THE EFFECTS OF A NUTRITION INTERVENTION ON ADULTS IN A COMMUNITY PROGRAM

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Obesity continues to be a national epidemic affecting many individuals in our communities today. One way to positively affect these individuals may be through a community nutrition intervention program; however, there is currently no data on the effects of this program. **PURPOSE:** The purpose of this study was to analyze the effect of a nutrition intervention program on adults in a community program called the Community Leisure Learn Program (CLLP) at the University of Pittsburgh. **METHODS:** Twenty-two men and women participated in a 10-week behavioral weight-loss nutrition intervention as part of an ongoing community program that provided physical activity opportunities as a primary focus. Participants were assigned to either a Non-Interactive Nutrition Intervention Program (NINIP) group or an Interactive Nutrition Intervention Program (INIP) group. In addition to the community program activities undertaken by both groups, INIP received a weekly behavioral weight-loss class and 1200-1500 kcal/20% fat diet. Baseline to 10 week differences between the NINIP and INIP groups were determined for body weight (kg), Eating Behavior Inventory (EBI), Paffenbarger Physical Activity Questionnaire, and a nutrition exam. Mean age was 38.3 ± 7.1 years and mean body mass index (BMI) was 34.1 ± 5.5 kg/m². **RESULTS:** Significant baseline to 10 week differences between the INIP and NINIP groups were found for the nutrition exam scores and EBI. The INIP group showed an average EBI score of 81.7 ± 7.4 at baseline and 91.0 ± 13.8 at 10-weeks along with an average nutrition exam score of 48.7% ± 12.5% at baseline and 59.7% ±

14.0% at 10-weeks whereas the NINIP showed an average EBI score of 79.6 ± 9.9 at baseline and 80.7 ± 11.6 at 10-weeks along with an average nutrition exam score of 50.1% ± 21.4% at baseline and 52.6% ± 18.1% at 10-weeks. **CONCLUSION:** Significant improvements were seen in the nutrition exam and EBI for the INIP group. However, there was not a significant difference in weight change and physical activity between the NINIP and INIP groups. A longer program with a physical activity focus may be necessary to achieve significant weight and physical activity changes.

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1.0 INTRODUCTION

Obesity is considered a public health epidemic in our country today. As the rate of overweight and obese Americans continues to increase, we are faced with the challenge of intervening to instill change (16). The presence of obesity increases the risk for medical complications including greater risk of type II diabetes, cardiovascular disease, certain cancers, and death (27). Lifestyle characteristics (i.e.: nutritional intake and physical activity) affect weight status and therefore, affect the chance of developing preventable diseases and conditions associated with obesity (17). Nutrition is an important component of a healthy weight status and plays a critical role in obesity prevention and treatment.

Obesity has been characterized as a preventable lifestyle disease. Although various strategies have been developed in an attempt to decrease obesity rates, the numbers continue to rise; over 66% of Americans are overweight or obese (4). An array of weight loss and weight maintenance techniques exist, from commercial weight loss solutions, structured self-guided approaches, to medically supervised diets; however, they may not be available to everyone due to barriers such as income, education, motivation, or family responsibilities. Another approach to address this major epidemic is through local community-based interventions targeted at assisting individuals to make changes in their nutrient intake and physical activity levels. Community-based interventions involve a process whereby health professionals define a health problem, develop strategies to remedy the problem, and involve local community members to

assist in implementing strategies to resolve the problem (33). Addressing the problem through a community-based intervention may be a way to reach and educate an underserved population about the associated risks of obesity, and effective strategies for prevention of weight gain or weight loss through proper food and lifestyle choices.

1.1 RATIONALE

1.1.1 Prevalence of Obesity

The prevalence of obesity has steadily increased over the last three decades (35). Current evidence reports that obesity rates are likely to remain on the rise. In fact, projections show that if trends continue, over 80% of Americans will be overweight or obese 15 years from now (35). Moreover, by year 2030, according to projection models, nearly 90% (86.3%) of all Americans will become overweight and 51.1% will be obese. Black women (combined prevalence 96.9%) and Mexican American men (91.1%) will be most affected. In children and adolescents, prevalence of overweight will increase 1.6-fold (to ~30%) by 2030 as well (36). These projections provide evidence that Americans, need to change poor lifestyle choices now, before these estimates are realized.

Despite the overall increase in obesity, there are large disparities between population groups and various nationalities. Obesity is most prevalent in African Americans of non-Hispanic descent; this population has the highest occurrence compared to all other races (16). Minority groups (i.e. non-Hispanic African Americans and Mexican Americans) actually have a

higher combined prevalence, compared to non-Hispanic Whites, by nearly 10 percentage points (36).

There are also disparities among African American men and women. In 2003-2004 black women showed a higher prevalence than black men with an 81.6% overweight or obese status reported (36). This obesity predominance observed in African American women may be associated with black women's discrepancy to the "thin ideal" body shape. In fact, there is evidence that African American women and their family members are satisfied with excess body weight on a woman's body, and actually try to avoid being "too thin" (31). This ideal may be a barrier to reach African American women who are overweight yet content with their body size. These women are still at risk for diseases and co-morbidities linked to excess body weight, which is why intervention is vital. If measures are not taken to change these trends, the majority of our population will be living with, and dying from, a preventable, lifestyle disease.

1.1.2 Dietary Approaches to Obesity

The loss or prevention of excess body weight is the most important part of decreasing obesity risk in an individual. Diet and physical activity are two components that are absolutely critical to weight loss success. Although physical activity is an important part of good health, it has been shown to be more important in the maintenance of a healthy weight and lifestyle. Therefore, targeting dietary intake is critical in assisting individuals with weight loss or preventing weight gain in the first place. A study done by Jakicic, Wing, and Winters-Hart (2002), showed that weight loss was influenced more by changes in eating behaviors than changes in physical activity (13). The study also highlighted the importance of changing eating behaviors to improve long-term weight loss, which may have a greater affect on weight loss than physical activity alone.

Furthermore, research has shown that an unhealthy diet may contribute to an increased prevalence of obesity and chronic diseases in African Americans; compared to other ethnic groups (9). African Americans have been shown to have higher intakes of sodium, cholesterol, total and saturated fat, and lower intakes of fiber, fruits, vegetables, and whole grains (9). African Americans are shown to be less likely than non-Hispanic white to adopt lower-fat eating behaviors, such as avoiding fast food (9). Educating this population about healthier food alternatives, better methods of food preparation, and adequate intakes of macronutrients may enable them to increase the quality of nutrition and therefore, improve weight status in this group of individuals. The educational component is an important first step because without practical knowledge and knowledge of lifestyle application, it is unlikely key behaviors will change.

An overall healthy lifestyle is not only important for initial weight loss, but is vital for long term weight maintenance, as a large part of weight regain may be attributable to an inability to maintain healthy eating and exercise behaviors over time (35). The means a healthy lifestyle may only be manageable if individuals break down barriers that interfere with attaining a healthy way of living. If individuals know how to make proper food choices, are capable of finding nutritious foods at low-cost, and are able to use healthy preparation methods they may be more likely to sustain a healthier lifestyle and appropriate body weight.

1.1.3 Community-Based Interventions

Although previous research addressing community health intervention programming is limited, some research has shown that well-designed community health-based intervention programs can be successful in improving lifestyle choices and healthy habits. A study done by Englert, Diehl, Greenlaw, Willich & Aldana (2007) assessed the clinical effects of a community-based lifestyle

intervention program in reducing coronary risk in a group of adults (5). Over a period of 30 days, the Coronary Health Improvement Project educational program was delivered through the Center for Complementary Medicine of the Swedish American Health System and was offered to its employees and the general public. Participants were instructed to improve lifestyle habits by optimizing their diet by shifting from the typical rich American Diet to a more whole-food, plant-centered diet. Several workshops (i.e. cooking classes, food shopping-tours, clinical breakout sessions) were offered to subjects during the 16 lecture program as well. Furthermore, participants were encouraged to improve health behaviors by increasing physical activity through a recommended daily fitness program of 30 minutes of walking and general exercise.

Significant improvements were shown in the most at-risk individuals which included reductions in weight, blood pressure, and blood cholesterol; over 73% of the participants had 3 or more coronary risk factors at the beginning of the intervention and only 46% at the end. Additionally, both women and men in the study lost an average of 6 pounds, while total cholesterol averages decreased 15 mg% and 22 mg%, and LDL came down 8 mg% and 17 mg%, respectively. The study reported that a well-designed community-based intervention program can improve lifestyle choices and health habits; it can also markedly, and quickly, reduce the level of coronary risk factors (5).

Community-based interventions have increasingly received attention since researchers and public health professionals have come to acknowledge the importance that environment plays in making healthy choices (33). However, research involving community-based studies investigating the effects of culturally appropriate interventions is warranted (9). Furthermore, applicable information pertaining to community programs focused on nutrition intervention is insufficient to respond to the current public health situation. Applicable information relate to

successful methods for health professionals to administer community-based interventions is limited. Consequently, it is unclear how formal education along with extrinsic and intrinsic motivation in a community-based program can affect weight status and lifestyle choices.

There has been one study recently published on obese African American women and weight loss that explored perspectives on, and identified barriers to, weight management (19). These barriers included lack of time remaining after fulfilling work, family, and social obligations; limited economic resources placing restrictions on food choices; and difficulty accessing classes needed to increase physical activity (19). A community-based intervention would be able to address all of these barriers through education, support, and healthy lifestyle opportunities.

1.2 STATEMENT OF THE PROBLEM

It is well known that the obesity epidemic in our country has steadily increased, and continued action needs to be taken to address this problem. Although teams of professionals all over the country (i.e. including researchers, exercise physiologists, nutritionists, public health experts etc.) are searching for answers everyday, addressing the obesity problems at a local level can be an important step to understanding part of the solution. Establishing a nutrition intervention as part of a community program, with primarily at-risk African Americans, may enable us to better understand ways to reach this population, and eventually help other communities establish similar programs.

Therefore, the purpose of this study will be to analyze the effect of a nutrition intervention program on adults in a community program called the Community Leisure Learn Program (CLLP) at the University of Pittsburgh.

1.3 SPECIFIC AIMS

The primary aims of this study are to examine:

1. Total caloric intake (kcals/day) in the Interactive Nutrition Intervention Program (INIP) compared to the Non-Interactive Intervention Program (NINIP).
2. Total fat intake (grams/day) in the INIP compared to the NINIP.

Exploratory aims of this study are to examine:

1. Weight and Body Mass Index (BMI) in the INIP compared to NINIP.
2. Waist circumference in the INIP compared to NINIP.
3. Level of physical activity (minutes) in the INIP compared to NINIP.
4. The results of the Eating Behavior Inventory (EBI) in the INIP compared to NINIP
5. The score of a nutrition exam in the INIP compared to the NINIP.

1.4 HYPOTHESIS

The primary hypotheses of this study are:

1. Total caloric intake will be significantly lower following the INIP verses NINIP.

2. Total fat intake will be significantly lower following the INIP verses NINIP.

Exploratory hypotheses of this study are:

1. Weight and BMI will be significantly lower following the INIP verses NINIP.
2. Waist/hip ratio will be significantly lower following the INIP verses NINIP.
3. Weekly levels of physical activity will be significantly greater following the INIP verses NINIP.
4. Scores on the EBI will be significantly higher in the INIP verses NINIP.
5. Score on the nutrition exam will be significantly higher following the INIP verses NINIP.

1.5 SIGNIFICANCE

The CCLP offers local underserved residents the opportunity to improve their health and well-being by participating in physical activity at the University of Pittsburgh every Saturday morning in the spring and fall. This population is comprised primarily of minorities with low socioeconomic status; the majority of participants are also overweight and of African American descent. Therefore, an organized nutrition intervention added to this program will allow participants to receive accurate nutrition education and may improve their nutrition status at a low cost. Addressing the nutrition component was chosen primarily because the participants in the CLLP are already exposed to an organized physical activity program through aerobics classes and resistance exercise.

Due to the fact that there are currently no data recorded or published on the impact of the CLLP on health parameters and weight, this is an excellent opportunity to address the effect of an organized nutrition intervention on CLLP participants. The intervention will not only benefit the participants, it will also provide information regarding how the structure of the service can be improved upon for future implementation.

This study will help at-risk individuals learn about healthy food choices; moreover, the results of the data analysis will help CLLP coordinators improve the program structure and thus, increase program effectiveness overall. Publication of the results would also raise awareness of the community out-reach service and may increase participation. Furthermore, publication of the information would also benefit society as a whole, because new research pertaining to the prevention and treatment of obesity, specifically related to community-based intervention, is warranted.

2.0 REVIEW OF LITERATURE

2.1 INTRODUCTION

The purpose of this literature review is to provide support for the addition of a nutrition intervention to an already existing community-based health program, which focuses mainly on physical activity. However, current research involving nutrition interventions administered in a community-based health program setting is limited; therefore, it is necessary to examine other community-based health interventions, many of which pertain to overweight and obesity prevention and treatment. Several different subtopic areas will be discussed in this literature review consisting of: the presence of obesity in the United States (U.S.), community-based health intervention programs, the effects of dietary changes and physical activity on health, and the prevalence of health concerns and obesity in African Americans and low-income populations.

2.2 PRESENCE OF OBESITY IN THE UNITED STATES

Over the past three decades the United States has observed a dramatic increase in the presence of obesity, which has become a major public health crisis (25). According to National Health and Nutrition Examination Survey (NHANES) data collected in 2003-2004, approximately two

thirds (66.3%) of men and women aged 20 years or older were overweight or obese; nearly one third (32.42%) were obese and 2.8 percent were categorized as extremely obese (35). It is apparent that overweight and obesity are currently affecting the majority of the US population.

Since 1960, obesity rates have been increasing for almost fifty years. During 1960-1980, data has shown that prevalence first increased slowly, then from 1976-1980 prevalence increased more dramatically at an average rate of approximately 1 percentage point each year (35). A substantial increase then occurred from 1976-1980 to 1999-2000 when obesity rates doubled from 15.1% to 30.9%, respectively. Recent findings show in 2001-2002, more men in the US were overweight or obese at 68.8% prevalence vs. women at 61.6% prevalence (35). In general, women have shown a faster increase than men (0.91 vs. 0.65, respectively) for combined prevalence of overweight and obesity (36).

Furthermore, current evidence supports that obesity rates are likely to remain on the rise. In fact, projections show that if trends continue, by the year 2030, approximately 90% (86.3%) of all American adults will be overweight or obese and 51.1% will be obese (36). Projections show it will be possible for all adults to eventually become overweight or obese; if trends continue, 80% of all American adults have the potential to become overweight or obese in 15 years (36). However, there are some limitations to these projections, as a number of them are based on assumptions which are simplified scenarios. As the epidemic continues, future obesity rates may not proceed linearly as they do currently. In essence, the estimates assume that the environment will continue to worsen as rates have in the past. In addition, there may also be a sector of the population that is genetically protected from obesity or at lower risk of developing obesity through healthy lifestyle choices. Consequently, the force of the US obesity epidemic

may not impinge upon these individuals (36). Nonetheless, it is evident that this public health epidemic needs immense attention and effort to revolutionize the current situation.

In addition to the concern of obesity in adults, is the increased presence of obesity in children. Currently, the US is witnessing an unprecedented childhood obesity epidemic. Longitudinal epidemiologic surveillance studies in the US report that rates of childhood obesity have tripled from 1970-2004; this dramatic increase was even more prominent in the 6-11 year old age category (12). Among children and adolescents aged 6-19 years, nearly one third (31%) were at risk for either overweight or obesity and 16% were overweight (10). Adulthood obesity has been rising, thus, childhood obesity trends are following the parent's example. However, the blame cannot be placed on parents or children alone, Rhee (2008) states that many factors have been attributed to the overall rise in obesity, including changes in dietary habits, the availability of high-calorie nutrient-poor foods, increasing portion sizes, frequent patronage of fast-food establishments, increasing time in front of the television or computer, and the lack of physical activity at school or home (29). Adulthood obesity is similar to that of childhood obesity in that factors that contribute to its increasing prevalence.

Rhee also reports that parents play an important role in the growth, development, and socialization of children (29). Parents are able to influence children through their parenting practices, providing good examples of positive behaviors and attitudes, and interpersonal interaction within the family. The control that parents exhibit over these factors is important for the prevention and treatment of childhood obesity. In addition, parents also have influence over the food and activity behaviors in the home environment.

Isganatis and Levitsky (2008) report that risk factors for childhood obesity also include low-socioeconomic status, rapid infancy weight gain, and decreased physical activity levels (12).

Given poverty is a strong indicator of childhood obesity, it is understandable that children living in low socio-economic situations are at a high risk for overweight or obesity. Therefore, it can be inferred that there is a need to target children belonging to a lower-income demographic. There have been some efforts made thus far to prevent and treat childhood obesity (i.e.: the formation of childhood obesity coalitions, school lunch interventions, and walk to school month) (12).

However, programs like these have only had a minor impact on obesity rates; thus, current programs may not be sufficient. Isganatis and Levitsky (2008) report that children are existing in the new age of increased food availability and intake paired with decreased energy output for over the past three decades (12). Therefore, it is easy to understand why small scale efforts to reverse poor lifestyles choices in children and adolescents have only had limited effects. Even so, childhood and adolescence are critical time periods for individuals to form healthy lifestyle eating and physical activity behaviors; especially since overweight children are likely to become obese in adulthood (35).

2.3 COMMUNITY-BASED INTERVENTION

Kuhn, Doucet, & Edwards (1999) reviewed the following arguments for collaboration and the need for health promotion: (1) the need to address complex health problems in intersectoral and multifaceted interventions, (2) the ability to use scarce resources more efficiently, (3) the possibility to reach hard-to-reach target groups (18). These arguments emphasize the importance of the partnership of community, individual and institutional components in health promotion. Although there are a variety of different measures to treat and prevent obesity (including

commercial weight loss solutions, structured self-guided approaches, and medically supervised diets), these options may not be accessible, affordable, or allowable for some individuals. A community-based health intervention can reach an array of individuals, including those of low-socioeconomic status who may not be able to receive help elsewhere due to high cost, lack of availability, or inconvenient location. Targeting local residents and offering quality health education at a reasonable price and nearby location may increase the likelihood of participation in, and adherence to, the intervention.

Research studies involving community-based heath interventions have gained interest in the last few years, and a number of studies have reported successful results from such programs. Folta, Litchenstein, Seguin, Goldberg, Kuder, and Nelson (2009) administered a community-based intervention entitled "The Strong Women- Healthy Hearts Program" (8). The intervention aimed at reducing risks for cardiovascular disease in sedentary, midlife overweight or obese women. In this study, 8 counties in Arkansas and Kansas were assigned to a 12-week intervention that met two times per week. Ten to fifteen sedentary women with a mean age of 57 years were selected from each site to either participate in the intervention group (a heart health program) or in the delayed-intervention control group. Participants' weight, waist circumference, diet, physical activity, and self-efficacy were measured before and after the intervention. An increase in physical activity and healthy dietary changes were the primary aims of the 24 intervention sessions. The physical activity goal was to progressively increase exercise bouts to 30 minutes of moderate-to-vigorous aerobic activity per day; suggested options consisted of either dancing to a digital video disk (DVD) created for this project or walking outside, if location and weather permitted. It was also a physical activity objective to promote lower-intensity lifestyle physical activity outside of class. The goals of the dietary component,

which consisted of close, interactive training, were to modify dietary patterns and improve weight management skills. Educational dietary topics included an eating pattern rich in fruits, vegetables, low- or nonfat dairy products, fish, whole grains, and legumes. The consumption of leaner meats and poultry and less saturated and trans fats were also encouraged, along with smaller portion sizes (8).

Results of the intervention were very positive. Compared with the control group, participants in the intervention group showed a reasonable decrease in body weight. The intervention group lost an average of 3.7 pounds while the control group gained an average of 0.66 pounds. Waist circumference was reduced by an average of 2.1 inches in the intervention group with the control group increasing by 0.2 inches. Furthermore, the intervention group increased their physical activity levels by acquiring an average additional 1807 steps/day compared to the baseline assessment; the control group actually reduced physical activity levels as their average step counts decreased by 113 steps/day. The intervention group also reported significant decreases in intakes of energy (–390 kcal/day), carbohydrate (–56.6 g/day); total fat (–15.7 g/day); and cholesterol (-60 mg/day) while the control group only slightly decreased these intakes. There was a considerable mean decrease in total grams of saturated fat intake of 8.4 total grams/day in the intervention participants compared to an average decrease of 4.0 total grams/day in the control participants. Intervention participants decreased sweet food and dessert servings per day and showed a trend toward increased fruit and vegetable servings. Servings of sweets and desserts consumed per day decreased 0.7 in the intervention group at the same time as it increased 0.1 in the control group. Likewise, daily servings of fruits and vegetables increased by 0.3 in the intervention group while decreasing by 0.3 in the control group. Additionally, data indicated an increase in self-efficacy for dietary and physical activity

behaviors by 0.3 on the Likert Scale whereas the control group self-efficacy scores decreased by a Likert score of nearly 2.9. Therefore, it may be concluded that a community-based lifestyle intervention program can improve self-efficacy, increase physical activity, and decrease energy intake, resulting in decreased waist circumference and body weight among at-risk women (8).

However, a primary limitation of the Healthy Hearts Program study included the community-based design. It was not viable to randomize before recruitment and pre-test assessments; if administrators had been able to randomize before recruitment, it would have been possible to minimize the differences between the intervention and control groups caused by the recruitment process. Another potential source of bias stems from the study design; the educators who implemented the intervention also assessed participants during pre and post-testing and were not blinded to the treatment conditions (8).

Unfortunately, various characteristics depress the effectiveness of community-based interventions. Verheijden and Kok (2005) highlight aspects of community-based programs that alter the efficiency of these particular studies (33). These aspects include (1) study design (2) operationalization and measurement of outcome measures and (3) sample size and power problems (33). It is sometimes difficult to implement a strong study design with community-based programs. As in most research areas, a pre-test, post-test randomized controlled study is most desirable. In practice, it can be hard to find appropriate control group communities. However, there are strategies and distinct types of pretest-post-test measures which can be used to improve the strength of research designs. Relatively long time frames can also increase the likelihood of changes in data collection and procedures over time. Additionally, difficulty lies in selecting an appropriate sample size and having adequate power to detect a significant difference. In community-based interventions randomization takes place at the community level,

rather than at the individual level, therefore the communities, rather than the individuals, should be the units of analysis. This immensely affects sample size and as a result, causes studies to lack power to detect significant changes (33).

Nonetheless, research has shown that well-designed community health-based intervention programs can be successful in improving lifestyle choices and healthy habits. For example, a study done by Englert, Diehl, Greenlaw, Willich, and Aldana (2007) assessed the clinical effects of a community-based lifestyle intervention program over a period of 30 days (5). In this particular investigation the primary aim was to reduce coronary risk in a group of adults. Titled the Coronary Health Improvement Project educational program, the intervention was delivered through the Center for Complementary Medicine of the Swedish American Health System and offered to its employees and the general public. A shift from the typical rich American Diet to a more whole-food, plant-centered diet was a major focus of the 16 lecture intervention study. Several workshops were offered to the subjects as well. Participants were encouraged to improve health behaviors by increasing physical activity through a recommended daily fitness program of 30 minutes of walking and general exercise. The project was an intensive, educational program that aimed at making participants aware of the potential benefits of making lifestyle changes and then learning how best to accomplish this through changes in diet and physical activity. The curriculum was structured to progressively build on the concepts of lifestyle as medicine. Given that habits may be best acquired through daily practice, the program was intentionally administered almost daily over a period of 4 continuous weeks (5).

The workshops and educational sessions received a positive response and high participation from the subjects as significant improvements were shown in the most at-risk individuals. Participants also considerably reduced their consumption of animal products and

refined, processed foods while increasing intakes of fruits, vegetables, whole grain products and legumes. At the same time, the cohort walked 59,987 miles, averaging 2 miles per day. Improvements included reductions in weight, blood pressure, and blood cholesterol. In fact, over 73% of the participants had three or more coronary risk factors at the beginning of the intervention compared to 46% at the end of the study. Additionally, both women and men in the study lost an average of 6 pounds, while total cholesterol averages respectively decreased by 15 mg% and 22 mg% and LDL came down 8 mg% and 17 mg%, respectively. The intervention largely decreased the number of average coronary risk factors which shifted significantly from 3.4 to 2.3. Although both men and women showed marked improvement on the reduction of coronary risk factors, the progress in men (39%), was significantly higher compared to women (29%). Overall, the study reported that a well-designed community-based intervention program can improve lifestyle choices and health habits; they can also markedly and rather quickly reduce the level of coronary risk factors (5).

It is interesting to observe that Englert et al. (2007) specifically stated that "well-designed community-based intervention programs can improve lifestyle choices and health habits" however this particular study's limitations included self-selection bias, lack of a control group and short term results, as well as a chance for bias due to pretest treatment (5). While Englert et al (2007) was able to conduct a valuable study with respectable results, it should be noted that there are difficulties with study designs that should be altered and made structurally sound to ensure an effective, nonbiased study (5).

2.4 AFFECTS OF DIETARY CHANGES ON HEALTH

A balanced, nutritional diet is an essential part of living a healthy lifestyle. Lifestyle choices, such as poor dietary intake, are associated with the risk of cardiovascular disease and mortality from all causes (17). Recent research has provided evidence that a healthy lifestyle combines a prudent diet, regular physical activity, and maintenance of a healthy weight status (17). Furthermore, it has been suggested in various findings (13, 38) that the diet components may be of more importance in terms of weight management and therefore obesity prevention and treatment.

One study conducted by Jakicic, Wing, and Winters-Hart (2002) examined two components of a healthy lifestyle: physical activity and eating behaviors (13). The study observed the relationship of physical activity to eating behaviors and weight loss in women. During an 18-month behavioral weight loss program, participants were asked to decrease their energy intake (1200-1500 calories), and total fat (20-30% of total calories), and increase their time spent in exercise (progressing from 100 to 200 minutes per week). Participants attended group behavioral session for the duration of the study. Results reported that changes in eating habits, energy intake and physical activity caused significant weight loss (mean weight loss = 7.8 kg) in subjects by the end of the intervention. Additionally, decreases in calorie intake and improvement in eating habits were related to weight loss. However, it is important to note that results from multiple regression analyses showed weight loss was influenced more by changes in eating behaviors than changes in physical activity. From this study it can be inferred that dietary intake is the most important component of a healthy weight, which may result in overall decreased risk of obesity, and improved health status.

Dietary intake and nutrition status also affect other aspects of health. A study done by Rasmussen, Vessby, Uusitupa, Berglund, Pedersen, Riccardi, Rivellesi, Tapsell, and Hermansen (2006) assessed the effects of different types of dietary fat on blood pressure (28). Over 160 healthy subjects were randomly assigned to follow 1 of 2 isoenergetic diets for three months. The first diet was rich in monounsaturated fatty acids (MUFA) and the other rich in saturated fatty acids (SFA). Each group was further randomly assigned to receive supplementation with fish oil or placebo. The results of the study showed that blood pressure decreased with the MUFA diet but did not change with the SFA diet. Therefore, changing the proportions of dietary fat by decreasing saturated fatty acids and increasing monounsaturated fatty acids can decrease blood pressure (28). Given hypertension is a risk factor of diabetes and obesity, it is important to understand how small changes in diet can affect important aspects of health, such as blood pressure, cholesterol, or glucose levels.

It is also important to understand the foods that most positively effect health status and the body's overall nutritional condition. A study conducted by Esmaillzadeh, Kimiagar, Mehrabi, Azadbakht, Hu and Willett (2006) evaluated the relationship between fruit and vegetable intakes and the prevalence of metabolic syndrome (6). Metabolic syndrome refers to the state in which risk factors are clustered in persons with this disease, leading to an increased risk of morbidity and mortality due to cardiovascular disease and diabetes, which are both risk factors for obesity. Thus, it is important to know how a healthy diet affects this syndrome. Fruit and vegetable intakes were assessed with the use of a Food Frequency Questionnaire in a cross – sectional study of over 450 Tehrani female teachers aged 40-60 years with a mean BMI of 27 kg/m^2. Fasting blood samples were taken for biochemical measurements. Results found that higher intakes of fruit and vegetables are associated with a lower risk of the metabolic syndrome

(6). It was concluded that a dietary pattern rich in fruits and vegetables may be attributed to a healthy lifestyle and reduced risk of metabolic syndrome. Therefore, eating over 5 servings of fruit and vegetables daily is recommended to reduce the risk of chronic diseases, including obesity and cardiovascular disease (6).

2.5 HEALTH EFFECTS OF PHYSICAL ACTIVITY

The health benefits of regular physical activity are generally well known. An increase in physical activity increases overall energy expenditure and therefore can contribute toward maintaining a healthy energy balance; not surprisingly, a lack of physical activity has been linked to a higher risk of weight gain and incidence of obesity (22) Additionally, various reports have linked the obesity epidemic to progressively more sedentary lifestyles in the US (37).

Prevalence of physical activity in the U.S. was assessed in 2001 using a behavioral risk factor surveillance system by Macera, Ham, Yore, Jones, Ainsworth, Kimsey, and Kohl (2005)(20). It was also reported that an overall percentage of 45% U.S. adults (48% men and 43% women) were physically active at recommended levels during nonworking hours (20). Criteria for being considered physically active included at least 30 minutes spent in physical activity on five or more days per week at moderate-intensity activities, equal to walking at a brisk speed, or at least 20 minutes three or more days per week in vigorous activities, such as running, heavy yard work or aerobic dance. The assessment was performed through a random-digit-dialed telephone survey to U.S. adults over 18 years of age in the 50 contiguous states and the District of Columbia. Additional assessments included cognitive testing in 1998 and 1999 and a pilot test in four states (Nebraska, Georgia, Hawaii, and Michigan). A final questionnaire

was also used which included questions about moderate and vigorous activities performed during nonworking hours in a typical week. The questions also included the number of days per week and number of minutes per day. As expected, the prevalence of meeting recommended levels of physical activity was generally lower at older ages. Furthermore, the difference between the youngest group (18-29 years) and the oldest group (over 75 years) was faintly larger in women than men; (i.e.: 50% of women 18-29 years vs. 27% women age 75 years or older and 58% of men age 18-29 years vs. 38% of men aged 75 years or older) (20). In summary, less than half of U.S. adults meet the minimal physical activity recommendations and women tend to receive less physical activity than men, even in the younger age categories (20).

To more fully understand the importance of physical activity in the population, the effects of physical activity on obesity prevention and treatment through weight loss can be described. Although evidence through exercise intervention trials indicates that physical activity is not always effective as an initial means of weight loss, it is proposed that physical activity is crucial for maintenance of weight loss (11). It is also thought that physical activity could be a strong predictor of success in weight loss maintenance because it is a marker for compliance. Individuals who maintain a higher level of physical activity may also be better at maintaining their target energy intake (11).

In addition to a positive effect on the prevention and treatment of overweight and obesity, physical activity can also impact an individual's health status in terms of the management of type II diabetes and cardiovascular disease (CVD) (3). Individuals at high risk can benefit even more from physical activity; exercise has been shown to reduce risk of type II diabetes by 64% in this population (3). The effect of a single bout of aerobic exercise on insulin sensitivity lasts 24-72 hours (depending on duration and intensity) so it is important that exercise is frequently carried

out to receive the highest potential benefit (3). Furthermore, large benefits on risk of type II diabetes are attributed to greater intensities of physical activity, and some types may be more effective than others (e.g. walking and cycling, though this evidence is not consistent) (3). In a trial administered by O'Donovan, Kearney, Nevill, Woolf-May, & Bird (2005), the effects of 24 weeks of moderate or high intensity exercise on insulin resistance were compared (24). The findings suggested that moderate intensity exercise is as effective as high-intensity exercise in an intervention of equal energy cost (24).

Although the inclusion of physical activity is an important component of a healthy lifestyle, there is evidence that physical activity does not have a significant impact on weight loss. A study conducted by Wing (1999) reviewed the literature to find evidence on the role of physical activity in the treatment of adult overweight and obesity (38). To review the literature, three key meta-analyses and other additional literature searches were used to identify randomized trials related to the following questions: (1) Does exercise alone produce weight loss? (2) Does exercise in combination with diet produce greater weight loss than diet only? and (3) Does exercise in combination with diet produce better maintenance of weight loss than diet alone? Related articles acquired from the search were then analyzed for review. In answering the aforementioned questions, conclusions from the studies relating to the first question (i.e. exercise alone producing weight loss) showed that although exercise produces larger amounts of weight loss than a sedentary lifestyle, the effect of exercise alone is very modest; the magnitude of the effects only averaged 1-2 kg of body weight lost (38). Studies found to provide evidence for the second question (i.e. exercise in combination with diet producing a greater weight loss than diet alone) concluded in the majority of the studies exercise did not radically increase initial weight loss in addition to weight loss obtained with diet alone. However, in nearly all studies, the diet

plus exercise group lost, to some extent, more weight than the diet alone group. Evidence answering the third and final question (i.e.: exercise in combination with diet producing better maintenance of weight loss than diet alone) report that continued exercise is associated with long-term maintenance of weight loss. However, the difference was statistically significant in only two of the six randomized controlled trials. In all of the long-term maintenance studies reviewed, weight losses at follow-up were larger in diet plus exercise than in diet only (38). Therefore, it is important to understand that although diet plays an important role in weight loss, when diet is executed alone, only modest affects may be achieved. Consequently, the combination of physical activity and diet is recommended for overweight and obese individuals who want to decrease body weight (38).

2.6 OBESITY IN AFRICAN AMERICANS

Obesity is a major contributor to increased rates of hypertension and diabetes among Americans, particularly African Americans. For instance, African Americans have a higher prevalence of being overweight than their Caucasian counterparts (26). In 2003-2004, non-Hispanic blacks had the highest prevalence of overweight and obesity (35). Obesity reportedly affects 22.9% of non-Hispanic white men aged 20 through 39 years and a staggering 50.6% of non-Hispanic black women aged 40 through 59 years (10). Moreover, among women, non-Hispanic black women had the highest level of extreme obesity (13.5%) compared with 5.5% and 5.7% of non-Hispanic while and Mexican American women, respectively (10).

Contributing to the increased incidence of obesity and related health conditions among African Americans are the widespread issues of improper nutrition and lack of physical activity.

While national findings indicate that 23% of the adult population has a sedentary lifestyle, a disproportionate number of African Americans lead such a lifestyle with 55-75% of African American women rarely exercising, and 30-66% of men not exercising at all (26). General nutrition and eating behaviors are poor for this population. For instance, approximately 76% of the African American population does not meet minimum requirements for daily fruit servings and less than half meet the minimum daily recommendations for vegetables per day (26). Additionally, diet may be a large contributor to the increased prevalence in obesity and chronic diseases in African Americans. Compared with any other ethnic groups, African Americans have been shown to have higher intakes of cholesterol, total and saturated fat, and sodium and lower intakes of fiber, fruits, vegetables, and whole grains. African Americans have also been shown to be less likely than Caucasians to adopt lower-fat eating behaviors, such as avoiding fried foods (9). In fact, according to Gans, Risica, Kirtania, Jennings, Strolla ,& Steiner-Asiedu (2009) there is an inadequacy of published research on how to develop nutrition interventions for specific ethnic minority groups (i.e.: African American), one reason being that although nutrient data are accessible, little information is available on dietary patterns, portion size, specific eating behaviors, and food choices by ethnicity (9).

Obesity risks have been found to be higher in African American women than Caucasian women (26). According to the U.S. Department of Health and Human Services, in order to reduce obesity in the African American communities, more community-based interventions are needed to modify diet and increase activity levels (3). Current programs that address obesity are usually designed to meet the needs and values of Caucasians, and therefore may be less useful for African Americans. However, some studies have shown that programs that are culturally relevant for African Americans, and focus on nutrition and physical activity, can be successful in

reducing body weight and BMI. A culturally relevant approach can be useful in increasing knowledge of, and improved attitudes toward, nutrition (26). Moreover, education plays a vital role in obesity prevention and treatment. According to Walker-Sterling (2005) education can be used to foster curiosity and initiate questions from concerned African American about their own suboptimal health as a result of overweight or obesity (34).

2.7 OBESITY IN LOW INCOME POPULATIONS

The development of obesity is multifaceted and results from an interaction between an individual's genetic make-up, lifestyle choices, and health behaviors. Health habits and behaviors can be strongly associated with an individual's access to socioeconomic resources over the entire life course (14). A lifetime perspective on the widespread issue of adult obesity is receiving much attention from public health researchers at the present time.

Current data however is inconsistent on this issue of low socioeconomic status associated with obesity. A study conducted by James et al (2006) reviewed obesity in African American women in relationship to their socioeconomic status (SES) in childhood and adulthood (14). Data was collected via follow-up interviews from participants in the Pitt Country Study, a community-based, prospective study of risk factors for hypertension and related disorders for African Americans aged 25-50 years. The results showed that the odds of obesity were twice as high among women from low versus high childhood SES backgrounds, and 25% higher among women of low verses high adulthood SES. Therefore, it may be concluded that socioeconomic deprivation in childhood is a strong predictor of adulthood obesity in this community sample of African American women (14).

However, according to Wang and Beydoun (2007) in a systematic review and meta-regression analysis of the obesity epidemic in the U.S., the correlation between SES and obesity varies by ethnicity, and that ethnic and racial differences in BMI cannot be entirely explained by SES (36). Additionally, neither education nor income reflect SES equally across ethnic groups. However there is a possibility for a bidirectional causal relation between SES and obesity has been shown to adversely affect opportunities for education, occupation, and marriage (35).

2.8 CONCLUSION

After reviewing the literature, it can be seen that there are many factors to consider when offering a community-based health interventions. A major factor is the increased prevalence of obesity in the US today (25). Dietary effects on health are important factors to understand and incorporate into community-based programs, based on data that eating behaviors can have a greater effect on weight loss than physical activity (13). Thus, the prevention and/or treatment of overweight and obesity via positive changes in eating behaviors has been shown to be important. However, physical activity is a critical component in maintaining a healthy weight or improving physical well-being; it can also impact health status in terms of controlling or reducing risk for type II diabetes and CVD (3). The population group most at risk for obesity includes African Americans; they also currently hold the highest U.S. obesity prevalence rate (35). Although there is unconcluded data on the association between SES and obesity, health behaviors are associated with socioeconomic status, thus and there may be a need for obesity prevention and treatment in this demographic as well (14).

While evidence shows that obesity is a public health epidemic, rates are continuing to increase despite various efforts across the nation. There is no easy solution to this multifaceted problem, and although obesity is a complex issue involving lifestyle habits, genetics, motivation, and learned behaviors, one approach to treatment can be through the education and attainment of healthy choices.

3.0 METHODS

3.1 SUBJECTS

Thirty adults ranging from 25-50 years of age, male and female, will be recruited to participate in this study. Subjects of all backgrounds and nutritional status will be included. Subjects must be currently enrolled in the CLLP at the University of Pittsburgh and are required to have at least one child aged 6-12 years old also participating in this program. Participants will be randomly assigned to either a control group (NINIP) or an intervention group (INIP). Fifteen adults will be placed in the NINIP group and 15 adults will be placed in the INIP group. All participants will sign the informed consent agreement that will be approved by the University of Pittsburgh's Institutional Review Board prior to participation.

Exclusion Criteria are:

1. History of gastric bypass surgery
2. History of cardiovascular disease
3. History of type 1 or type II diabetes
4. Currently pregnant
5. Involved in any other nutrition or exercise intervention

3.2 RECRUITMENT PROCEDURES

The recruitment of potential subjects will involve mailings sent out to current participants of the CLLP. Informational flyers will also be posted throughout Trees Hall at the University of Pittsburgh, which is the academic building where the intervention sessions will be held. This advertisement will include general information regarding the study, such as the principle investigator's phone number and e-mail contact, stipend, and inclusion and exclusion criteria for participating in the study.

After giving verbal consent, subjects will undergo an initial phone screen to ensure the eligibility criteria are met. When potential subjects contact the principle investigator, they will be asked if they have had any previous history of gastric bypass surgery, cardiovascular disease, or any other chronic disease. The principle investigator will then inform potential subjects of the date of the first intervention session and confirm awareness of the 10-week intervention schedule. The principle investigator will inform potential participants of the chance of being randomly selected to an intervention group (INIP) or control (i.e. no direct intervention given) group (NINIP), the intervention will be available to the control group at a later time. Next, the principle investigator will inform potential subjects of the possible date of the first meeting session and confirm awareness of a 10-week intervention schedule, should they be randomized to this group. If the potential subjects have met qualifications for the study, they will be mailed additional information to be completed and returned before the first session. This packet will include a Health History (Appendix A), a Par-Q (Appendix B), and a consent form to read through and bring with them to the first session; at that time they will sign the consent form in front of the PI (Appendix C). All study procedures will be approved by the Institutional Review Board (IRB) at the University of Pittsburgh.

3.3 EXPERIMENTAL DESIGN

The investigation will employ a pre-test, post-test control group design. The design will consist of an intervention group (INIP) and a control group (NINIP). Subjects in the study will be assigned either the INIP or the NINIP group in a randomized manner. The INIP subjects will receive a 1 hour interactive nutrition education session after attending a 45 minute aerobics class each week for a total of 10 weeks. Subjects in the NINIP group will receive no direct nutrition intervention during the study; however, these individuals will be eligible to participate the intervention in the following Fall semester.

Both the INIP and NINIP groups will complete a pre-intervention assessment which includes both anthropometric and comprehensive measurements. Anthropometric measurements including height, weight and waist circumference, will be taken and recorded during the pre and post-test assessments. Comprehensive measurements will also be made through a series of questionnaires (i.e.: Eating Behavior Inventory (EBI), Paffenbarger Physical Activity Questionnaire, and a nutrition exam). At the end of the 10-weeks, both the INIP and the NINIP groups will complete a post assessment in which they will be evaluated on the same physical and comprehensive measures as in the baseline assessment. The INIP group will be aware of the existence of the NINIP and vice versa.

3.3.1 Experimental Variables

Independent Variable of the study:

1. Nutritional Intervention Sessions (10 weeks)

Dependent Variables of the study:

1. Caloric intake (kcal/day)
2. Total fat intake (grams/day)
3. Weight (kg)
4. Body Mass Index (BMI) (kg/m^2)
5. Waist circumference
6. Level of Physical Activity (minutes)
7. Score on Eating Behavior Inventory (EBI)
8. Score on nutrition exam

3.3.2 Baseline Assessment

Anthropometric measurements including weight, height, and waist/hip ratio will be measured before and after the intervention in both the INIP and NINIP groups. These measurements will be taken by the principle investigator and a research assistant. Weight will be measured using a Tanita scale, rounding each subject's weight to the nearest pound. Height will be measured using a stadiometer, rounding each subject's height to the nearest inch. Participants will be asked to remove their shoes in order to obtain both of these measurements and Body Mass Index (BMI) scores will then be computed. Waist circumference will be assessed using a measuring tape, rounding to the nearest millimeter. Subjects will be asked, prior to the first session, to wear thin clothing consisting of a T-shirt and non-bulky shorts or pants to insure accurate measurements.

In order for the measurements to remain consistent the principle investigator and research assistant will administer the same tests during baseline and 10-week measurements to decrease the risk of error in the collected data (i.e. the principle investigator will measure waist and hip

circumference and the research assistant will measure height and weight.) This will decrease the probability of error in the data collected.

The collected assessment information will be recorded and stored in a locked file only accessible to the principle investigator and his/her advisor to insure confidentiality to all subjects. The baseline assessment will take place in the resistance exercise facility in Trees Hall at the University of Pittsburgh. These anthropometric assessments are taken to examine physical attributes and to compute body mass index (BMI) status of the subjects as well as to compare baseline and 10-week assessments for possible changes.

3.3.3 Pre Intervention Assessment

In addition to examining anthropometric measurements this study will examine comprehensive measurements, such as eating behaviors changes and knowledge of nutritional information. Eating behaviors will be examined through an Eating Behavior Inventory (EBI) and nutritional knowledge will be determined using a nutrition exam that will be administered by the principle investigator at the beginning of the intervention. The EBI is an assessment that examines eating behaviors over the past several months (Appendix D). This is a standardized questionnaire which assesses participant's food related habits and attitudes toward eating; a higher EBI score is desirable as this means the participant is claiming to be practicing healthy eating behaviors. The nutrition exam will be developed by the principle investigator and will consist of questions related to the nutrition facts and food lessons taught throughout the intervention session lectures; it will be administered at baseline and 10-weeks (Appendix E). A questionnaire (i.e.: Paffenbarger Physical Activity Questionnaire) pertaining to physical activity behaviors will also be administered (Appendix F). The Paffenbarger Questionnaire primarily examines calories

(kcal) expended through leisure time physical activity. Calories expended per week are calculated through walking, stair-climbing, and recreational activities estimates. The EBI and Paffenbarger questionnaires will be administered during baseline assessment and following 10 weeks of the CLLP.

3.3.4 10 Week Assessment

Following the 10-week intervention, a final assessment will be administered to both the INIP and NINIP groups. All subjects will return to the Trees Hall resistance exercise facility at the end of 10 weeks during a regularly scheduled session. The anthropometric measurements of weight, height, and waist circumference will be taken again. The equipment, measurement procedures, and administrators will remain unchanged from the baseline assessment as well. The principle investigator and research assistant will perform the same measurements taken at baseline (i.e. waist circumference, height, and weight, respectively).

The EBI and Paffenbarger Questionnaires will be administered as part of the final assessment to examine differences when compared to the pre-intervention assessment. The nutritional exam will be given at this time, as well. All of the final assessment questionnaires will be filled out by the participants in the same lecture classroom environment as done in the baseline assessment. Results will be recorded and stored in a safe, confidential location. These records will later be analyzed to examine any changes that may have occurred due to the intervention. Any participant who does not attend the last CLLP session will be contacted by the PI to schedule a final assessment.

3.4 INTERVENTION

The intervention group (INIP) will receive an educational nutrition session each Saturday morning during the 10 week period. The principle investigator will create and provide each of the 10 nutrition intervention sessions. Attendance will be taken at these sessions and also at the aerobics class each week to observe any possible correlations between intervention progress and participation in aerobics classes. Each week the subjects will learn about a new topic pertaining to healthy lifestyle and food choices. The nutrition sessions will consist of interactive activities (i.e. role-playing of proper eating behaviors and demonstrations of healthy meal preparation.) Along with each lesson, a healthy snack or meal will be provided, if possible.

The INIP subjects will be required to complete daily food and physical activity logs to help control calorie intake and monitor physical activity throughout the day. Subjects will be asked to document each item of food consumed, time of consumption, and amount, as well as number of minutes spent in physical activity. Participants should bring these logs to the intervention sessions each week. A recommended calorie range will be suggested to each participant based on an individual goal of weight loss or maintenance and subjects will be encouraged to stay within that recommended calorie range. Participants will be encouraged to acquire 30 minutes of cardiovascular exercise as recommended by the 2008 Physical Activity Guidelines for Americans (29).

3.4.1 Intervention Procedures

The first meeting will consist of an informational meeting and baseline assessment, and the first week's intervention session. Both the INIP and NINIP groups will attend the informational

meeting and participate in the baseline assessment. However, the NINIP will be released before the week 1 intervention session begins. Upon arrival, each subject will sign the informed consent, as this is required before any participation in the study occurs.

The informational session will begin with an overview of the purpose of the study, and explanation of the 10-week schedule. Subjects will be separated into two rooms and notified of the group (INIP or NINIP) to which they have randomly been assigned. The difference between the intervention (INIP) and control (NINIP) groups will then be explained. Subjects are not able to switch groups because they have been randomly assigned for control purposes of the study. It will be communicated that the NINIP subjects will receive no direct nutrition intervention during the study. NINIP participants will be pre-tested that day and post-tested at the end of week 10 along with the INIP group. These subjects will then be guaranteed to receive the full intervention in the Fall of the next year, which is known as "wait-list" or delayed treatment control group. Additionally, it will be made clear that subjects in both the INIP and NINIP, will not be allowed to take part in any other lifestyle or weight loss intervention programs during the 10 week intervention period.

It will also be communicated that INIP subjects must attend 80% of the sessions and turn in weekly food and physical activity logs during the 10-week period, or they will not receive compensation at the end of the study. The principle investigator will explain the expectation for the subjects to attend as many sessions as possible and clarify that the intervention is about helping them, as well as furthering the study of community-based health programming. Therefore, subjects' participation and effort is very important. All other information pertaining to the daily food and physical activity logs, as well as other details regarding the study, will be explained, and questions will be answered, at this time.

After the completion of the informational meeting and baseline assessment there will be an additional opportunity for subjects to ask questions to the principle investigator. Finally, the NINIP participants will be released and INIP participants will receive the first nutritional intervention session along with a binder to store their nutritional session materials. INIP participants will also receive a calorie counter book to look up nutritional information regarding foods they consume. Participants will also be able to use this reference to help them complete their daily food logs. The INIP group will receive the calorie counter books and daily food intake and physical activity logs before completion of the first intervention session.

3.4.2 Nutritional Intervention Sessions

The delivery of the nutrition education component in the intervention sessions is important to the effectiveness of the study. The format of the intervention will be interactive and easy to follow for the participants. The material for the educational sessions will be tailored to the population of participants in the study (i.e. African American and low-income status).

Each intervention session will begin with a positive thought and health-related quote and end with a nutrition tip pertaining to the weekly topic at hand. Every week will concentrate on a different area of nutrition, but each topic will address a nutritional issue that is applicable to the participants' everyday lives, with regard to food choices and eating behaviors.

A 10 week schedule is listed below:

Week 1: Importance of a healthy weight status relating to preventable diseases
Week 2: Dietary fat, calorie, and physical activity goals
Week 3: Problem Solving
Week 4: Understanding food labels
Week 5: Grocery shopping on a budget
Week 6: Quick, easy, healthy family meals
Week 7: Recipe Makeovers

Week 8: Food, nutrition, and weight loss myths
Week 9: Real world role-playing: Staying healthy at the restaurant
Week 10: Maintaining a healthy lifestyle long-term and support system appreciation

Week 1 will begin with a topic which emphasizes the importance of a proper nutrition and a healthy weight status as it relates to the risk of disease. This issue is important to cover in the first week so participants can be motivated throughout the intervention to prevent risk of disease by improving their lifestyle behaviors. Dietary calorie and fat intake goals will be established during week 2, which may help participants maintain or decrease their weight status throughout the intervention. Physical activity goals may also help participants achieve greater bouts of physical activity.

Topics covered in week 3 through week 9 are all concepts that are designed to help participants make healthier food choices and improve their eating behaviors. Information taught in these intervention sessions is also designed to help subjects meet their calorie, fat and physical activity goals as well. During week 10 (the final week) the post-testing, a shortened final lecture, and a "support system appreciation" session will occur. Subjects are encouraged to bring someone who has encouraged or supported them throughout the intervention to this session; this will allow the support person to experience some of the intervention they have been a part of for the last 10 weeks.

4.0 RESULTS

The purpose of this study was to analyze the effect of a 10-week nutrition intervention program on adults in a community program called the Community Leisure Learn Program (CLLP) at the University of Pittsburgh. Subjects were randomized to the Interactive Nutrition Intervention Program (INIP) or the Non-Interactive Nutrition Intervention Program (NINIP). Participants in the INIP group participated in behavioral weight-loss classes focused on nutrition and behavior change. This study examined the difference in total caloric intake, fat intake, and the Eating Behavior Inventory (EBI) for individuals in the INIP compared to individuals in the NINIP. The independent variable was the 10-week behavioral weight-loss nutrition intervention classes. The primary dependent variables were change in total calorie intake, fat intake, and the score on the EBI. The exploratory dependent variables include the change in body mass index (BMI), waist circumference, level of physical activity in minutes, and a nutrition exam score.

4.1 SUBJECT CHARACTERISTICS

Table 1 Subject Characters

Variable	All Subjects	INIP (Intervention)	NINIP (Control)
Age (years)	38.3 ± 7.1	40.6 ± 7.4	30.1 ± 7.9
Height (in)	64.6 ±4.0	64.7 ± 3.6	60.0 ± 4.7
Weight (kg)	91.9 ± 17.8	91.8 ± 13.9	97.8 ± 20.3
Body Mass Index (BMI)	34.1 ± 5.5	34.2 ± 5.7	35.1 ±5.7
% Minority Representation	77% (n=17)	90% (n=10)	64% (n=7)

*There were no significant differences in the above variables at $p<0.05$

Table 4.1 above lists baseline characteristics for this study. T-tests showed no significant differences between the INIP and the NINIP groups. According to chi-square tests there were no significant differences in distribution of gender between the INIP and NINIP groups. However, difference in race representation approached significance at $p=0.056$ at $p<0.05$. Nevertheless, as stated above, race was not significantly correlated with any of the dependent variables.

4.1.1 Gender Characteristics

The subjects in this investigation were 22 men and women participating in a behavioral weight-loss intervention through the Community Leisure Learn Program (CLLP) at the University of Pittsburgh. Of the 22 individuals, 6 males and 16 females participated; gender was distributed

evenly between the INIP and NINIP groups. Correlations were run between race and all dependent variables and it was found that race was not significantly correlated with any dependent variables. Correlations were also run between gender and all dependent variables and it was found that gender was significantly correlated with weight and the Paffenbarger Physical Activity Questionnaire total kilocalorie (kcal) expenditure, showing that overall weight and kcal expenditure was greater for men than women in both groups.

4.1.2 Weight Loss and Physical Activity Characteristics

Results from a three way ANOVA between gender, weight loss, and time between the INIP and NINIP groups showed a p-value of 0.116 at $p<0.05$. While there was a significant weight loss for all combined group participants, the interaction between the INIP and NINIP groups was not significant. However, weight loss in the INIP group was greater than the NINIP although not significant at $p<0.05$. The INIP mean baseline weight was trending towards significant differences with the INIP group having a greater weight loss; the INIP mean baseline weight was 91.97 ± 13.9 kg and 89.24 ± 16.3 kg at 10 weeks, which resulted in an average weight loss of approximately 2.72 ± 4.09 kg. The NINIP mean baseline weight was 97.94 ± 20.33 kg and 97.59 ± 19.11 kg at 10 weeks, an average weight loss of approximately 0.35 ± 2.12 kg. As for energy expenditure through the Paffenbarger Physical Activity Questionnaire, there was not a significant difference for all combined group participants and also not a significant difference between the INIP or NINIP groups at $p<0.05$. The INIP group kcal expenditure means were 1241.5 kcal ± 829.11 at baseline and 1214.00 ± 851.86 kcals at 10 weeks, a difference of -27.50 ± 1107.63 kcals. The NINIP group kcal expenditure means were 487.60 ± 543.60 kcals at baseline and 1217.75 ± 1072.59 kcals at 10 weeks, a difference of approximately +730.15 ±

1120.11 kcals. Therefore there was no significant increase in kcal expenditure overall or between the INIP or NINIP groups.

4.2 SUBJECT RETENTION

Twenty-two subjects were initially enrolled in this study and five individuals failed to complete the follow-up at 10-weeks, despite various attempts to contact these participants. For these five individuals missing data includes: body weight at week 10 (n=5), waist circumference at week 10 (n=5), 24-hour diet recall at week 10 (n=5), nutrition exam (n=5), and self-reported dietary intake (n=5). Therefore, complete data (body weight, waist circumference, 24-hour diet recall, Paffenbarger Questionnaire, Eating Behaviors Inventory, nutrition exam) from 17 subjects were used for the final analysis in this investigation.

4.3 CHANGE IN BODY WEIGHT

Repeated measures of analysis of variance (ANOVA) revealed a weight loss of -2.72 ± 4.1 kg from baseline to week 10 in the INIP (intervention group). In the NINIP (control group), a slight weight loss of only -0.3 ± 2.1 kg was reported from baseline to 10 weeks. These results are shown in Figure 4.1 and Table 4.2. These results were not statistically significant but trending in the right direction with a p-value of 0.079 at $p<0.05$. However, when a 3-way ANOVA was run for the main effect of time (which included gender, group (intervention or control), and time), it

was found that there was a significant decrease in weight for all participants combined (both INIP and NINIP groups) from baseline to 10 weeks with a p-value of 0.029.

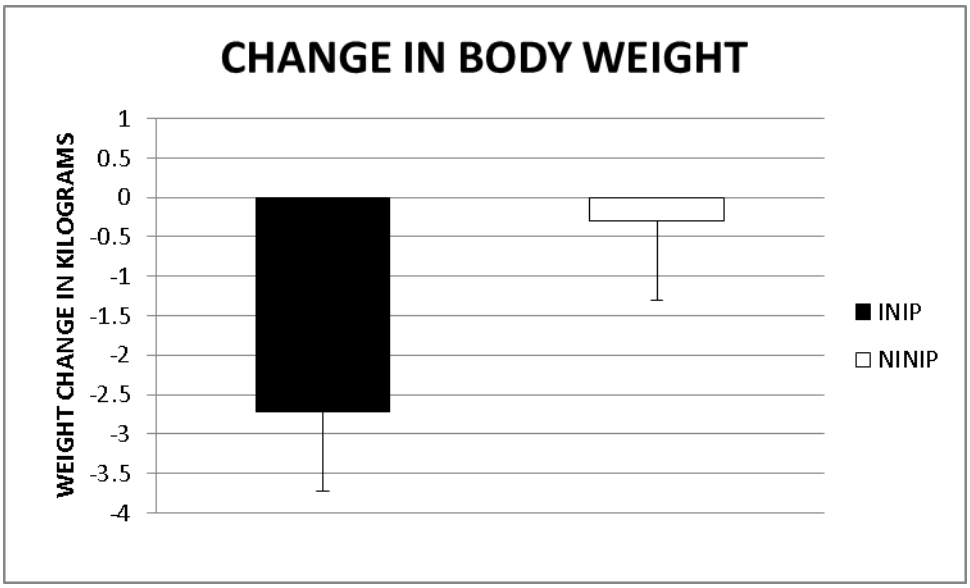

Figure 1 Change in Body Weight from Baseline to 10 Weeks (n=17)

[No significant changes at $p<0.05$]

Table 2: Change in Weight, BMI, and Waist Circumference (n=17)

VARIABLE	TIME	INIP (Intervention)			NINIP (Control)		
		ALL	MEN	WOMEN	ALL	MEN	WOMEN
WEIGHT (kg)	**BASELINE**	91.8±13.9	98.5±20.4	89.4±12.7	97.8±20.3	114.8± 9.6 *	90.7±19.7*
	10 WEEKS	89.1±16.3	93.1±28.1	92.92±30.38	97.5±19.1	113.0 ±7.9 *	91.0±18.9*
BMI (kg/m^2)	**BASELINE**	34.2±5.8	34.02±0.98	34.28±7.05	35.1 ±5.7	34.85 ±3.0	35.26±6.8
	10 WEEKS	33.2±6.6	31.9±4.01	33.7±7.71	35.0±5.4	34.30 ±2.4	35.35±6.4
WAIST CIR. (cm)	**BASELINE**	91.0±19.0	87.8 ± 35.7	92.3 ± 14.6	98.5±17.2	110.00 ± 9.5	93.57±17.9
	10 WEEKS	89.7±14.9	95.5±20.5	87.40±14.3	94.9±13.2	103.5 ± 9.0	91.14±13.4

*Statistically significant ($p<0.05$) Note: Weight was significant when controlled by gender

4.3.1 Change in Weight by BMI

All participants started the study categorized as either overweight (BMI = 24.9-29.9 kg/m^2) or obese (BMI > 29.9 kg/m^2). Weight change can be seen between the NINIP and INIP groups from baseline to 10 weeks between categorized "overweight" and "obese" individuals. The NINIP participants categorized as overweight showed an average weight of 71.5 ± 9.0 kg at baseline and 73.59 ± 10.99 kg at 10 weeks for a mean gain of 2.05 ± 1.99 kg. The NINIP participants categorized as obese showed an average weight of 104.54 ± 16.46 kg at baseline and 103.59 ± 15.71 kg at 10 weeks for a mean loss of -0.95 ± 1.78 kg. The INIP participants categorized as overweight showed an average weight of 76.73 ± 5.14 kg at baseline and 73.41 ± 2.51 kg at 10 weeks for a mean loss of -3.31 ± 2.64 kg. The INIP participants categorized as obese showed an average weight of 98.07 ± 11.00 kg at baseline and 95.58 ± 14.88 kg at 10

weeks for a mean loss of -2.49 ± 4.81 kg. The above results between the BMI categories were not significant at $p<0.05$. These results can be found in Figure 4.2 below.

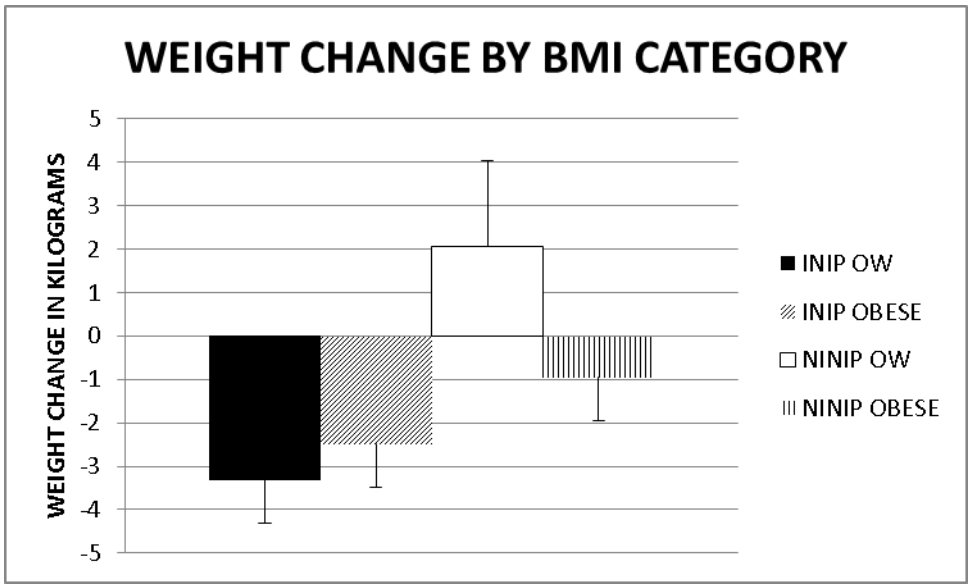

Figure 2 Change in Weight by BMI Category from Baseline to 10 Weeks (n=17)

[No significant changes at $p<0.05$]

4.4 CHANGE IN TOTAL CALORIE CONSUMPTION

Change in total calorie consumption from baseline to the final 10 week assessment is shown in Figure 4.3. The total calories for each assessment were reported through a 24-hour recall questionnaire. A repeated measures analysis of variance (ANOVA) revealed a non-significant decrease ($p=0.79$) in total calorie consumption in the INIP compared to an increase in total calorie consumption in the NINIP. The INIP reported 1294.4 ± 690.5 kcals on average at

baseline and 1204.3 ± 463.5 kcals on average at 10 weeks. The NINIP reported 1471.7 ± 571.9 kcals on average at baseline and 1664.9 ± 729.1 on average at 10 weeks.

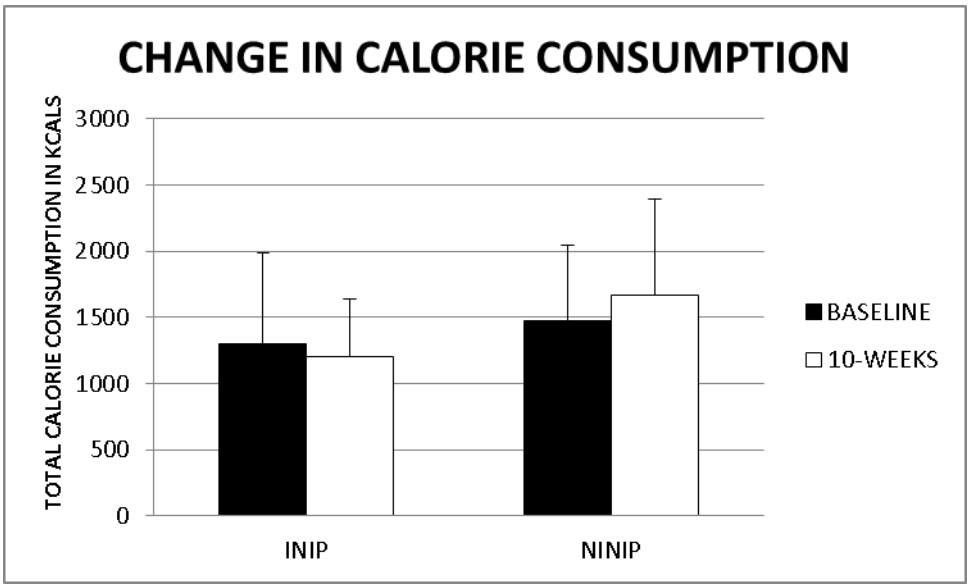

Figure 3 Change in Calorie Consumption from Baseline to 10 Weeks (n=17)

[No significant changes at $p<0.05$]

4.5 CHANGE IN FAT INTAKE

Change in total fat consumption is shown in Figure 4.4. The total fat (g) consumption for each assessment was reported through a 24-hour recall questionnaire as well. A repeated measures analysis of variance (ANOVA) revealed a decrease of 5.2 ± 40.53 grams of total fat consumption/day in the INIP compared to an increase of 6.1 ± 51.87 grams of total fat consumption/day in the NINIP. The change in fat gram consumption/day was not significant ($p=0.97$). The INIP reported 46.1 ± 30.4 grams fat consumption/day at baseline and 40.8 ± 22.2

grams fat consumption/day at 10 weeks. The NINIP reported 62.5 ± 39.0 grams at baseline and 68.7 ± 39.8 grams at 10 weeks.

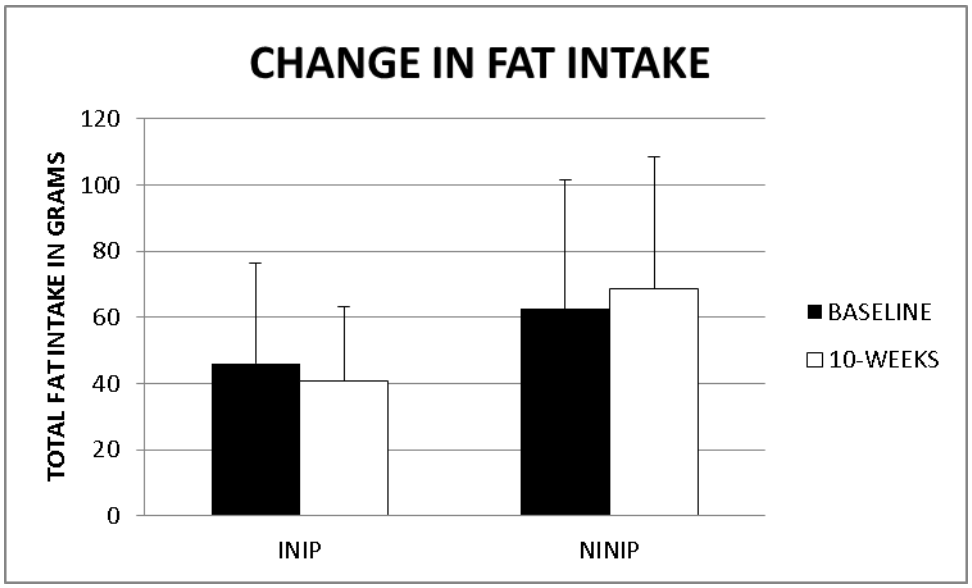

Figure 4 Change in Fat Intake from Baseline to 10 Weeks (n=17)

[No significant changes at $p<0.05$]

4.6 CHANGE IN BODY MASS INDEX (BMI)

Body mass index (BMI) results are shown in Figure 4.5 and Table 4.2. Repeated measures of analysis of variance (ANOVA) revealed BMI to slightly decrease in the INIP groups with a calculated BMI of 34.2 ± 5.8 kg/m² on average at baseline and 33.2 ± 6.6 kg/m² on average at 10 weeks. The BMI for the NINIP groups was reported to be approximately the same at week 1 (35.1 ± 5.7 kg/m²) and week 10 (35.0 ± 5.4 kg/m²). These measures were not significant but were trending in that direction ($p=0.07$).

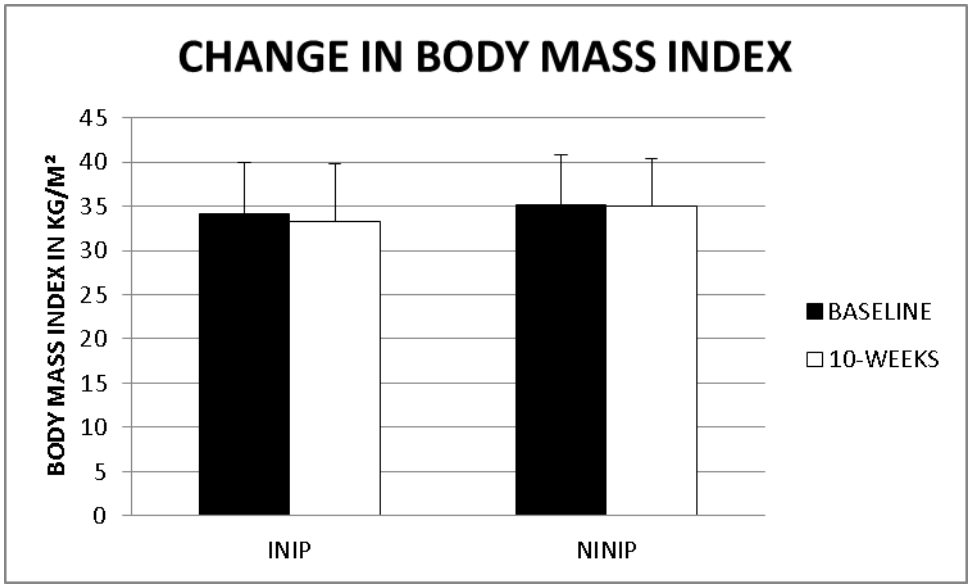

Figure 5 Change in BMI from Baseline to 10 Weeks (n=17)

[No significant changes at $p<0.05$]

4.6.1 Change in BMI by BMI Category

Change in BMI can also be seen between the NINIP and INIP groups from baseline to 10 weeks between categorized "overweight" and "obese" individuals. The NINIP participants categorized as overweight showed an average BMI of 27.22 ± 1.32 kg/m² at baseline and 27.97 ± 2.02 kg/m² at 10 weeks for a mean change of +0.75 ± 0.70 kg/m². The NINIP participants categorized as obese showed an average BMI of 37.11 ± 4.39 kg/m² at baseline and 36.80 ± 4.35 kg/m² at 10 weeks for a mean change of -0.31 ± 0.61 kg/m². The INIP participants categorized as overweight showed an average BMI of 27.28 ± 0.66 kg/m² at baseline and 26.12 ± 0.23 kg/m² at 10 weeks for a mean change of -1.16 ± 0.89 kg/m². The INIP participants categorized as obese showed an average BMI of 36.98 ± 4.03 kg/m² at baseline and 36.02 ± 5.44 kg/m² at 10 weeks for a mean change of -0.96 ± 1.91 kg/m². The above result of the three way ANOVA for the

main effect of time of BMI by BMI categories were not statistically significant at $p<0.05$. These results can be found in Figure 4.6 below.

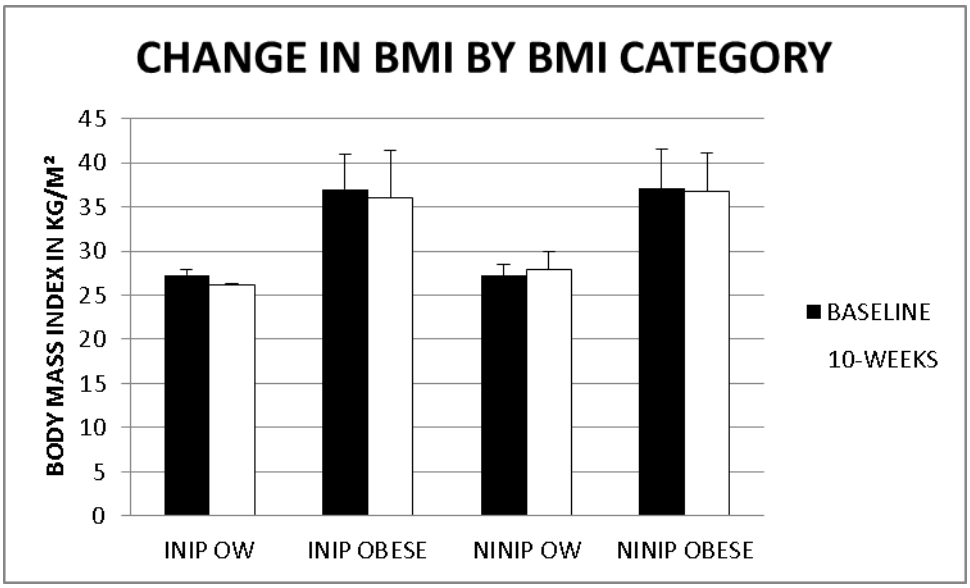

Figure 6 Change in BMI by BMI Category from Baseline to 10 Weeks (n=17)

[No significant changes at $p<0.05$]

4.7 CHANGE IN WAIST CIRCUMFERENCE

Waist circumference results are shown in Figure 4.7 and Table 4.2. Repeated measures of analysis of variance (ANOVA) showed waist circumference to slightly decrease in both the INIP and NINIP. Waist circumference measures in the INIP group on average showed a non-significant decrease of -1.29 ± 13.62 cm from baseline to 10 weeks. The NINIP group showed a

non-significant decrease of -3.65 ± 5.46 cm from baseline to 10 weeks. Again, neither of these measures were reported to be statistically significant (p=0.428).

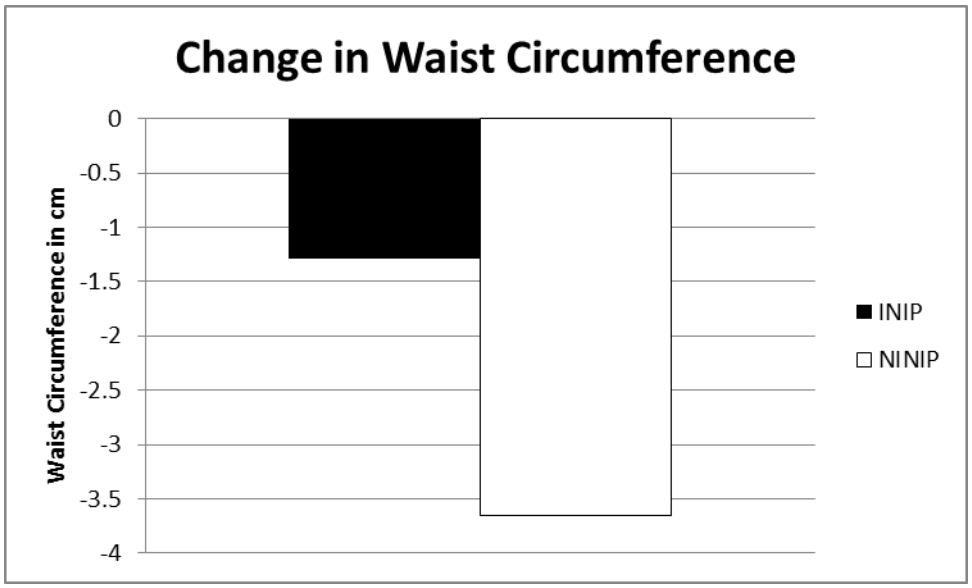

Figure 7 Change in Waist Circumference from Baseline to 10 Weeks (n=17)

[No significant changes at p<0.05]

4.7.1 Change in Waist Circumference by BMI Category

Change in waist circumference seen between the NINIP and INIP groups from baseline to 10 weeks between categorized "overweight" and "obese" individuals. The NINIP participants categorized as overweight showed an average waist circumference 72.50 ± 7.78 cm at baseline and 74.75 ± 10.25 cm at 10 weeks for a mean change of +2.25 ± 2.48cm. The NINIP participants categorized as obese showed an average waist circumference of 105.00 ± 11.50 cm at baseline and 99.88 ± 8.03 cm at 10 weeks for a mean change of -5.12 ± 5.00 cm. The INIP

participants categorized as overweight showed an average waist circumference of 86.5 ± 20.51 cm at baseline and 72.75 ± 6.72 cm at 10 weeks for a mean change of -13.75 ± 13.79 cm. The INIP participants categorized as obese showed an average waist circumference of 92.80 ± 20.51 at baseline and 96.5 ± 10.93 in at 10 weeks for a mean change of +3.7 ± 11.04 cm. The above results for waist circumference by BMI category revealed no significant differences at $p<0.05$. These results can be found in Figure 4.8 below.

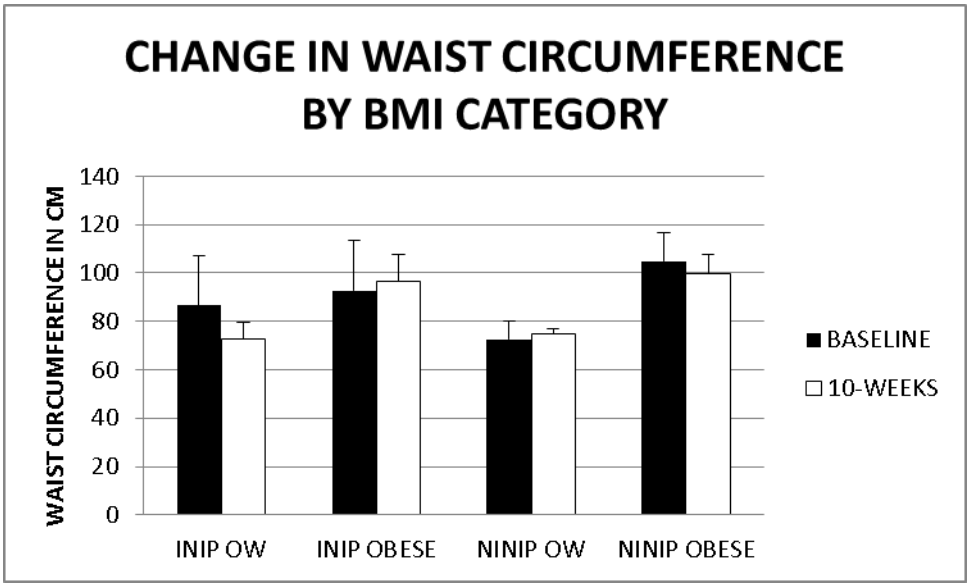

Figure 8 Change in Waist Circumference by BMI Category (n=17)

[No significant changes at $p<0.05$]

4.8 CHANGE IN EATING BEHAVIOR INVENTORY

Change in participant's eating behavior inventory was reported through an Eating Behavior Inventory Questionnaire (EBI). Results of the EBI can be found in Figure 4.9 below. A repeated measures analysis of variance (ANOVA) showed a statistically significant increase in EBI scores

for the INIP group verses the NINIP group with a significance factor of p=0.018 at p<0.05. The INIP showed an average score of 81.7 ± 7.4 at baseline and 91.0 ± 13.8 at 10 weeks. The NINIP scored an average of 79.6 ± 9.9 at baseline and 80.7 ± 11.6 at 10 weeks and therefore shown only a slight increase in EBI scores.

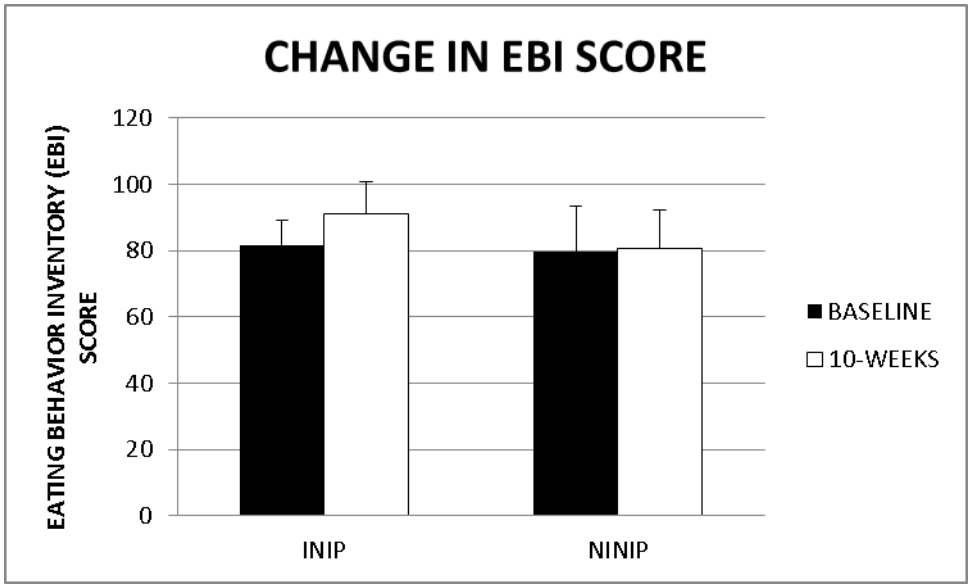

Figure 9 Change in EBI Score from Baseline to 10 Weeks (n=17)

[Significant changes (p=0.018) at p<0.05]

4.9 CHANGE IN LEVELS OF PHYSICAL ACTIVITY

Changes in physical activity levels were analyzed by both self-reported minutes in physical activity/day and total kilocalories (kcals) burned through exercise and daily activity reported in the Paffenbarger Physical Activity Questionnaire. Unfortunately, there was a lack of data to analyze participants' total number of self-reported minutes of physical activity due to insufficient participant recording. However, it was found that both the INIP group and NINIP group

increased their total kcals expended as measured by the Paffenbarger Physical Activity Questionnaire, although the increase between the INIP and NINIP groups was not statistically significant with a p-value of p=0.209 at p<0.05. The INIP group showed an average difference of -27.50 ± 1107.63 kcals from baseline to 10 weeks. The NINIP group showed an average difference of -730.15 ± 1120.11 kcals from baseline to 10 weeks. These results can be found in Figure 4.10 below.

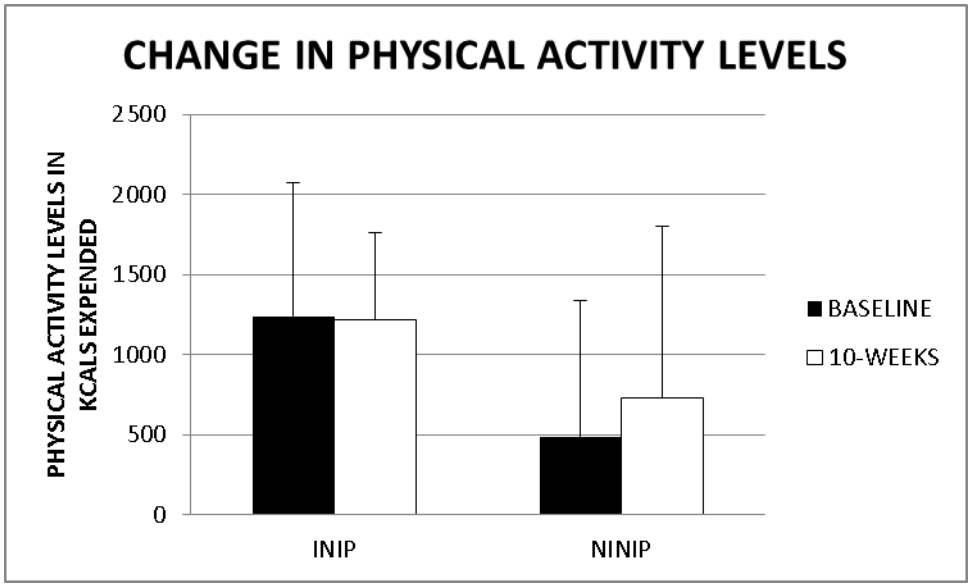

Figure 10 Change in Physical Activity Levels from Baseline to 10 Weeks (n=17)

[No significant changes at p<0.05]

4.10 CHANGE IN NUTRITION EXAM SCORE

Change in participant's knowledge of basic nutrition information was measured through a short, 10 question nutrition exam created by the principle investigator. There was a greater improvement seen in the INIP as compared to the NINIP; the change in scores was reported to be

statistically significant with a significance factor of p=0.005. The INIP reported an average score of 48.7% ± 12.5% at baseline and 59.7% ± 14.0% at 10 weeks. The NINIP reported an average score of 50.1% ± 21.4% at baseline and 52.6% ± 18.1% at 10 weeks. Results of the nutrition exam can be found below in figure 4.11. The above results will be further discussed in the next section of this manuscript.

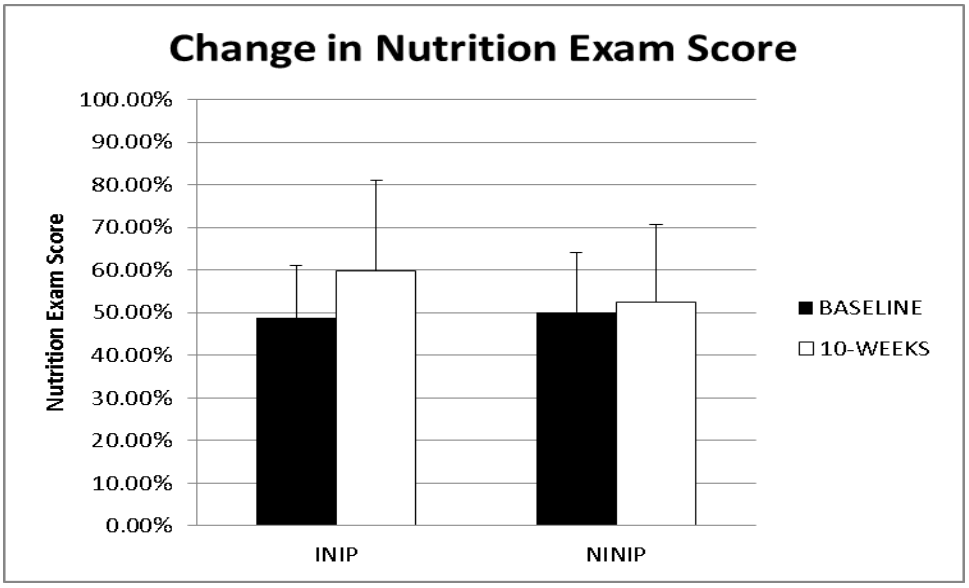

Figure 11 Change in Nutrition Exam Score from Baseline to 10 Weeks (n=17)

[Significant changes (p=0.005) at p<0.05]

5.0 DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.1 INTRODUCTION

There is evidence to support that well-designed community health based intervention programs can be successful in improving lifestyle choices and health habits (4). Data from Agurs-Collins, et al (2007) demonstrate that short-term community-based health interventions can have a significant impact on weight loss, physical activity, nutrition knowledge, consumption of dietary fat, saturated fat, and cholesterol in an African American population (1). Similarly, data from the "The Strong Women-Healthy Hearts Program" study revealed that a 12-week community-based program can significantly improve self-efficacy, increase physical activity, and decrease energy intake, resulting in a significant decrease in waist circumference and body weight in a sedentary population (6). Thus, the above literature as well as several other studies (4, 7, 11) provides evidence that short-term, community-based health interventions can be successful in improving health status and health behaviors.

Despite several positive results of community programs on health found in the literature, there are still limitations to the aforementioned studies. If these limitations be can addressed, they may have a significant impact on future community programs and the manner in which these programs are conducted. A few limitations to community-based health interventions include the delivery and methods of the intervention, limited duration and intensity of the

intervention, insufficient scope of activities, and inadequate penetration into the community (19). Programs with limited length of time may have difficulty in attaining communitywide influence, depending on the level and intensity of program activities. In addition, the intensity of the program may be limited due to a lack of resources, inexperienced intervention leaders, and lack knowledge on infiltrating information to the rest of the community. Due to the limited knowledge on community programming, research should focus on duration and intervention intensity, ensuring maximum impact of intervention delivery and means to outsource interventions into the community, to reach a greater number of individuals.

The CLLP at the University of Pittsburgh lacks an overall focus on lifestyle change to maximally improve health outcomes. The primary focus of this program is offering physical activity opportunities, without a comprehensive wellness model that includes a nutrition component. Therefore, the current study was designed to primarily examine the influence of an intensive and interactive nutrition intervention on adults in a community program. This is the first study to examine the effects of a nutrition component added to the Community Leisure Learn Program (CLLP) at the University of Pittsburgh.

5.2 DISCUSSION

5.2.1 Baseline Findings

Baseline findings revealed that gender was distributed evenly among the 22 participants. In addition, gender was significantly correlated with starting weight and energy expenditure through physical activity. Men showed a significantly greater starting weight and physical

activity levels. A greater start weight in men is not surprising, as males biologically have more muscle and tend to weigh more than their female counterparts. Therefore, gender was controlled for on the dependent variables in the analysis.

Correlations between race and all dependent variables were also run because 77% of the participants were African American; however this correlation was shown to be non-significant. There were no significant differences in additional baseline characteristics between the INIP and NINIP groups including: age, height weight, body mass index (BMI) or minority representation.

5.2.2 Primary Aims

The primary aim of this study was to examine total caloric intake (kcals/day) in the INIP group compared to the NINIP group. Results of this study revealed no significant changes in total calorie intake in INIP compared to NINIP group. The lack of significant change between INIP and NINIP groups may be a result of numerous factors. The total caloric intake was acquired from information obtained on a 24-hour diet recall questionnaire. Inaccurate calorie recording may attribute to the lack of change as some subjects struggled recalling their food consumption for the past 24 hours. The 24-hour diet recall questionnaire only assesses dietary habits from one single 24-hour period and during this study it was administered only on weekend days (the CLLP is held only on Saturday mornings). A 24-hour diet recall on a weekend day may reveal different results when compared to a 3-day diet recall which assesses multiple days per week, including week days. Therefore, the 24-hour diet recall may not have accurately represented participants' kilocalorie consumption during the time it was collected.

Another primary aim was to examine the total fat intake (grams/day) in INIP compared to NINIP group. Results of this study revealed no significant changes in total fat intake in INIP

compared to NINIP group. The total fat intake was also acquired from the 24-hour diet recall questionnaire. Similar reasons to the above, pertaining to inaccurate calorie recording and possible misrepresentation of dietary consumption, may also explain the lack of change in participants' fat intake in the INIP and NINIP groups as observed in total kcal consumption results.

5.2.3 Exploratory Aims

There were also several exploratory aims in this study including the examination of body mass index (BMI), waist circumference, level of physical activity (minutes), Eating Behavior Inventory Questionnaire (EBI) score, and a nutrition exam score in INIP compared to NINIP group. These dependent variables were assessed at both baseline and 10 weeks.

Results of the first exploratory aim, (BMI) showed that the INIP group decreased BMI by -1.0 ± 6.3 kg/m² and NINIP group decreased BMI by -0.01 ± 8.2 kg/m². Lack of change in BMI may be a result of the short duration of the intervention. Also, because there was not a significant change in weight loss in INIP compared to NINIP, a change in BMI was not likely. Furthermore, research continuously shows that a combined diet and exercise intervention produces a greater amount of weight loss, as compared to just diet or exercise alone. The INIP group only focused on nutrition, which may have attributed to a non-significant decrease in body weight and BMI (21).

The second exploratory aim of the study was to examine waist circumference which for INIP group was 91.0 ± 19.0 cm at baseline and 89.7 ± 14.9 cm at 10 weeks and NINIP was 96.5 ± 16.9 cm at baseline and 94.9 ± 13.5 cm at 10 weeks. These changes were not significant, which is most likely because there was not a significant difference in weight loss.

The third exploratory aim of the study was to examine levels of physical activity in minutes in INIP compared to NINIP group. Due to insufficient recording of self-reported daily physical activity in minutes, physical activity levels were obtained from the Paffenbarger Physical Activity Questionnaire and calculated by kcals expended from self-reported physical activities at the present time. The INIP group reported an increase in kcals expended through physical activity by +120 ± 748 kcals whereas the NINIP group increased amount of kcals expended through physical activity by +630 ± 891 kcals from baseline to 10 weeks. The study was a total of two hours long with the physical activity portion offered during the first hour and the nutrition class was offered only to INIP group during the second hour. The NINIP group did not receive access to the nutrition classes but instead had access to physical activity during the first hour of the program and were encouraged to relax and socialize during the second hour, during which the INIP group participated in nutrition class. Although the INIP group was given the opportunity to be physically active at the program, they were given no education or formal lessons pertaining physical activity or given physical activity goals of any kind. It was not expected to see a significant difference in physical activity levels because the intervention did not focus on physical activity. Furthermore, the INIP group and NINIP group had the same opportunity for physical activity during the program, so it is not likely to see a significant difference between groups. Therefore, future concentration on physical activity in addition to a nutritional component during the CLLP may increase energy expenditure through physical activity. This additional focus on physical activity may, in turn, increase weight loss in participants as well.

The fourth exploratory aim of the study was to examine the EBI Questionnaire scores in the INIP compared to the NINIP. The INIP group scored an average score of 81.7 ± 7.4 at

baseline and 91.0 ± 13.8 at 10-weeks whereas the control group scored an average of 79.6 ± 9.9 at baseline and 80.7 ± 11.6 at 10-weeks. This increase in EBI score from baseline to 10 weeks in the INIP was statistically significant when compared to the EBI score increase for the NINIP from baseline to 10 weeks. The significant increase in the INIP could be attributed to the fact that the INIP group's principle focus was on modification of healthy eating behaviors and nutrition knowledge through the interactive nutrition intervention classes. The NINIP did not attend the nutrition classes and therefore, most likely did not focus on changing their eating behaviors which may attribute to the lesser change in EBI scores.

The fifth and final exploratory aim of this study was to examine nutrition exam scores in the INIP compared to the NINP at baseline and 10 weeks. The INIP group increased their nutrition exam score from 48.7% ± 12.5% at baseline to 59.7% ± 14% at 10 weeks, whereas the NINIP group increased their score from 50.1% ± 21.4% to 52.6% ± 18.1% from baseline to 10 weeks, respectively. The increase in the nutrition exam from baseline to 10 weeks was statistically significant for the INIP as compared to the change for the NINIP. Similar to reasoning for the EBI, the significant increase in the INIP nutrition exam score may be linked to the circumstance that the INIP group's main focus was on modification of healthy eating behaviors and nutrition knowledge through the interactive nutrition intervention classes; the NINIP did not attend these classes and therefore most likely did not obtain additional information pertaining to dietary facts and general nutrition knowledge.

Due to the significant improvements shown the results from in Eating Behavior Inventory (EBI) scores and nutrition exam scores, it could be assumed that participants did make changes in their eating behaviors and increase their knowledge of nutrition information. However, because there was not a significant decrease in caloric consumption, it could be inferred that

there may not have been changes in actual eating behaviors because if there was, it would be shown through significant decreases in caloric consumption. Conversely, error in reporting on the 24-hour diet recall may be a reason that significant changes were not seen in caloric consumption; lack of food intake reporting and inaccurate calorie estimation may also have been factors. While there was a significant increase in nutrition knowledge, as seen through the nutrition exam, this increase in knowledge does not always translate into behavior change. It takes time for an individual to make lifestyle changes because they are, in fact, changing the way they live their lives. Despite the focus on behavioral tools, the lack of time may have prevented participants from being able to put their nutrition knowledge and newly learn behavioral skills into practice. Therefore, the limited program length may have affected the study outcomes; 10-weeks may have been enough time to see significant changes nutrition knowledge and scores on the EBI, but it may not have been enough time to see those practices translate into adequate behavior change to cause significant changes in weight loss and caloric consumption.

5.2.4 Cultural Influence

Cultural influence may have played a role in the results of this study; 77% of participants were African American which means that the majority of participants were represented by a minority population. Many of the individuals in the CLLP who considered participating the study were perceived to be at a low reading level and some individuals struggled with understanding the consent form which may have influenced their decision to not enroll in the study; thus, this may be a reason for a smaller sample size.

More culturally specific tools and information may be necessary to increase the impact of this program. According to Airhihenbuwa, Kumanyika, Agurs, Lowe, Saunders, & Morssink

(1996) food choices and cooking methods of African Americans have been influenced by customs passed down from past generations. (2) African Americans often struggle with barriers (i.e. perception that "eating healthy" means giving up one's heritage and conforming to the dormant culture, social and cultural symbolism of high-fat foods, lack of time and energy to prepare healthy foods, and no sense of urgency to change diet unless there is a health concern) which hinder behavior change toward positive eating choices (9). The intervention included interactive lessons on reading food labels, grocery shopping on a budget, and making healthy choices at restaurants as well as behavioral tools such as goal setting and problem solving. Although the primary investigator was aware of the African American influence of the participants, and some intervention topics were chosen with cultural needs in mind (i.e. low-fat food substitutes, quick and easy meal preparation, and health concerns with excess weight) the intervention could have been tailored to be more culturally sensitive toward this population focusing on the aforementioned barriers above.

Furthermore, some data suggest that African Americans perceive heavy body weight as more attractive and receive less social pressure for thin-less, which could reduce motivation for weight loss (7). It was evident in this intervention that some of the participants, usually women, struggled with the ambivalence of wanting to achieve a healthy weight status, but at the same time liking their body shape and excess weight. There was also often social pressure from significant others (i.e. marriage partners) who advised participants to not lose "too much" weight and lose their body shape. Therefore, body perception and weight loss may have to be addressed in future culturally tailored weight loss programs.

In the future, it may be more impactful to first survey participants to find out what kind of foods they are consuming on a regular basis and the common barriers to healthy eating

experienced by participants prior to the intervention. Using this information, intervention lessons could then be tailored (i.e. culturally specific behavior change topics and food demonstrations) to these barriers based on the needs of the specific population.

5.3 APPLICATION OF FINDINGS

The major findings in this investigation were that the individuals who participated in the interactive nutrition intervention program (INIP), which focused on changing eating habits, were shown to significantly increase their nutrition knowledge and make positive changes in their eating behaviors. These findings support two of the exploratory hypotheses that included there would be a positive change in the Eating Behavior Inventory scores and nutrition exam in the INIP group compared to the NINIP group. Although there were no significant changes in weight loss or BMI in INIP compared to the NINIP group, these outcomes were trending in the direction of significance. These findings can help community health intervention programmers in the future to focus on nutrition and behavioral changes in eating behavior.

5.4 CONCLUSIONS

The important findings of this study are those demonstrating that a significant increase in positive eating behaviors and nutrition knowledge can be seen in individuals participating in a community-based health intervention focusing on nutrition and eating behaviors. These findings may be important because they suggest that even a small scale nutrition intervention can have

positive impact on eating behaviors and nutrition knowledge. A longer term intervention may additionally influence positive changes in body weight and BMI. It is advised that the future direction of the CLLP focus on both diet and physical activity to reach maximum positive changes in health outcomes. Ultimately, a community program may want to focus on both nutrition and physical activity, if adequate resources are available.

5.5 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study is not without limitations, which may reduce the application of this study's findings. Future research should address the following factors to improve the potential impact of community-based health interventions on health outcomes, as well as improve the application of these findings to other community programs.

1. *Program length*

   The duration of the study was only 10-weeks in length. This was a small pilot study which was administered along with an already existing program called the CLLP. In compliance of the CLLP's tradition to run the program for only 10-weeks in length, the duration of the program was limited to this timeline.

2. *Nutrition focus of intervention*

   The primary focus of the community-based intervention was predominantly nutrition. Although physical activity opportunities were offered as part of the CLLP, no physical activity goals were set nor were any informational lectures on physical activity given to either the INIP or NINIP group. Therefore, a physical activity component may be necessary in the future to maximize weight-loss potential and the overall program impact.

3. Small sample size

This present investigation included only 22 participants whom were initially enrolled in the study. Moreover, only 17 participants completed the final assessment despite various attempts to contact these participants. This small sample size maybe attributed difficulty of transportation and travel to the intervention site as many participants in the program were of lower socio-economic status.

4. Weather conditions

The study took place during the winter months of a city which experienced abnormally high snow-fall and other extreme winter weather conditions. This may have affected participant's attendance rates and therefore may have affected the nutritional knowledge attained and physical activity levels potentially received from the study.

5. *Resources*

As this was a small-scale pilot study, resources were limited. With access to additional incentives, more accommodating facilities, and a greater amount of money to supplement educational lessons, the intervention may have been able to make a greater impact.

6. Cultural Diversity

The intervention could have been tailored more specifically to meet the needs of participants because there may have been cultural issues which were beyond the scope of the program. In future programming, it may be helpful to first screen participants to find out their current eating habits and behaviors and then tailor the intervention those specific cultural needs.

APPENDIX A

HEALTH HISTORY FORM

Health History Form

Contact Information:

Name _____

Street Address _____

City _____ State _____ Zip Code _____

Home Phone _____

Work Phone _____

Cell Phone _____

Please circle your primary/preferred number:

Home Work Cell

Email _____

*Staff will remove this information from the following questionnaire to preserve your confidentiality.

Health History Form Continued

1. Gender: ☐ Male ☐ Female

2.a. Age: ☐☐ **(21-55)** 2.b. Date of Birth: ☐☐/☐☐/☐☐

3. Which of the following best describes your racial heritage? (you may choose more than one category):

   θ American Indian or Alaska Native

   θ Asian

   θ Black or African-American

   θ Hispanic, Latino, or Cape Verdean

   θ Native Hawaiian or Other Pacific Islander

   θ White

   θ Other (Specify:_____)

4. Current Weight: ☐☐☐ pounds ***Office Use: BMI = _____(25-40 kg/m^2)***

5. Current Height: ☐ feet ☐☐ inches

6. Are you able to walk for exercise? ☐ **YES** ☐ No

   If "no", specify reason: _____

8. Have you ever been told by a doctor or other medical person that you have any of the following conditions? If "yes", Specify:

   a. Heart Disease ☐ Yes ☐ **NO** _____

b. Angina ☐ Yes ☐ **NO** _____

c. Hypertension ☐ Yes ☐ **NO** _____

d. Heart Attack ☐ Yes ☐ **NO** _____

e. Stroke ☐ Yes ☐ **NO** _____

f. Diabetes (sugar) ☐ Yes ☐ **NO** _____

g. Cancer ☐Yes ☐ **NO** _____

9. Are you presently being treated by a doctor or other medical person for any other physical or psychological problems? ☐ Yes ☐ **NO**

If "yes", specify: _____

10. Are you taking any medications for the purpose of weight loss? ☐Yes ☐**NO**

If "yes", specify: _____

11. Do you currently smoke? ☐ Yes ☐ **NO**

If "yes", specify: _____

12. Are you currently a member of another organized exercise or are you participating in an organized weight reduction program? ☐ Yes ☐ **NO**

If "yes", specify: _____

13. Have you lost 10 or more pounds within the past year? ☐ Yes ☐ **NO**

If "yes", specify number of pounds: ____Method used:_____

14. Are you currently participating in other research studies? ☐ Yes ☐ **NO**

If “yes”, specify: _____

15. Have you been a participant in a previous exercise or weight control study?

☐Yes ☐**NO**

If “yes”, specify:_____

18. Do you plan to spend any time out of town on vacation or business in the next 12 months that may affect your ability to attend weekly group meetings? ☐ Yes ☐ **NO**

If “yes”, specify: _____

20. Do you plan on relocating outside of the Greater Pittsburgh Area within the next 12 months? ☐ Yes ☐ **NO**

If “yes”, specify: _____

WOMEN ONLY COMPLETE THE FOLLOWING QUESTIONS

21. a. Are you currently pregnant? ☐ Yes ☐ **NO**

b. Have you been pregnant in the last 6 months? ☐ Yes ☐ **NO**

c. Do you plan on becoming pregnant in the next 12 months? ☐ Yes ☐**NO**

APPENDIX B

PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)

PAR – Q

Physical Activity Readiness Questionnaire

Regular physical activity is fun and healthy, and increasingly, more and more people like yourself are training for endurance events. However, some people should check with their doctor before they become much more physically active. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor. Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO	
____	___	Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
____	___	Do you feel a pain in your chest when you do physical activity?
____	___	In the past month, have you had chest pain when you were not doing physical activity?
____	___	Do you lose your balance because of dizziness or do you ever lose consciousness?
____	___	Do you have a bone or joint problem that could be made worse by a change in your physical activity?
____	___	Is your doctor currently prescribing drugs (i.e., water pills) for your blood pressure or heart condition?
____	___	Do you know of any other reason why you should not do physical activity?

Note: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

I have read, understood and completed the questionnaire. Any questions I had were answered to my full satisfaction.

Print Name

_____

Signature: _____ Date: _____

Signature of Parent or Guardian_____ _____ Witness: _____

APPENDIX C

INFORMED CONSENT

TITLE: The Effect of a Nutrition Intervention on Adults in a Community Program

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SOURCE OF SUPPORT: School of Education Student Research Grant

Why is this research being done?

You are being asked to participate in a follow-up study which will re-test the continued effect of a nutrition program on adults in a community program. A 10-week nutrition intervention was administered to a group of adults participating in the Community Leisure Learn Program (CLLP) at the University of Pittsburgh. The intervention provided participants with nutrition knowledge and educational materials to support the alteration of a healthy lifestyle through improved nutrition behaviors and physical activity levels. This follow-up study will help to assess the longer-term effect of the nutrition intervention.

Who is being asked to take part in this research study?

Seventeen adults who were previously consented and participated in the nutrition intervention as part of the original study will be asked to take part in the follow-up study. This study has minimal to no risks involved. All participants will sign the informed consent agreement that will be approved by the University of Pittsburgh's Institutional Review Board prior to participation.

What procedures will be performed for research purposes?

If you decide to take part in this research study, you will be asked to complete a variety of questionnaires including an eating behavior inventory (EBI), the Paffenbarger Questionnaire, a nutrition exam, a follow-up survey, and a24 hour diet recall. You will also be asked to have anthropometric measurements taken such as height, weight and waist circumference.

Screening Procedures:
Procedures to determine if you are eligible to take part in a research study are called "screening procedures." For this follow-up research study, the screening procedures include:

1. A health history form will be required to be completed by you prior to any participation in the study.

If you do not meet all of the inclusion criteria, you will not be able to participate in the follow-up study at this time. All procedures will take place in Trees Hall at the University of Pittsburgh. The follow-up assessment procedures will be administered by the primary investigator of the study.

Follow-up Assessment Procedures:
If you qualify to take part in this follow-up study, you will undergo the follow-up assessment procedures as followed:

1. Prior to the start of the study you will complete a consent form and health history questionnaire.

2. Body weight will be assessed using the Tanita bioelectrical impedance analyzer (BIA) scale. You will remove your shoes and socks and stand on the scale for approximately 10 seconds to obtain body weight on the Tanita scale. Height will be measured using a stadiometer, rounding each subject's height to the nearest inch. Participants will be asked to remove their shoes in order to obtain both of these measurements and body mass index (BMI) will then be computed. Waist circumference will then be assessed using a measuring tape, rounding to the nearest millimeter. You will have been asked, prior to the follow-up session, to wear thin clothing consisting of a T-shirt and non-bulky shorts or pants to insure accurate measurements.
3. You will then fill our 5 separate questionnaires including the eating behavior inventory (EBI), the Paffenbarger questionnaire, a nutrition exam, a 24-hour food recall, and a follow-up survey which consists of approximately 10 questions relating to eating behaviors and weight change since the completion of the nutrition intervention nearly 5 months prior. These questionnaires will be completed by both the INIP and NINIP participants.

What are the possible risks, discomforts, and side-effects of this follow-up research study?

Breach of Participant's Confidentiality

All research data will be labeled with an assigned research code and not anything that directly identifies the participant to ensure confidentiality. Participant's contact information will not need to be collected at this time as this information has already been collected and properly stored for the original study.

Risk of follow-up assessments

Risks of the follow-up assessments include measurement of height, weight, and waist circumference. There are little to no risks, discomforts, or side-effects of this follow-up research study.

What are the possible benefits of taking part in this follow-up research study?

Participants will be able to assess their progress in eating behavior and physical activity changes and the longer-term effect of the nutrition intervention.

If I agree to take part in this research study, will I be told of any new risks that may be found during the course of the study?

You will be promptly notified if, during the conduct of this follow-up research study, any new information develops which may cause you to change your mind about continuing to participate.

Will my insurance provide or I be charged for the costs of any procedures performed as part of this follow-up research study?

Neither you, nor your insurance provider, will be charged for the cost of any procedures performed for the purposes of this research study.

Will I be paid to take part in this follow-up research study?

You will be paid $30.00 upon completion of this follow-up research study. There will be no partial compensation for only half of the follow-up assessments being completed.

Who will know about my participation in this research study?

Any information obtained about you from this research will be kept as confidential (private) as possible. All records related to your involvement in this follow-up research study will be stored in locked filing cabinet. You identity on these records will be indicated by a case number rather than by your name, and the information liking these case numbers with your identity will be kept separate from the research records. You will not be identified by name in any publication of the research results.

Will this research study involve the use or disclosure of my identifiable medical information?

This follow-up research study will not involve the use or disclosure of any identifiable medical information.

Who will have access to identifiable information related to my participation in this research study?

In additional to the investigators listed on the first page on this authorization (consent) form and their research staff, the follow individuals will or may have access to identifiable information related to your participation of this follow-up research study:

1. Authorized representatives of the University of Pittsburgh Research Conduct and Compliance Office may review your identifiable research information for the purpose of monitoring the appropriate conduct of this research study.

2. In an unusual case, the investigators may be required to release identifiable information related to your participation in this follow-up research study in response to an order from a court of law.

3. Authorized people sponsoring this research study, as they need to be sure that the information that is collected is correct, accurate, and compete, and to determine the results of this research study.

For how long will the investigators be permitted to use and disclose identifiable information related to my participation in this research study?

The investigators may continue to use and disclose, for the purposes described above, identifiable information related to your participation in this research study for a minimum of 5 years after the final reporting or publication of a project.

Is my participation in this research study voluntary?

Yes! Your participation in this research study is completely voluntary. You may refuse to take part in it, or you may stop participating at any time, even after signing this form. Your decision will not affect any current or future relationship you may have with the University of Pittsburgh.

May I withdraw, at a future date, my consent for participation in this research study?

Yes. To do so, you must contact the investigators on the first page of this consent form. If you withdraw from this study, we will continue to use the information we have collected from you during the course of this research study. That information will be labeled with an assigned research code number that will not directly identify you.

If I agree to take part in this research study, can I be removed from the study without my consent?

It is possible that you may be removed from the research study by the researchers to protect your safety or if you are unwilling or unable to complete the research protocol.

****

VOLUNTARY CONSENT

All of the above has been explained to me and all of my questions have been answered. I understand that any future questions I have about this research study during the course of this study, and that such future questions will be answered by the investigators listed on the first page of this consent document at the telephone numbers given. Any questions I have about my rights as a research subject will be answered by the Human Subject Protection Advocate of the IRB Office, University of Pittsburgh (1-866-212-2668). By signing this form, I agree to participate in this research study.

Participant's Signature Printed Name of Participant Date

CERTIFICATION OF INFORMED CONSENT

I certify that I have explained the nature and purpose of this research study to the above-named individual, and I have discussed the potential benefits, and possible risks associated with participation. Any questions the individual has about this study have been answered, and we will always be available to address future questions as they arise.

Printed Name of Person Obtaining Consent Role in Research Study

Signature of Person Obtaining Consent Date

APPENDIX D

EATING BEHAVIOR INVENTORY (EBI)

	Never or Hardly ever	Some of the time	About half of the time	Much of the time	Always or almost always
A. I carefully watch the quantity of food that I eat.	☐1	☐2	☐3	☐4	☐5
B. I eat foods that I believe will aid me in losing weight.	☐1	☐2	☐3	☐4	☐5
C. I keep 1 or 2 raw vegetables available for snacks.	☐1	☐2	☐3	☐4	☐5
D. I record the type and quantity of food which I eat.	☐1	☐2	☐3	☐4	☐5
E. I weigh myself daily.	☐1	☐2	☐3	☐4	☐5
F. I refuse food offered to me by others.	☐1	☐2	☐3	☐4	☐5
G. I eat quickly compared to most other people.	☐1	☐2	☐3	☐4	☐5
H. I consciously try to slow down my eating rate.	☐1	☐2	☐3	☐4	☐5
I. I eat at only one place in my home.	☐1	☐2	☐3	☐4	☐5
J. I use the same placemat and other utensils for each meal.	☐1	☐2	☐3	☐4	☐5

K. I eat and just can't seem to stop.	☐1	☐2	☐3	☐4	☐5
L. I eat in the middle of the night.	☐1	☐2	☐3	☐4	☐5
M. I snack after supper.	☐1	☐2	☐3	☐4	☐5
N. My emotions cause me to eat.	☐1	☐2	☐3	☐4	☐5
O. I buy ready-to-eat snack foods for myself.	☐1	☐2	☐3	☐4	☐5
P. I shop when I'm hungry.	☐1	☐2	☐3	☐4	☐5
Q. I shop from a list.	☐1	☐2	☐3	☐4	☐5
R. I leave food on my plate.	☐1	☐2	☐3	☐4	☐5
S. I serve food family style (serve from bowls on table).	☐1	☐2	☐3	☐4	☐5
T. I watch TV, read, work, or do other things while I eat.	☐1	☐2	☐3	☐4	☐5
U. If I'm served too much, I leave food on my plate.	☐1	☐2	☐3	☐4	☐5
V. Generally, while I'm at home, I leave the table as soon as I finish eating.	☐1	☐2	☐3	☐4	☐5
W. I keep a graph of my weight.	☐1	☐2	☐3	☐4	☐5
X. I eat when I'm not really hungry.	☐1	☐2	☐3	☐4	☐5
Y. I store food in containers where it is not readily visible or in a closed cupboard.	☐1	☐2	☐3	☐4	☐5
Z. I decide ahead of time what I will eat for meals and snacks.	☐1	☐2	☐3	☐4	☐5

APPENDIX E

NUTRITION EXAM

1. One pound is made up of how many kilo-calories?
   a. 3600 c. 1500
   b. 3500 d. 2000

2. Trans-fat should only make up what percentage of one's diet?
   a. 3% c. 10%
   b. 5% d. 1%

3. Which item is not a good example of a high-fiber food?
   a. Beans c. Oatmeal
   b. Strawberries d. Animal Cracker

4. Most women should consume what range of calcium each day?
   a. 1000-1200 mg c. 500-1000 mg
   b. 1500-2000 mg d. 2.5 -3.0 grams

5. On average, it takes how many minutes for your brain to get the message from your stomach that you are no longer hungry?
   a. 5 minutes c. 20 minutes
   b. 10 minutes d. 45 minutes

6. One serving size of meat would be equal to:
   a. A deck of cards c. A matchbox
   b. A size 7 shoe d. None of the above

7. A good source of Vitamin C would include:
   a. Milk
   b. Fruit
   c. Lean meat
   d. Wheat thin crackers

8. How much water should you drink each day for proper hydration?
   a. 6 six ounce glasses
   b. 8 eight ounce glasses
   c. 1 gallon
   d. 6 eight ounce glasses

9. One egg yolk contains approximately how many mg of cholesterol?
   a. 100 mg
   b. 200 mg
   c. 50 mg
   d. 300 mg

10. Margarine is made from vegetable oil and contains:
   a. No cholesterol
   b. A small amount of cholesterol
   c. Just as much cholesterol as butter
   d. Half the amount of cholesterol as butter

APPENDIX F

PAFFENBARGER PHYSICAL ACTIVITY QUESTIONNAIRE

EXERCISE HABITS

1. Was there anything about the past week that made exercising especially different for you in terms of extended illness, injury, or vacation?

☐$_1$Yes ☐$_2$No

*If "NO", please complete this questionnaire about this past week.

*If "YES", please complete this questionnaire about the previous week.

2. First, we are interested in the number of flights of stairs you climbed on average **EACH DAY** in this past week. We only want to know the number of flights you climb going *UP* - not down.

One Flight = 10 steps if you know the number of steps.

☐☐ Flights per day

3. Next, we want to know how many city blocks or their equivalent you walked on average **EACH DAY** in this past week. We are only interested in walking done out of doors and walking done indoors for the sole purpose of exercise. We do not want walking done around the house or at work.

Consider that 12 city blocks = 1 mile.

☐☐ Blocks per day

4. Were there any sports, fitness, or recreational activities in which you participated during the past week? We are interested only in time that you were physically active.

(Note: all walking should only be included in Question 3)

Sport, Fitness, or Recreation	**Times per Week**		**Average Time per Episode**	***Office Use Only***
a.	☐☐		☐☐☐ Minutes	☐
b.	☐☐		☐☐☐ Minutes	☐
c.	☐☐		☐☐☐ Minutes	☐
d.	☐☐		☐☐☐ Minutes	☐

5. Would you say that during the past week (the week used for questions 2-4) you were:

☐ less active than usual

☐ more active than usual

☐ about as active as usual

6. At least once per week, do you engage in regular activity akin to brisk walking, jogging, bicycling, etc. long enough to work up a sweat, get your heart thumping, or get out of breath?

☐ Yes ☐☐ times per week; Activity: _____

☐ No

7. On a usual weekday and a weekend day, how much time (to the nearest 1 hour) do you spend on the following activities? The total for each day should add to 24 hours

Sport, Fitness, or Recreation	**Usual Weekday** **Hours per Day**	**Usual Weekend Day** **Hours per Day**
a) Vigorous Activity (digging in the garden, strenuous sports, jogging, aerobic dancing, sustained swimming, brisk walking, heavy carpentry, bicycling on hills, etc.)	☐☐	☐☐

b) Moderate Activity (housework, light sports, regular walking, golf, yard work, lawn mowing, painting, repairing, light carpentry, ballroom dancing, bicycling on level ground, etc.)	☐☐	☐☐
c) Light Activity (office work, driving car, strolling, personal care, standing with little motion, etc.)	☐☐	☐☐
d) Sitting Activity (eating, reading, desk work, watching TV, computer work, listening to the radio, etc.)	☐☐	☐☐
e) Sleeping or reclining	☐☐	☐☐

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