posttests were administered at the end of the ten week and six week group programs by the researcher.

**Procedure - Individual Counseling Category**

IRB approval was obtained for the dietitians of the Bariatric and Diabetic centers to recruit the participants along with the researcher. The researcher or dietitian asked the subjects permission to approach them to discuss the research study. The researcher or dietitian explained the study and asked the subjects to sign the consent form if they were interested in participating in the study. Pretest was administered before the first
individual counseling session by the researcher or dietitian. Next the participants attended consultations with the nutritionist. The Bariatric dietitian informed the researcher when the subjects would be coming in for their second consultations. Posttest was administered at the end of the two session intervention period by the researcher or dietitian for the Bariatric Center subjects and at the end of the single 90 minute session for the Diabetic Center participants.

Data Analysis

The three sections of the questionnaire measuring the TPB constructs were scored on a five point Likert scale. The minimum score a subject could achieve on each question was one and the maximum score was five. For each section (intentions, PBC, attitudes [the attitude section had three subgroups - not worthwhile/worthwhile; very easy/very difficult; unpleasant/pleasant]) the scores from the eight questions were totaled. Thus, the maximum score of 40 could be attained for each section. Repeated measure of analysis of variance was used for statistical analysis. The independent variables were time with two levels: pretest and posttest and intervention with two levels: individual and group counseling category. Student t-test was employed to compare changes between counseling categories from pre to post times. The statistical significance was set at $p \leq 0.05$. The descriptive data from the demographic form was presented as means and standard deviation for continuous data and frequencies for categorical variables.
CHAPTER IV

RESULTS

Demographic Characteristics

Out of the original 41 subjects enrolled in the two counseling formats, 32 participants completed the study. Five subjects in the group category were unable to complete the program and four subjects in the individual counseling category could not attend the follow-up sessions. Both individual and the group counseling categories had 16 subjects each that completed the study.

Descriptive characteristics of the study population are summarized in Tables 1 and 2. The average age of those entering the trial was older (approaching 50 years); they were mostly of Caucasian ethnicity with an overall mean BMI greater than 30 for both counseling groups. The demographic data on education indicated that 50% of the group counseling category held Master’s degree and 50% of the individual counseling category had completed high school. The remaining subjects were split between the other levels of education. Medical history indicated that majority of the trial participants were experiencing comorbidities of diabetes, heart disease, hypertension and/or asthma.

Description of Theory of Planned Behavior (TPB) Construct Results

Each TPB construct was measured using eight questions answered on a five point Likert scale. The scores from the eight questions were totaled. Therefore, the maximum score of 40 and the minimum score of eight could be attained for each construct. Table 3 reports the average score for each TPB construct for the two counseling categories.
Table 1

Demographics for Mean Age, BMI and Exercise Per Week

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Individual Counseling (n = 16)</th>
<th>Group Counseling (n = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>48.06 ± 14.98</td>
<td>49.69 ± 11.52</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>37.51 ± 8.05*</td>
<td>31.12 ± 5.63*</td>
</tr>
<tr>
<td>Exercise per week (days)</td>
<td>1.75 ± 2.29</td>
<td>2.81 ± 1.94</td>
</tr>
</tbody>
</table>

*p ≤ 0.05
### Subject Characteristics

<table>
<thead>
<tr>
<th>Demographic Data</th>
<th>Individual Counseling (n = 16)</th>
<th>Group Counseling (n = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5 (31.3)</td>
<td>8 (50.0)</td>
</tr>
<tr>
<td>Female</td>
<td>11 (68.8)</td>
<td>8 (50.0)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>12 (75.0)</td>
<td>15 (93.8)</td>
</tr>
<tr>
<td>African-American</td>
<td>3 (18.8)</td>
<td>1 (6.3)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1 (6.3)</td>
<td>----</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>4 (25.0)</td>
<td>4 (25.0)</td>
</tr>
<tr>
<td>Married</td>
<td>8 (50.0)</td>
<td>11 (68.8)</td>
</tr>
<tr>
<td>Divorced</td>
<td>3 (18.8)</td>
<td>1 (6.3)</td>
</tr>
<tr>
<td>Widowed</td>
<td>1 (6.3)</td>
<td>----</td>
</tr>
<tr>
<td><strong>Level of Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High School</td>
<td>8 (50.0)</td>
<td>3 (18.8)</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>1 (6.3)</td>
<td>3 (18.8)</td>
</tr>
<tr>
<td>Associate’s Degree</td>
<td>4 (25.0)</td>
<td>----</td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>1 (6.3)</td>
<td>8 (50.0)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (12.5)</td>
<td>2 (12.5)</td>
</tr>
<tr>
<td><strong>Yearly Household Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$&lt; 24,999</td>
<td>6 (37.5)</td>
<td>1 (6.3)</td>
</tr>
<tr>
<td>$25,000 - $34,999</td>
<td>----</td>
<td>2 (12.5)</td>
</tr>
<tr>
<td>$35,000 - $49,999</td>
<td>4 (25.0)</td>
<td>1 (6.3)</td>
</tr>
<tr>
<td>$50,000 - $64,999</td>
<td>2 (12.5)</td>
<td>2 (12.5)</td>
</tr>
<tr>
<td>$&gt;65,000</td>
<td>4 (25.0)</td>
<td>7 (43.8)</td>
</tr>
<tr>
<td><strong>Medical History</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>5 (31.3)</td>
<td>6 (37.5)</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>4 (25.0)</td>
<td>10 (62.5)</td>
</tr>
<tr>
<td>Kidney Disease</td>
<td>2 (12.5)</td>
<td>----</td>
</tr>
<tr>
<td>Hypertension</td>
<td>4 (25.0)</td>
<td>4 (25.0)</td>
</tr>
<tr>
<td>Asthma</td>
<td>3 (18.8)</td>
<td>3 (18.8)</td>
</tr>
<tr>
<td>Stroke</td>
<td>----</td>
<td>1 (6.3)</td>
</tr>
</tbody>
</table>

*a* Three participants did not respond to this question in the group counseling category.  
*b* Participants could select multiple medical history categories as applicable to them.
Table 3

*Means of Each Theory of Planned Behavior (TPB) Construct by Counseling Category*

<table>
<thead>
<tr>
<th>TPB constructs(^a)</th>
<th>Counseling Categories</th>
<th>Individual (n=16)</th>
<th>Group (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Intentions</td>
<td>30.44 ± 4.32</td>
<td>33.88 ± 4.15</td>
<td>34.56 ± 3.50</td>
</tr>
<tr>
<td>Perceived Behavior Control</td>
<td>30.88 ± 3.50</td>
<td>33.38 ± 4.00</td>
<td>30.94 ± 6.10</td>
</tr>
<tr>
<td>Attitude (not worthwhile to worthwhile)</td>
<td>36.63 ± 3.40</td>
<td>38.31 ± 3.20</td>
<td>36.94 ± 3.11</td>
</tr>
<tr>
<td>Attitude (very easy to very difficult)</td>
<td>23.00 ± 6.60</td>
<td>25.88 ± 7.60</td>
<td>23.63 ± 7.01</td>
</tr>
<tr>
<td>Attitude (unpleasant to pleasant)</td>
<td>28.94 ± 5.92</td>
<td>29.56 ± 5.56</td>
<td>27.38 ± 5.00</td>
</tr>
</tbody>
</table>

\(^a\)Totals were based on the sum of eight questions. The total minimum score possible for each construct was eight and the total maximum score possible for each construct was 40. Higher construct score predicts better behavioral outcome.
The results indicate that the pre-intervention TPB constructs intentions and PBC were scored in the range of 30 to 34 which implies that most subjects scored a four on the five point Likert scale. The TPB construct attitude (not worthwhile to worthwhile) totals indicate that most subjects scored on the higher end of the scale even in the pre-intervention phase of the trial. The scores for the construct attitude (very easy to very difficult) were on the middle range of the scale; on average, subjects scored three on a five point Likert scale pretest and upon posttest scoring pattern remained similar.

Figure 1 illustrates a significant difference in intentions between the individual and group counseling formats ($p = 0.014$). This outcome supports part of the research hypothesis - there is a difference in the intentions towards healthy nutrition behaviors between individuals participating in a group counseling program vs. those receiving individual counseling by a dietitian. Repeated measure analysis also demonstrated that for both the counseling categories there was a significant increase in intentions overtime ($p \leq 0.05$). The individual and group counseling categories were not significantly different for all other TPB constructs.

Regardless of the counseling format, there was significant increase from pre-intervention to post-intervention for all TPB constructs (i.e., intentions, PBC and the three sub-groups for attitudes) ($p \leq 0.05$; Table 4). These results support the research hypothesis - there is a difference in the intentions, attitudes and PBC of individuals, towards healthy nutrition behaviors after participating in a nutrition intervention. When comparing the two counseling categories by means of change in TPB constructs from pre-intervention to post-intervention the results demonstrated that there was a
Figure 1. Theory of Planned Behavior (TPB) construct intentions from pre to post time points by counseling categories.

*p ≤ 0.05
Table 4

*Changes in Theory of Planned Behavior (TPB) Constructs Regardless of Counseling Categories*

<table>
<thead>
<tr>
<th>TPB constructs</th>
<th>Mean Paired Differences&lt;sup&gt;a&lt;/sup&gt; (Post – Pre) (n = 32)</th>
<th>p value&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intentions</td>
<td>2.31 ± 3.63</td>
<td>.001</td>
</tr>
<tr>
<td>Perceived Behavior Control</td>
<td>3.19 ± 3.94</td>
<td>.001</td>
</tr>
<tr>
<td>Attitude (not worthwhile to worthwhile)</td>
<td>1.41 ± 3.72</td>
<td>.041</td>
</tr>
<tr>
<td>Attitude (very easy to very difficult)</td>
<td>4.41 ± 5.75</td>
<td>.001</td>
</tr>
<tr>
<td>Attitude (unpleasant to pleasant)</td>
<td>2.31 ± 4.90</td>
<td>.012</td>
</tr>
</tbody>
</table>

<sup>a</sup>Dependent *t*-test to compare if there were significant changes between posttest and pretest scores without regard to categories expressed as mean ± standard deviation.

<sup>b</sup>Statistical significance was set at $p \leq 0.05$
statistically significant (p ≤ 0.05) difference between individuals participating in a group counseling program vs. those receiving individual counseling by a dietitian for attitude subgroup unpleasant to pleasant (Figure 2). For all other TPB constructs, the change in constructs by individual and group counseling categories were not significantly different.

There was a significant interaction of time and counseling category (p ≤ 0.05 by repeated measure analysis) for the TPB construct attitude (unpleasant to pleasant) (Figure 3). Individual and group counseling category subjects responded differently to time as greater increase overtime was observed in the group counseling category for the construct attitude (unpleasant to pleasant) as compared to individual counseling category.
Figure 2. Changes in Theory of Planned Behavior (TPB) constructs by counseling categories.

*Independent t-test to compare significant changes between counseling categories expressed as mean differences ± standard deviation.

*p ≤ 0.05
Figure 3. Theory of Planned Behavior (TPB) construct attitude (unpleasant to pleasant) from pre to post time points by counseling categories.

*p ≤ 0.05 for time by counseling category interaction.
CHAPTER V
DISCUSSION

The purpose of this study was to examine if a difference exists between the intentions, attitudes, and PBC of the adult community members who receive healthy lifestyle instructions via the format of individual counseling as compared to group counseling interventions. The subjects participated in group programs and individual counseling sessions available in the community and hospital settings. Even though these programs were not developed based on a theoretical foundation, they did create an environment for increasing awareness and facilitating the voluntary adoption or maintenance of behaviors that were conducive to health.

The trial participants were primarily Caucasian older men and women; majority were married with a mean BMI in the clinically obese range (BMI $\geq 30$). All subjects had at least a high school diploma and half of the group counseling category had obtained a Master’s level education. According to the medical history, some study members had been diagnosed with obesity-related comorbidities.

TPB has been successful in predicting or explaining the relationship between factors thought to be associated with an outcome of interest (Armitage & Conner, 2001; Gardner & Hausenblas, 2004; Mancini, 2001). According to the TPB, the strength of a person’s intention to perform a given behavior (e.g., I intend to eat fruit and/or vegetables at each meal) is the determinant of that behavior change occurring. Intention to perform the behavior is further determined by the attitudes and PBC (Ajzen, 1991, 2002). The results of this study offer evidence that both individual and group counseling format
subjects had significantly higher TPB construct scores post-intervention supporting the hypothesis there is a difference in the intentions, attitudes and PBC of individuals towards healthy nutrition behaviors after participating in a nutrition intervention. This implies that all measured TPB constructs were enhanced after nutrition education intervention focused on healthy lifestyle changes whether it was imparted through individual or group counseling. Studies have applied TPB model to diverse health conditions to bring about positive behavior change (Blue, 2007; Kelley & Abraham, 2004; Lautenschlager & Smith, 2006). Many of these study interventions were developed based on a theoretical foundation. On the contrary, the current study showed improvements in TPB constructs (intentions, attitudes and PBC) of interventions which were not based on a specific theory and were available through existing clinical and wellness settings. Research based on TPB has shown intention converts to behavior when PBC is high and also the more positive a person’s overall attitude toward the behavior, the greater his or her perception of control (Gardner & Hausenblas, 2004). The present research did demonstrate an increase in PBC and a more positive attitude after group and individual counseling format interventions. However, this study did not measure actual change in health behaviors. Although several other trials have indicated that increasing TPB constructs does lead to healthier lifestyle change for instance behavioral weight control program participants who had high intention and high PBC lost significantly more weight compared to subjects who had lower intentions and PBC (Waleekhachonloet et al., 2007). Similarly, patients showed increase in all constructs of the TPB and better nutrition adherence after participation in a theory based education
program for diabetics (Gucciardi et al., 2007). Conclusions from the present study showed improvements in TPB constructs and as observed by other researchers this may raise the likelihood that positive behavioral changes could be executed through group and individual nutrition education interventions.

Several relevant studies that have employed theory based interventions for weight gain prevention and improving metabolic syndrome risk factors, allowed researchers to describe the study population’s psychosocial variables (such as self-efficacy, attitudes and perceptions; Armitage & Conner, 2001; Manios et al., 2007; Tuuri et al., 2009).

Correspondingly, TPB attitude sub-group construct scores of this study illustrated that the participants were inclined to consider it worthwhile to enroll in a lifestyle change program whether it be via the set-up of group or individual counseling. However, the subjects found the process of adopting healthy nutrition behaviors difficult both before and after the interventions. This indicates that nutrition education counseling sessions may need to focus more resources on how gradual shaping of behavior could be an easier process and less on enumerating why attending the program would be worthwhile.

Theory based investigations have also been able to assess which constructs were stronger or weaker by looking at the construct scores. This has helped practitioners recognize when obese patients were receptive to specific behavioral interventions, types of education modules and which dietary, physical activity and behavior modifications techniques were successful for which behaviors (Armitage & Conner, 2001; Gucciardi et al., 2007; Logue, Sutton, Jarjoura, & Smucker, 2000; Lombard, Deeks, Ball, Jolley, & Teede, 2009). Similarly, the current study helped describe psychosocial variables
pertaining specifically to TPB in an effort to shed light on which constructs or subgroups of a construct needed strengthening. The lower construct scores for attitude subgroups (very easy to very difficult) and (unpleasant to pleasant) suggest weak attitudes for these subgroups while the moderate scores for intentions and PBC suggest these constructs could be further improved. This knowledge adds to the body of research which could enable dietitians and physicians recognize potential value of TPB constructs in facilitating nutrition-related behavior change. A recent review by the ADA recommends constructs, variables and strategies central to behavioral theories be considered while developing effective diet counseling (Spahn et al., 2010).

In the present study significant difference in intentions was found between the two counseling categories. Participants receiving group education had significantly higher intentions as compared to the individual counseling category. However, there was no significant difference between the two counseling categories for PBC and all three subgroups of attitude. Therefore, the research hypothesis, there is a difference in the TPB psychosocial variables towards healthy nutrition behaviors between the two counseling categories was partially supported. Scientists comparing individual and group counseling formats have had mixed results. Some reviews found group counseling to be more efficacious than individual counseling (Paul-Ebbohimhen, & Avenell, 2009) while other studies found change in health outcomes similar for group and individual counseling post-interventions (Ash et al., 2006; Waleekhachonloet et al., 2007).

The individual and group education interventional programs have different characteristics and advantages. Individual therapy permits a greater opportunity to
address personal and emotional issues (Renjilian et al., 2001) whereas interventions provided in group settings provide the option of enhanced social support thus creating an environment that facilitates behavior change (Arseneau et al., 1994). Therapeutic factors like group learning and group optimism probably help create this positive environment (Cooper et al., 2003). The findings from this study support these pros of individual and group counseling formats as no significant difference was found between the two categories for most of the TPB constructs.

The current research also examined if there was a difference in the TPB constructs by comparing the two counseling categories by means of change in TPB constructs within categories from pre-intervention to post-intervention. There was a significant difference for attitude sub-group (unpleasant to pleasant) upon comparing the two education formats. It can be reasoned that attitude sub-group (unpleasant to pleasant) became stronger in the group counseling format as compared to the individual counseling format. However, for all other TPB constructs, no significant difference between group counseling and individual counseling formats was found when comparing change in TPB constructs within categories. This is supported by the conclusions of other studies from the literature which determined that behavior change outcomes following group counseling format interventions were comparable to behavior change outcomes following individual counseling format interventions (Ash et al., 2006; Jeffery et al., 1983; Waleekhachonloet et al., 2007). The individual and group counseling formats are the nutrition education modules that are predominantly employed in the clinical and non-clinical settings for delivery of nutrition education. The findings from this research
emphasize that both counseling formats were comparable in terms of TPB construct improvements and as demonstrated by other researchers (Tussing & Chapman-Novakofski, 2005; Tuuri et al., 2009) the construct score increases may facilitate adoption of positive behavior.

**Application**

The results of this study suggest that community members could increase their intentions, PBC and attitudes by enrolling in individual or group counseling programs if available to them through their worksites, hospitals or wellness programs. The acquisition of this data would allow the program developers and the dietitians to recognize intention, attitudes and PBC can be strengthened through nutrition education programming delivered via the medium of individual and group counseling. Improving behavioral skills would empower participants to improve their nutritional intake and control weight in a healthy manner. Scientists could employ the current research to inform and develop programs which would lead to measurable health improvements at a population level.

The research emphasizes the fact that participants find the nutrition education available in wellness and other group programs and individual counseling sessions to be worthwhile. Also as no difference was found for most TPB constructs between group counseling and individual counseling delivery formats for weight management and healthy lifestyle components, participants could choose either individual or group programs for acquiring nutrition education information. Other studies have shown the cost-effectiveness of group counseling format as group-based interventions provided
instructions to multiple participants while at the same time achieving similar health outcomes as the individual format (Ash et al., 2006; Gillespie et al., 1995). The current study also found comparable results in terms of change in theoretical constructs for the two counseling formats. Therefore, in the current economic times based on previous and this current research, group therapy could be utilized as one of the primary approaches to behavior change intervention.

**Limitations**

Several limitations of the study are noted. The total numbers of subjects enrolled were 32 as 16 subjects enrolled in each counseling category generating a small sample size. There was a difference in the format and amount of time allocated to nutrition education with respect to the two counseling formats. The duration of intervention was 90 minutes for the individual counseling format while the group counseling nutrition education intervention time ranged from 45 to 60 minutes once a week for five to six weeks in length. The content of the nutrition education delivered could not be matched exactly. Both counseling formats delivered dietary information geared towards achieving weight loss and healthier lifestyle. This trial also did not measure actual change in health related outcomes.

**Future Research**

Dietetics practitioners are encouraged to develop effective group and individual counseling interventions grounded in theory and further evaluate these programs to better identify the strategies for increasing participation and adherence to the intervention principles by community members. Researcher dietitians and wellness program directors
need to develop methodology to judge the intentions, attitudes and PBC of the individuals wanting nutrition education to better understand which constructs need additional attention. The information gathered could be helpful in refining behavior modification strategies (motivational interviewing or goal setting or self monitoring) aimed at altering target behaviors. Additional research needs to be done to determine whether change in theoretical constructs resulting from participating in nutrition education programs could in fact translate into sustained behavior change.

**Conclusions**

In conclusion, there was an increase in the intentions, attitudes and PBC of individuals towards healthy nutrition behaviors after participating in a nutrition intervention. Overall improvements in behavioral constructs were observed following the participation in existing clinical and non-clinical setting interventions. In addition, there was a difference in the intentions but not in the attitudes and PBC towards healthy nutrition behaviors between individuals participating in a group counseling program vs. those receiving individual counseling by a dietitian. Although, the intentions were raised more in the group counseling category for all other TPB constructs the two counseling modules were comparable. Community members interested in enhancing behavioral skills could enroll in well designed nutrition education programs whether they are imparted through group or individual counseling formats.
APPENDICES
APPENDIX A

STUDY QUESTIONNAIRE
Appendix A

Study Questionnaire

Please fill the below mentioned information in order to match the pre and post-test questionnaire and the demographic form.

Last three letters of your Last Name _____  Last two digits of your Birth Year _____

Intentions

Instructions: Please answer what your intentions are towards the following healthy nutrition behaviors by placing an “X” on the scale that best describes your intention.

<table>
<thead>
<tr>
<th>Intentions</th>
<th>Definitely No</th>
<th>Some what No</th>
<th>Neutral (Neither Yes nor No)</th>
<th>Some what Yes</th>
<th>Definitely Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I intend to avoid snacking on fattening foods between meals and in the evenings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I intend to avoid being in places where I might be tempted to eat fattening foods and/or eat too much (e.g., restaurants, bakeries, coffee shops)</td>
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<tr>
<td>I intend to decrease food intake in general by eating lighter meals, not having seconds, and not overeating</td>
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<tr>
<td>I intend to substitute less fattening foods for fattening foods</td>
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<tr>
<td>I intend to maintain the same portion of bread, cereal, rice, pasta or potatoes at each meal</td>
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<tr>
<td>I intend to eat fruit and/or vegetables at each meal</td>
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<tr>
<td>I intend to minimize the amount of animal fats in my diet (lean meats, skinless poultry)</td>
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<tr>
<td>I intend to use little or no fats in cooking (e.g., margarine, butter, oil, olive oil or lard)</td>
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</tbody>
</table>

Please continue to next page
Perceived Behavioral Control
Instructions: Please answer what your Perceived Behavior Control (PBC) is towards the following healthy nutrition behaviors by placing an “X” on the scale that best describes your PBC.

<table>
<thead>
<tr>
<th>Perceived Behavior Control I feel complete control over whether not I can:</th>
<th>Strongly Disagree</th>
<th>Disagree Some</th>
<th>Neutral (Neither yes nor No)</th>
<th>Agree Some</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoid snacking on fattening foods between meals and in the evenings</td>
<td></td>
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<tr>
<td>Avoid being in places where I might be tempted to eat fattening foods and/or eat too much (e.g., restaurants, bakeries, coffee shops)</td>
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<tr>
<td>Decrease food intake in general by eating lighter meals, not having seconds, and not overeating</td>
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<tr>
<td>Substitute less fattening foods for fattening foods</td>
<td></td>
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<tr>
<td>Maintain the same portion of bread, cereal, rice, pasta or potatoes at each meal</td>
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</tr>
<tr>
<td>Eat fruit and/or vegetables at each meal</td>
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</tr>
<tr>
<td>Minimize the amount of animal fats in my diet (lean meats, skinless poultry)</td>
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<td></td>
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<tr>
<td>Use little or no fats in cooking (e.g., margarine, butter, oil, olive oil or lard)</td>
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<td></td>
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</tbody>
</table>

Please continue to next page
Attitudes
Instructions: Please answer what your attitudes are towards the following healthy nutrition behaviors by placing an “X” on the scale that best describes your attitudes.

For me to avoid snacking on fattening foods between meals and in the evenings would be...

Not worthwhile: _____:_____:_____:_____ Worthwhile
Very Easy: _____:_____:_____:_____ Very Difficult
Unpleasant: _____:_____:_____:_____ Pleasant

For me to avoid being in places where I might be tempted to eat fattening foods and/or eat too much (e.g., restaurants, bakeries, coffee shops) would be...

Not worthwhile: _____:_____:_____:_____ Worthwhile
Very Easy: _____:_____:_____:_____ Very Difficult
Unpleasant: _____:_____:_____:_____ Pleasant

For me to decrease food intake in general by eating lighter meals, not having seconds, and not overeating would be...

Not worthwhile: _____:_____:_____:_____ Worthwhile
Very Easy: _____:_____:_____:_____ Very Difficult
Unpleasant: _____:_____:_____:_____ Pleasant

For me to substitute less fattening foods for fattening foods would be...

Not worthwhile: _____:_____:_____:_____ Worthwhile
Very Easy: _____:_____:_____:_____ Very Difficult
Unpleasant: _____:_____:_____:_____ Pleasant

Please continue to next page
Maintaining the same portion of bread, cereal, rice, pasta or potatoes at each meal would be...  

Not worthwhile:  ____:____:____:____:____: Worthwhile  
Very Easy:  ____:____:____:____:____: Very Difficult  
Unpleasant:  ____:____:____:____:____: Pleasant  

Eating fruit and vegetables at every meal would be...  

Not worthwhile:  ____:____:____:____:____: Worthwhile  
Very Easy:  ____:____:____:____:____: Very Difficult  
Unpleasant:  ____:____:____:____:____: Pleasant  

Limiting the amount of animal fats in my diet would be...  

Not worthwhile:  ____:____:____:____:____: Worthwhile  
Very Easy:  ____:____:____:____:____: Very Difficult  
Unpleasant:  ____:____:____:____:____: Pleasant  

Using little or no fats in cooking would be...  

Not worthwhile:  ____:____:____:____:____: Worthwhile  
Very Easy:  ____:____:____:____:____: Very Difficult  
Unpleasant:  ____:____:____:____:____: Pleasant  

Please continue to next page
Instructions: Please answer the following questions as part of the demographic questionnaire which will help us better describe the study participants. Your responses are voluntary and will be treated in a highly confidential manner.

Today's date ______________

Age: ______

Sex: ( ) Male / ( ) Female

Race: ( ) Caucasian ( ) African-American ( ) Hispanic ( ) Asian ( ) Other

Marital Status: ( ) Single ( ) Married ( ) Divorced ( ) Widowed

You’re Education: High School _______   Bachelor’s Degree ________
Associate’s Degree _______      Master’s Degree _______   Other ______

Yearly Family Income:  ( ) < $24,999
( ) $25,000 - $34,999
( ) $35,000 - $49,999
( ) $50,000 - $64,999
( ) >$65,000

How many people does this income support? ________

How many times per week do you currently exercise/participate in sports? ______________

Anthropometrics: Average adult weight: _________ lbs.   Height _______ (inches/cm)

Medical History: Please circle if there is any history/present medical problem?
Diabetes   Kidney Disease
Heart Disease   Asthma
Hypertension   Stroke

Thank you for taking the time to complete this survey!
APPENDIX B

LIFESTYLE - 10 WEEKS TO A HEALTHIER BODY
Appendix B

LiteStyle -10 Weeks to a Healthier Body

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Week 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Think Light and Eat Right</td>
<td>Week 2</td>
</tr>
<tr>
<td>Fire up Metabolism</td>
<td>Week 3</td>
</tr>
<tr>
<td>Easy Meal Planning</td>
<td>Week 4</td>
</tr>
<tr>
<td>Super foods</td>
<td>Week 5</td>
</tr>
<tr>
<td>Psychology of Weight Management</td>
<td>Week 6</td>
</tr>
<tr>
<td>Exercise Physiology</td>
<td>Week 7</td>
</tr>
<tr>
<td>Mind and Body</td>
<td>Week 8</td>
</tr>
<tr>
<td>Keeping the Motivation</td>
<td>Week 9</td>
</tr>
<tr>
<td>The Art of Dining out</td>
<td>Week 10</td>
</tr>
</tbody>
</table>
APPENDIX C
CARDIAC REHABILITATION GROUP PATIENT
EDUCATION SESSION PAMPHLET
Appendix C

Cardiac Rehabilitation Group Patient

Education Session Pamphlet

Akron General Medical Center
Phase II Cardiac Rehabilitation
Group Patient Education Sessions

Thursday Oct 14 Dietary guidelines
Thursday Oct 21 Weight Management
Thursday Oct 28 T.L.C. Diet
Thursday Nov 4 Dash Diet
Thursday Nov 11 Food Label Logic
Thursday Nov 18 Dining Out

Education Sessions:
8:15 - 9:00 am
11:30 - 12:15 pm
1:30 - 2:15 pm
4:45 - 5:30 pm
APPENDIX D

CONSENT FORM
Appendix D

Consent Form

Informed Consent to Participate in a Research Study

Study Title: Intentions, attitudes, and perceived behavior control towards healthy nutrition behaviors of individuals participating in a group wellness program vs. those receiving individual counseling.

Principal Investigator: Aditi Paranjape, B.S.

You are being invited to participate in a research study. This consent form will provide you with information on the research project, what you will need to do, and the associated risks and benefits of the research. Your participation is voluntary. Please read this form carefully. It is important that you ask questions and fully understand the research in order to make an informed decision. You will receive a copy of this document to take with you.

Purpose

The numbers of individuals who are overweight and obese and with obesity related health problems are on the rise in the United States. Lifestyle intervention strategies have led to improvements in metabolic abnormalities. These interventions have resulted in decreased body weight and reduction in elevated blood glucose and blood pressure levels. The two modes of delivery for lifestyle interventions are individual counseling and group counseling through group wellness programs. The objective of this study is to determine
if a difference exists between the intentions, attitudes and perceived behavior control (PBC) of the adult community members who receive individual weight management counseling and those who participate in a group weight management program.

**Procedures**

You will receive the consent forms to read over and sign if you wish to participate in the study. Following that the researcher will give you the pre-test questionnaire. It will have four sections. The first three sections will ask you questions about your intentions, attitudes and perceived behavioral control (PBC) towards healthy nutrition behaviors. The last section will collect demographic information. You will then attend your counseling sessions. Group program participants will attend the Akron General Health & Wellness Center’s Lifestyles wellness program and Akron General Medical Center’s phase II cardiac rehabilitation education sessions and a post-test questionnaire will be given at the end of the programs. Individual counseling session participants will attend two counseling sessions or 90 minutes of individual counseling and a post-test questionnaire will be given after you have attended the counseling sessions.

**Benefits**

This research will not benefit you directly. However, your participation in this study will help researchers to better understand the intentions, attitudes and PBC of subjects participating in the two counseling groups (individual and group). This knowledge may impact how and what nutrition education information should be given along with improving the design of the program. It may help the dietitians in identifying which education module of the individual counseling session would be most relevant to the
patient. The information from this study could further allow the wellness program developers and the dietitians to recognize which areas (intention, attitudes or PBC) of the participants need to be strengthened. That information may be helpful in refining behavior modification strategies (motivational interviewing or goal setting or self monitoring) aimed at altering target behaviors.

**Risks and Discomforts**

You may ask to see the questions before deciding whether or not to participate in the study. There are no anticipated risks beyond those encountered in everyday life.

**Privacy and Confidentiality**

No identifying information will be collected. Your signed consent form will be kept separate from your study data, and responses will not be linked to you. Research participants will not be identified in any publication or presentation of research results; only aggregate data will be used. Researcher is asking for last three letters of last name and last two digits of birth year to be able to match the pre and the post questionnaires for each subject. Only the researcher will have access to the collected data.

**Compensation**

No money is being provided to you for participating in this research study. You can continue to participate in the group wellness program and receive individual consultations regardless of your participation in the study.

**Voluntary Participation**

Taking part in this research study is entirely up to you. You may choose not to participate or you may discontinue your participation at any time without penalty or loss.
of benefits to which you are otherwise entitled. You will be informed of any new, relevant information that may affect your health, welfare, or willingness to continue your study participation.

Contact Information

If you have any questions or concerns about this research, you may contact Aditi Paranjape at 330.860.0244 or Dr. K. Gordon at 330.672.2248. If you have any questions about your rights as a research participant or complaints about the research, you may call the Kent State University Institutional Review Board IRB at 330.672.2704.

Consent Statement and Signature

I have read this consent form and have had the opportunity to have my questions answered to my satisfaction. I voluntarily agree to participate in this study. I understand that a copy of this consent will be provided to me for future reference.

________________________________  _____________________
Participant Signature     Date
REFERENCES
REFERENCES


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