Nutri One-on-One: The Assessment and Evaluation of a Single One-on-One Nutritional Coaching in Patients Affected by Metabolic Syndrome

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NUTRI ONE-ON-ONE: THE ASSESSMENT AND EVALUATION OF A SINGLE ONE-ON-ONE NUTRITIONAL COACHING IN PATIENTS AFFECTED BY METABOLIC SYNDROME

A Thesis in Biomedical Sciences by Jennifer L. King

A Thesis Submitted in Fulfillment of the Requirements for the Degree of MASTERS OF SCIENCE IN BIOMEDICAL SCIENCES
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Abstract

The Nutri One-on-One Program's aim was to positively modify participants' nutritional habits and lifestyles through a brief one-on-one health coaching session, which was conducted within a primary healthcare setting at the Philadelphia College of Osteopathic Medicine's Clinics. It is documented that 70% of deaths in the U.S. result from complications secondary to chronic diseases of metabolic syndrome. The participants were selected by physicians and classified as suffering from one or more of the five indicators of metabolic syndrome: abdominal obesity, elevated serum triglycerides, low HDL-cholesterol, elevated blood pressure, and insulin resistance.

Evidence shows that health coaching positively assists individuals in modifying their lifestyle to a healthier one to prevent and control disease. Health coaching is most effective when utilizing the concept of one-on-one motivational interviewing and interactions. Therefore, this model was adopted in order to allow for tailored nutritional education and behavioral goal setting leading to individual success.

The collected subject health information allowed for a specifically tailored nutritional education lesson to be distributed in order to assist the participant in setting a primary health goal and three Health Actions to achieve the Health Goal. The effects of Nutri One-on-One have been analyzed through participant's goal setting, self-reported achievement score, patient and physician satisfaction surveys, nutritional educational assessment, and a follow-up telephone call. The 74 participants, 48 female and 26 male, were initially interviewed to gain insight into their personal daily nutritional habits and nutritional history.

Personalized one-on-one nutritional health coaching through the Nutri One-on-One program proved to be successful, as 98% of the participants reported that their health goals were still a priority at the one-month follow-up, and the subjects had implemented their three health actions at 75%. The tailored education for healthy
nutritional living and behavior change continued to create positive behavior modifications within subjects and 93% of the study population reported that even the one time intervention was an asset to their health and overall primary healthcare visit and hoped to have similar interaction in their future visits.
Table of Contents

Acknowledgments.......................................................................................................... viii
List of Figures.................................................................................................................... ix
List of Tables........................................................................................................................ x

Chapter I.
Background...................................................................................................................... 1
  1.1 Obesity and Associated Complications.......................................................... 1
  1.2 Obesity on the Rise................................................................................. 3
  1.3 Methods of Intervention to a Healthier Weigh............................................. 4
  1.4 Significant Economic Consequences of Obesity................................. 6
  1.5 Metabolic Syndrome ............................................................................... 7
  1.6 The Reason for the Health Epidemic............................................................. 8
  1.7 Success of One-on-One Interventions ........................................................... 9
    1.7.1 5As Model........................................................................................ 14
    1.7.2 Barriers and Obstacles ........................................................................... 15
  1.8 Theory of Planned Behavior ........................................................................ 16
  1.9 Readiness to Change..................................................................................... 16
  1.10 Purpose......................................................................................................... 19
  1.11 Hypothesis.................................................................................................... 19

Chapter II.
Methods and Materials...................................................................................................... 20
  2.1 Location of the Study................................................................................... 20
  2.2 Participants ................................................................................................... 21
    2.2.1 Recruitment Inclusion Criteria..................................................... 21
    2.2.2 Exclusion Criteria........................................................................... 21
  2.3 Initial Session Procedures........................................................................... 22
    2.3.1 Obtain Vitals and Patient Information............................................. 22
    2.3.2 Initial Meeting and Counseling Session............................................. 22
      2.3.2.1 Health Form............................................................................. 23
      2.3.2.2 Primary Health Goal............................................................. 24
      2.3.2.3 Readiness Score..................................................................... 24
      2.3.2.4 Nutritional Education Lesson Plan........................................... 24
      2.3.2.5 Three Health Actions.............................................................. 25
      2.3.2.6 Take-Home Flyer.................................................................... 25
      2.3.2.7 Reminded about Follow-Up.................................................... 26
    2.3.3 Initial Patient Satisfaction Survey......................................................... 26
  2.4 Follow-Up Procedures..................................................................................... 26
    2.4.1 Asses Three Health Actions.............................................................. 27
    2.4.2 Determine if Goals are Still a Priority................................................ 27
    2.4.3 Patients Perceived Benefit from Initial Session................................... 27
    2.4.4 Primary Goal Success........................................................................ 28
    2.4.5 Additional and Future Actions............................................................ 28
  2.5 Follow-Up Educational Assessment................................................................. 28
2.6 Physician's Satisfaction Survey....................................................................29
2.7 Assessment Tools..........................................................................................29
2.8 Hard Data and Subject Information ............................................................30
2.9 Statistical Package for the Social Sciences (SPSS).......................................30

Chapter III.
Results...............................................................................................................................31
  3.1 Demographics................................................................................................ 31
  3.2 Anthropometric Measurements...................................................................32
  3.3 Metabolic History...........................................................................................33
  3.4 Social History.................................................................................................35
  3.5 Lesson Plans Delivered..................................................................................37
  3.6 Readiness Score..............................................................................................38
  3.7 Initial Survey Questionnaire.........................................................................39
  3.8 Meeting Health Actions and Primary Goals.................................................41
  3.9 Health Goal Priority During Follow-Up.......................................................41
  3.10 Patient Perceived Intervention Value........................................................42
  3.11 Patient Perceived Overall Success in Obtaining Primary Goal..................43
  3.12 Additional and Future Actions...................................................................44
  3.13 Educational Assessment.............................................................................45
  3.14 Non-Responder Subject Rate.......................................................................46
  3.15 Physicians Survey.........................................................................................47
  3.16 Other Analysis..............................................................................................49

Chapter IV.
Discussion.........................................................................................................................53
  4.1 Implications of Results..................................................................................53
  4.2 Initial Session Findings................................................................................60
  4.3 Complications with Participant Referrals......................................................61
  4.4 One-on-One Environment.............................................................................62
  4.5 Health Goals...................................................................................................62
  4.6 Initial Patient Satisfaction Survey.................................................................64
  4.7 Initial Session Challenges.............................................................................64
  4.8 Follow-Up.......................................................................................................66
  4.9 The Three Benefits on the Study.................................................................68
  4.10 Five Assessment Tools...............................................................................70
  4.11 Limitations of Study....................................................................................73
  4.12 Future Research...........................................................................................74

Chapter V.
Conclusion.......................................................................................................................75

References.....................................................................................................................76
Appendices

Appendix A. Health Form
Appendix B. Nutritional Education Lesson Plan
Appendix C. Take Home Flyer
Appendix D. Initial Patient Satisfaction Survey
Appendix E. Follow-Up Session Survey
Appendix F. Follow-Up Educational Assessment
Appendix G. Physician’s Satisfaction Survey
Appendix H. Variables Used for SPSS Program
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List of Figures:

<table>
<thead>
<tr>
<th>Figure 2.1</th>
<th>PCOM Healthcare Clinic</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.2</td>
<td>One-on-One Intervention Room</td>
<td>22</td>
</tr>
<tr>
<td>Figure 3.1</td>
<td>Metabolic Syndrome Factors Seen in Participants</td>
<td>35</td>
</tr>
<tr>
<td>Figure 3.2</td>
<td>Time When Subjects became Non-Responders</td>
<td>46</td>
</tr>
</tbody>
</table>
List of Tables:

Table 1.1 Adult BMI Ranges and Obesity Classifications .......................................................... 2  
Table 3.1 Gender .......................................................................................................................... 31  
Table 3.2 Age.............................................................................................................................. 31  
Table 3.3 Subject’s Anthropometric Measurements at Initial Visit .......................................... 32  
Table 3.4 Type 2 Diabetes Prevalence ....................................................................................... 33  
Table 3.5 Heart Disease Prevalence ......................................................................................... 33  
Table 3.6 Hypertension Prevalence ......................................................................................... 34  
Table 3.7 Obesity Prevalence ................................................................................................. 34  
Table 3.8 Smoking and Drinking Habits and History ............................................................... 35  
Table 3.9 Subject Cooking Meals and Dining at Home ............................................................ 36  
Table 3.10 Times Monthly Subject Eats Fast Food .................................................................. 36  
Table 3.11 Times Monthly Subject Eats at Full Service Restaurant ........................................ 37  
Table 3.12 Educational Lesson Plans ....................................................................................... 37  
Table 3.13 Readiness Scores .................................................................................................... 38  
Table 3.14 Initial Survey Questionnaire .................................................................................. 40  
Table 3.15 The Percentage of Goals Met at Initial Session ...................................................... 41  
Table 3.16 Set Health Goal Priority ......................................................................................... 41  
Table 3.17 Patient Perceived Intervention Value ...................................................................... 42  
Table 3.18 Patient Perceived Overall Success in Obtaining Primary Goal .............................. 43  
Table 3.19 Patient Taking Additional Actions Before One Month Follow-up and Plans to Take More Future Actions .................................................................................. 44  
Table 3.20 Education Assessment Multiple-Choice Questions ................................................ 45  
Table 3.21 Physicians’ Survey Questionnaire ......................................................................... 48  
Table 3.22 Non-Responder Subjects and Comparing Variables .............................................. 49  
Table 3.23 Readiness Score and Comparing Variables ............................................................. 50  
Table 3.24 Educational Assessment Retention and Comparing Variables ............................... 51  
Table 3.25 Subject Satisfaction of Intervention and Comparing Variables ............................ 51  
Table 3.26 Subject Goal Achievement and Comparing Variables .......................................... 52
Chapter I.

Background:

1.1 Obesity and Associated Complications

In order to accurately diagnose an individual’s body status, a health-oriented definition of overweight and obese needs to be determined. This definition should be based on the amount of excess body fat present within an individual, particularly visceral fat (Centers of Disease Control and Prevention, 2011). Currently, no easily determined precise definition exists in the medical community, thus creating uncertainty and difficulties when diagnosing.

According to the U.S. Department of Health and Human Services Centers for Disease Control and Prevention, Body Mass Index (BMI) is a “fairly reliable method for measuring body fatness in most people” (Centers of Disease Control and Prevention, 2011). Empirical evidence shows that although BMI does not measure body fat directly, it is an inexpensive screening tool that can be utilized to identify possible weight issues within a population (Centers of Disease Control and Prevention, 2011). BMI values consider both a persons weight and height; the calculations are based on the following formulas:

\[
\text{BMI} = \frac{\text{Weight (kg)}}{[\text{height (m)}]^2}
\]

\[
\text{BMI} = \frac{\text{Weight (lbs)}}{[\text{height (in)}]^2 \times 703}
\]
The standard weight status associated with BMI ranges for adults are as follows:

Table 1.1 Adult BMI Ranges

<table>
<thead>
<tr>
<th>BMI</th>
<th>Weight Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 18.5</td>
<td>Underweight</td>
</tr>
<tr>
<td>18.5-24.9</td>
<td>Normal</td>
</tr>
<tr>
<td>25-29.9</td>
<td>Overweight</td>
</tr>
<tr>
<td>30.0 and Above</td>
<td>Obese</td>
</tr>
</tbody>
</table>

(Centers of Disease Control and Prevention, 2011)

Obese patients are further placed into three classes, based on their BMI:

Table 1.2 Obesity Classifications

<table>
<thead>
<tr>
<th>Class</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>30-34.9</td>
</tr>
<tr>
<td>Class 2</td>
<td>35-39.9</td>
</tr>
<tr>
<td>Class 3</td>
<td>40-49.9</td>
</tr>
</tbody>
</table>

(Duke Medical, 2010)

There is a fairly strong correlation between BMI values and excess body fat; however, this correlation can vary in regard to sex, race, fitness, and age (Centers of Disease Control and Prevention, 2011). It is important to remember that BMI is not a direct or perfect measurement of excess body fat, because the calculations come from an individual’s total weight, including water, muscle, and fat. Therefore, simple BMI calculations cannot distinguish between the three weight contributors, and a highly trained athlete may produce a misleadingly elevated BMI value. This elevated BMI value would be a result of the increased muscularity in the athlete and not actual excess body fat. This example helps illustrate how imperative it is that healthcare professionals consider a variety of health risk factors especially an individual’s waist circumference when assessing the patient’s overall health status, because body fat distribution has significant health ramifications.
Also, when addressing weight status, it is important to consider obesity predisposition in humans due to both genes and environment (J. R. FAU et al., 0212). Certain individuals are more inclined to have excess body fat because of their genetic make-up, while others experience the weight gain due to culture, lifestyle habits, and lack of nutritional education.

When considering environmental factors, it is important to focus on the balance between physical activity and nutrition (Robroek, Bredt, & Burdorf, 2007a). A lack of balance can create an unhealthy weight and may be due to a combination of factors: childhood family environment, nutritional knowledge, or lifestyle priorities and habits. These environmental factors may trigger the genetic predisposition towards obesity within a specific individual causing a weight gain. As a result, lifestyle modifications including regular physical activity and proper energy-reduced diets are the foundations for weight maintenance and management, whether the predisposition originates as environmental or genetic (Wycherley, Mohr, Noakes, Clifton, & Brinkworth, 2012).

Obesity and its associated comorbidities are the leading causes of death for 70% of the U.S. population, and on average contribute to a fifteen-year reduction of average lifespan (Olsen & Nesbitt, 2010). Obesity, particularly abdominal obesity, is strongly associated with a variety of comorbidities including: diabetes, hypertension, hyperlipidemia, fatty liver disease, obstructive sleep apnea, gastroesophageal reflux disease, vertebral disc disease, osteoarthritis, and increased risk of postmenopausal breast, endometrial, colon, kidney, and esophageal cancer (Laddu, Dow, Hingle, Thomson, & Going, 2011).
1.2 Obesity on the Rise

Obesity is currently recognized as the most significant contributing risk factor to the health burden of the world (Bischoff et al., 2012). An estimated 69% of U.S. adults are currently deemed overweight or obese (Ma J, Yank V, Xiao L, et al, 2013) and a disturbing 17% of children and adolescents are already suffering from obesity and its complications (Laddu, Dow, Hingle, Thomson, & Going, 2011).

These alarming statistics make it essential that healthcare professionals seek out new ways to address the health epidemic. Currently, there are a variety of factors contributing to the issues of obesity; however, lack of knowledge about nutrition, portion control, and self-efficacy seem to be the most prevalent. In the U.S., especially among the populations from poor backgrounds having low access to education, knowledge concerning dietary recommendations remains very low (Perkins-Porras et al., 2005). Therefore, interventional programs (outreach programs, counseling, and nutritional education) need to start within the local communities. Programs also need to be available, accessible, low in cost, and applicable to the underserved populations.

Obesity is a major health problem across the world, currently affecting two out of every three U.S. adults (Laddu, Dow, Hingle, Thomson, & Going, 2011). These numbers alone and the continual rise within them indicate a need for radical change. The current approaches taken towards rectifying the obesity epidemic are not proving to be effective in the U.S. or around the world.

1.3 Methods of Intervention to a Healthier Weight

Physical activity is a key component of weight management. Although balance between nutrition and physical exercise is important, physical activity alone should not be the sole focus of an intervention when addressing weight reduction in obese individuals. Exercise should be amended to include methods for weight loss.
Visceral fat is extremely responsive to physical activity. If considerable visceral fat is lost even though significant amounts of weight are not, benefit is gleaned. However, the weight loss might be modest. As evidence shows, a weekly exercise energy expenditure of 2000 kcal/week is necessary for an observable weight loss, and even at this level of expenditure, only a mild weight loss can be expected (Laddu, Dow, Hingle, Thomson, & Going, 2011). The aforementioned amount of expenditure and modest weight loss is not significant enough to improve the health status of classified obese individuals, and this type of exercise is often unattainable for an individual of this classification to achieve due to his or her current physical status and capabilities.

It is important to realize that, while not the main focus in obesity interventions, exercise should be encouraged within all individuals because it can improve metabolic fitness, install healthy lifestyle, and improve cardiovascular health. Exercise will notably decrease abdominal obesity, positively affect glucose tolerance, affect other metabolic syndrome variables (blood glucose levels, systolic and diastolic blood pressure, triglycerides, increase HDL-cholesterol), have a lowering effect on LDL-cholesterol, and subside inflammatory markers (Ross, Hudson, Day, & Lam, 2013). While studies show that effects of exercise are positive and add significant value to overall health; however, to be effective in weight loss, exercise has to be combined with kcalorie reduction methods for optimal outcomes.

Caloric reduction done in a healthy manner is an effective method for weight loss; therefore, it should be a key focus of education and intervention programs when addressing body composition (Laddu, Dow, Hingle, Thomson, & Going, 2011). Berk’s pilot study using a combination of combined physiological intervention and a very low caloric restricted diet for Diabetic Type 2 patient’s proved to be an effective weight loss method and gave an ability to maintain the weight loss over a two-year time period. A very low caloric diet forces the body into ketosis and enhances lipolysis, but prevents a negative nitrogen balance allowing for effective,
quick, and safe weight loss in individuals, especially Diabetic Type 2 persons (Berk et al., 2012).

In order to address the obesity comorbidities, it is important to specifically address diet. Diet is one of the main aspects of lifestyle influencing some forms of cancer and cardiovascular disease (Perkins-Porras et al., 2005). Therefore, nutrition education that informs about simple dietary facts and behavior modifications needs to be the primary focus for combating the epidemic of obesity and the complications it affords.

Evidence shows that providing education concerning lifestyle changes and dietary modifications has a notable effect on the population’s health outcomes and specifically obesity rates (Son et al., 2012). In fact, even a modest weight loss of 5%-10% through dietary changes and lifestyle modifications can have a significant effect concerning health benefits for an individual (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013). However, it is important to note that even modest weight loss, such as 5%-10%, is difficult to maintain over a long period due to the chronic relapse nature of obesity. Therefore, a support or maintenance system must also be put into place for sustainable success.

1.4 Significant Economic Consequences of Obesity

Recent U.S. economic figures show that over $207 billion are spent annually on the increased need for medical care and an overall loss of productivity due to elevated rates of disease, disability, and death (Laddu, Dow, Hingle, Thomson, & Going, 2011). This significant financial burden to the U.S. demonstrates an imperative need for change and implementation of new methods to address overall health.

As 75% of the U.S. healthcare dollars are currently being spent on diseases caused by obesity, change needs to begin by employing nutritional education,
proper weight loss methods, and maintenance practices that the population can readily use (Olsen & Nesbitt, 2010). The focus of improving dietary lifestyles should first begin with low-income populations because change within these populations will contribute to a reduction in social disparities with major chronic diseases (Perkins-Porras et al., 2005). Two effective methods for disseminating this type of nutritional information to such populations are health consultation and counseling, which are not only a cost effective approach, but are both endorsed as effective strategies towards positively managing poor lifestyles habits (Son et al., 2012).

1.5 Metabolic Syndrome

Metabolic syndrome refers to a clustering of symptoms including abdominal obesity, elevated serum triglycerides, low HDL-cholesterol, hypertension, and insulin resistance (J. R. FAU et al., 2012). Much controversy exists over the term, definition, pathogenesis, and clinical utility; therefore, healthcare professionals seldom use it to define a patients’ current status. Despite the controversy behind the term, it is well accepted among the medical and scientific community that the conditions constituting the controversial diagnosis do indeed frequently cluster together. With approximately one third of the U.S. adult population suffering from metabolic syndrome, there is a serious need to address and understand the ramifications of metabolic syndrome (J. R. FAU et al., 2012).

More specifically according to the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATPIII) metabolic syndrome is defined by “an individual having three of the following five characteristics: abdominal obesity determined by waist circumference (men > 102cm; women > 88cm); elevated triglycerides > 150mg/dl; low HDL-cholesterol levels (men < 40mg/dl; women < 50mg/dl); elevated blood pressure >130/>85mmHg; and elevated fasting blood glucose > 110mg/dl” (J. R. FAU et al., 2012).
Due to the frequent clustering of the symptoms constituting metabolic syndrome, it is agreed that nutritional counseling focusing on one or more of the five symptoms, will eventually have an effect on all of the symptoms experienced by the metabolic syndrome patient. Therefore, just as healthcare professionals observe complications clustering together upon diagnosis, it is also noted that positive progression towards alleviating one complication will have an encouraging impact upon the other associated complications.

1.6 The Reason for the Health Epidemic

The complications of metabolic syndrome, especially obesity, are causing a quantifiable health epidemic across the world. There are a few factors directly contributing to the health epidemic: primarily, poor public knowledge about recommended dietary intake, unhealthy lifestyle habits, and a lack of understanding the importance of maintaining a healthy weight. This lack of knowledge and education is very frequently observed in the underserved, lower socioeconomic, and lower educated communities, thus, presenting the need to begin change within these communities (B. P. FAU, FAU, & Stevens, 0318).

Evidence shows that primary healthcare settings are an ideal location for addressing the issues of obesity and minimizing its disease burden within a population (Ma J, Yank V, Xiao L, et al, 2013). Primary care physicians are ideally placed in a role that will allow for effective lifestyle counseling and nutritional education distribution. However, a U.S. national survey reveals that “there is a continuing failure to incorporate weight management into clinical practice, especially that of primary care” (Ma J, Yank V, Xiao L, et al, 2013).

In fact, Helmink et al. states that many general practitioners support the notion of implementing weight management and counseling into their practice, but due to a significant lack of time to dedicate specifically to each patient, they are unable to successfully do so (Helmink et al., 2010). It is evident that the issue of
time prevails as the leading obstacle preventing proper counseling and education within the primary care settings. The time allotted for each visit is not adequate to address family history, exam procedures, questions, ailments, and give personally modified nutritional education regarding lifestyle modifications and nutritious intake. Physicians are forced to give general knowledge concerning nutrition to each patient, and perhaps a pamphlet, which often leaves the patient unable to apply the learned information to his or her own personal lifestyle for positive change.

Primary care facilities are not the only effective institutions for behavioral counseling and nutritional education. A variety of settings have proven to be successful, such as: schools, religious organizations, health centers, diabetic outreach classes, etc. However, there is an extreme lack of institutions where obesity prevention and treatment programs are being implemented, and the existing clinics are far from adequate (Bischoff et al., 2012). Thus, there is a dire need for new clinics, methods, and practices focused towards combating obesity and metabolic syndrome.

1.7 Success of One-on-One Interventions

As discussed primary care clinics are a key setting for obesity management because the healthcare providers are aware of their patients health status and the patient is usually seen in a private setting (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013) This is an ideal setting because findings suggest that presenting nutrition information in an individual face-to-face environment between a health professional and subject produces a more significant effect than group or self-counseling (Perkins-Porras et al., 2005).

However, even in an intimate doctor’s visit setting, the intervention needs to be tailored specifically to the individual, with personalized specific advice and knowledge being distributed. In order for the healthcare professional to be successful in providing tailored advice to a participant, it is imperative that the
interaction be conducted in a one-on-one setting. The nutritional counseling needs to be formulated in a way that each participant can adequately address his or her habits, nutritional knowledge, perceived obstacles, self-efficacy, confidence, motivation, and physical concerns in order to be successful (Perkins-Porras et al., 2005).

Coach-led interventions done in this one-on-one interaction environment have statistically significant success. This is exemplified by the Ma J. et al. study where 7% of the initial target weight loss goal was achieved by 37% of the one-on-one led intervention participants compared to only 14.4% of the self-led participants (Ma J, Yank V, Xiao L, et al, 2013). In addition, many studies from the U.S., Netherlands, Korea, London, Dutch, German, and Australian evaluate the continual promising effects of one-on-one intervention on health behavior and the effective elements of brief intervention overall (Bischoff et al., 2012; A. W. FAU et al., 0429; Helmink et al., 2010; Ma J, Yank V, Xiao L, et al, 2013; Perkins-Porras et al., 2005; Robroek, Bredt, & Burdorf, 2007a; Sacerdote et al., April 2006; Son et al., 2012; Wycherley, Mohr, Noakes, Clifton, & Brinkworth, 2012).

The one-on-one concept is also important for addressing different lifestyle modifications and nutritional practices a patient might present. For example, not every healthy lifestyle modification will be achievable or desired by each participant. Therefore, the one-on-one concept is important when addressing effective behavior modification principles, such as goal setting. Goal setting has proven to be a promising technique and is becoming more widely utilized in the nutritional counseling settings (Sacerdote et al., April 2006).

Goal setting is effectively established when using the “SMART framework: finding behavioral goals that are specific, measurable, achievable, rewarding, and timely” within a one-on-one setting (Vallis, Piccinini-Vallis, Sharma, & Freedhoff, 2013). It is important that the individual goals are focused and deemed obtainable. It is the responsibility of the health coach or healthcare professional to make sure
that each goal is addressed, expected outcomes are hypothesized, the goal is obtainable to the specific participant, and the time frame for observable results are understood.

The goals need to come from the participant and be guided in an effective direction by the healthcare professional. Goals may be small or large, and may address the major health complication of the participant. As the goals are reached, the positive outcomes will encourage a snowball effect. The participant will soon become stimulated to set more goals with larger outcomes as he or she is positively reinforced by the results from the prior obtained goals. It is also essential that the healthcare professional conduct the goal setting in a nonjudgmental and open environment for the most successful results (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013).

Participants need to feel confident about being able to obtain their health related goals; by allowing them to establish their own goals a sense of self-assurance is cultivated (Helmink et al., 2010). When a participant sets a personal goal, he or she will experience the motivation to follow through and obtain the desired outcome, due to the feeling that the goal is obtainable. However, because the participant is setting his or her own goals, the healthcare professional might occasionally need to modify the participant’s aims in a more realistic direction. Participants can have unrealistic weight loss expectation and as a result become discouraged when the unrealistic objectives are not achieved (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013).

Therefore, addressing unrealistic ideas and obstacles (real or perceived) to weight loss is extremely critical for preventing dispirited participants and negatively affected long-term maintenance of goals (Laddu, Dow, Hingle, Thomson, & Going, 2011). Participants might experience an array of obstacles, some predictable and others not; thus, it is important that the participants are aware of all deemed possible obstacles to prevent a relapse.
In general every intervention should address the grander obstacles to change, such as: cost, preparation time, taste, and the belief that the present level of consumption is adequate (Perkins-Porras et al., 2005). Interventions must ensure that the health professional is dispersing the education and treatment plans in a method the participants feels content in following and adapting to (Vallis, Piccinini-Vallis, Sharma, & Freedhoff, 2013) Additionally, a discussion should follow on how the intervention might impede with participants’ other activities and physical capabilities (Helmink et al., 2010).

Wycherley et al. identifies that the fundamental factors to address during an intervention are: maintaining portion control, continuing the personalized prescribed diet, reducing fatty foods, receiving dietary habits education, and receiving continual motivation through small improvements in health status, weight loss, and diabetes control (Wycherley, Mohr, Noakes, Clifton, & Brinkworth, 2012). Each element is a vital component to address during the intervention and helps enable the participant to become successful.

Wycherley et al. also states that there are two main motivating factors that draw participants towards health intervention programs, in hope of improved health status and increased education. Approximately 63% of participants in the Wycherley’s et al. study identified weight loss as the ultimate primary goal and 40% report improvement in diabetes control as a primary motivator (Wycherley, Mohr, Noakes, Clifton, & Brinkworth, 2012). Setting goals focused on both weight loss and improved diabetes control allows for observable outcomes that can easily build confidence and motivate continued effort from participants. For example, Ma J at el. states, lifestyle modifications focused on modest weight loss and moderate physical activity can considerably reduce diabetes mellitus, lower blood pressure, improve cholesterol panels, and improve insulin management; all of which are very quantifiable results that have the ability to lead to increased motivation and sustainability (Ma J, Yank V, Xiao L, et al, 2013).
It is also important to note that any length of intervention, brief or extended, has measurable effects and successful outcomes. Interventions do not need to be extremely lengthy in order to be effective. As a result, the quality of education (i.e. one-on-one interactions) and counseling is more important than the quantity. In fact, evidence shows that even brief meetings with physicians or healthcare professionals show promising effects concerning lifestyle modifications; and, “even interventions as short as three minutes can significantly increase change” (Son et al., 2012). However, when addressing the subject of time during interventions it is important that the counseling session is adequately long enough to assure the participant that the methods discussed are beneficial, safe, and have the potential to provide observable results (Helmink et al., 2010).

In regard to time, not only are positive outcomes seen with brief intervention, but information and new knowledge are retained by the participant. Son et al. states that, three quarters of subjects participating in a brief ten minute counseling sessions answered that they understood the information well and felt confident in their ability to retain it for future use (Son et al., 2012). In addition to the length of an intervention, there is also a major concern for long term effectiveness built by ongoing support and motivation provided to the participants after the initial intervention is complete.

Fundamental factors for sustainable long-term success are motivation from monitoring, encouragement, and accountability (Wycherley, Mohr, Noakes, Clifton, & Brinkworth, 2012). It is critical that the participants be provided with a follow-up plan, in order to install continued support and motivation for the intervention. When a participant feels like he or she has someone to oversee and to provide ongoing education and support, the long-term effects become more significant. Wycherley et al. further solidifies this idea by stating that the success of lifestyle intervention programs are primarily due to the high levels of professional support, most importantly the supervision (Wycherley, Mohr, Noakes, Clifton, & Brinkworth, 2012).
The need for implementation of nutritional interventions and counseling is imperative. Currently the approaches being taken towards weight management and nutritional education are ineffective. This is why the implementation of a one-on-one intervention programs needs to begin now, as the large-scale effect will take time. Glanz et al. states, “a comprehensive nutrition intervention in the community requires a multistep approach, including changing social norms and organizational and environmental factors”. Therefore, visible and quantifiable change can be expected to come with time (Glanz, Patterson, Kristal, DiClemente, & al, 1994).

1.7.1 5As Model

The 5As Model was originally used for smoking cessation, but has now been adapted for obesity counseling. The model implements a process of counseling that is rooted in the theories of behavior change such as self-management support, readiness assessment, behavior modifications, and self-efficacy enhancement (Vallis, Piccinini-Vallis, Sharma, & Freedhoff, 2013). The model has proven to be very successful for smoking cessation and is continuing to be successful as a guide for behavioral interventions. This particular behavioral intervention method has shown to sustain success within weight management and has also increased awareness to the general population on the issues of obesity (Vallis, Piccinini-Vallis, Sharma, & Freedhoff, 2013).

The 5As Model is comprised of “five key components: ask, assess, advise, agree, and assist. Ask permission to discuss weight; be non judgmental and explore the patients readiness to change. Assess body mass index, waist circumference, obesity stage, and explore drivers and complications of excess weight gain. Advise the patient about the health risks of obesity, the benefits of modest weight loss, the need for long-term strategy, and treatment options. Agree on realistic weight loss expectations, targets, behavioral changes, and specific details of the treatment plan.
Assist in identifying and addressing barriers, provide resources, arrange follow up, and install support” (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013).

The “model has a physiological root using the 4Ms framework: mental health, mechanical, metabolic, and monetary factors” (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013). By utilizing the 4Ms framework it allows the healthcare professional to utilize the one-on-one interaction to consider each patient individually and focus attention on the 4Ms while distributing information and conducting the intervention.

Motivational interviewing is also a common weight loss technique that embraces the 5As model. It is an evidence based interviewing method that utilizes patient-driven behavior change to sustain ideal outcomes (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013). The motivational interviewing technique has shown to result in a 1.6 kg greater weight loss within the first three months of counseling, than in participants who do not receive the motivational interviewing (Laddu, Dow, Hingle, Thomson, & Going, 2011). Therefore, motivational interviewing is an effective method to implement during obesity and nutritional counseling.

**1.7.2 Barriers and Obstacles**

Impediments preventing participants from adhering or continuing to the intervention should be expected and discussed during the intervention in order to maintain long-term results. It is important to address all barriers or obstacles a participant will face, so that he or she is prepared to combat the issues that arise and is not disheartened while experiencing them. Also, a greater long-term success rate has been shown to occur when obstacles are addressed during the intervention and when anticipated by the participant.

Wycherley et al. show that obstacles are common; the majority of participants report obstacles such as: a desire for greater food variety, a craving for
tastier foods, breaking routine due to social outings and travel, stress, lack of support, difficulty defining portion sizes, expense, fear of injury, not observing benefits in a timely manner, and lack of accessibility to healthy foods (Wycherley, Mohr, Noakes, Clifton, & Brinkworth, 2012). Other noted perceived barriers have been: not enough time, fatigue, unavailability of facilities to exercise, not enjoying spots or outdoor activity, embarrassment, religion and culture, low self-efficacy, and inadequate supervision at home (Helmink et al., 2010; Robroek, Bredt, & Burdorf, 2007a; Robroek, Bredt, & Burdorf, 2007b).

Due to the prevalence of obstacles, it is imperative that both the healthcare provider and participant discuss any possible barriers and how the barriers might affect the individual’s specific goals and lifestyle habits. An open one-on-one environment will ensure greater success with addressing possible complications and result in overall improved outcomes.

1.8 Theory of Planned Behavior

The concepts of the Theory of Planned Behavior provide evidence that through counseling, interviewing, and consideration of past behaviors, one can accurately predict the expected behavior of another individual. The theory states that, “intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes towards the behavior, subjective norms, and perceived behavioral control; and these intentions together with perception of behavioral control account for considerable variance in actual behavior” (Ajzen, 1991).

The Theory of Planned Behavior is well supported by empirical evidence and shows that nutritional interventions conducted on the individual level are not only effective, but the outcomes for the specific participant can usually be predicted (Ajzen, 1991). This theory indicates that a healthcare provider can properly tailor the nutritional knowledge given, address foreseeable obstacles in weight loss and
nutritional management, and formulate an effective nutritional intervention for each participant to adhere that will result in success.

1.9 Readiness to Change

The stages of change model, which addresses the readiness to change in individuals, was first utilized to treat alcoholism and has recently been applied to dietary behavior. The model consists of “five distinct stages: precontemplation (unaware, not interested in change); contemplation (thinking about change); preparation or decision (making definite plans to change); and action (actively modifying and preventing relapse)” (Glanz, Patterson, Kristal, DiClemente, & al, 1994). People vary in their readiness to change, intentions, and behaviors in relation to attempting dietary change over time; therefore, methods and steps used to promote healthy changes need to evolve with the individual’s progression on the readiness scale.

There are “four key physiological factors that are hypothesized to be influenced by the stage of dietary change: self-rated health, self-efficacy for change, motivation or the personalized importance of eating low-fat foods, and weight loss history” (Glanz, Patterson, Kristal, DiClemente, & al, 1994). Due to stage status being cognitive and self-perceived rather than merely behavioral, the scale depends largely on a participant’s ability to accurately self-rate his or her own diet (Glanz, Patterson, Kristal, DiClemente, & al, 1994). An individual cannot accurately assess his or her current diet without the proper education and knowledge concerning nutritional intake, and this is why the educational piece in counseling is so essential.

Glanz et al. state that participants with better self-rated health and confidence tend to be further progressed along the readiness scale (Glanz, Patterson, Kristal, DiClemente, & al, 1994). Perkins-Porras et al. also proposes that because individuals vary in readiness to change, it can be observed that the overall positive changes are often greatest in the individuals initially observed to be in the
later stages of change (Perkins-Porras et al., 2005). Therefore, one can expect that changes tend to emerge in the later stages of readiness.

It is important to consider where a participant falls on the readiness scale before administering nutritional information and counseling. Glanz et al. finds that, distributing detailed information, such as, reading nutrition labels to someone in precontemplation (early stages of change) is a waste of time and effort. It is more effective for the healthcare provider to try and increase that participant’s self-awareness and attempt to progress the individual further along the readiness scale in order to see future beneficial outcomes (Glanz, Patterson, Kristal, DiClemente, & al, 1994). By first assessing the readiness scale, a healthcare professional is enabled with the ability to make more efficient progress and can avoid working harder than the participant (Vallis, Piccinini–Vallis, Sharma, & Freedhoff, 2013).

As discussed, Perkins-Porras et al. suggests that behavioral counseling will have different effects or outcomes depending on the baseline stage of readiness in the individual (Perkins-Porras et al., 2005). In order to provide tailored and effective intervention methods specific to the individual, the baseline stage must be determined. The baseline stage will allow for a successful one-on-one intervention, where motivational interviewing and nutritional counseling will be extremely effective and efficacious to the individual.
1.10 Purpose

The present study addresses the overwhelming epidemic of metabolic syndrome; as well as, the current nutritional education methods, behavioral nutritional modification methods, and the overall clinical experience and visit satisfaction of participating subjects. The Nutri One-on-One program focuses on metabolically compromised subjects and behavioral change techniques: motivational interviewing, one-on-one interventions, nutritional education, and lifestyle counseling to create positive change notable to both the subjects and the overseeing attending physicians. This study focuses on the effects of one-on-one counseling and follow-up methods in patients’ accomplishing their health goals, perceived achievement, nutritional knowledge, and overall health visit satisfaction.

1.11 Hypothesis

Patients affected by complications of metabolic syndrome will benefit from a brief nutritional counseling in a one-on-one environment and be able to achieve a healthier lifestyle. We hypothesize that: 1. There will be a significant retention of nutrition knowledge, 2. a greater primary care visit satisfaction, and 3. a considerable achievement of health goals through patient health actions towards a modified lifestyle.
Chapter II.
Methods and Materials:

2.1 Location of the Study

The Nutri One-on-One research and patient interaction was conducted at four of the Philadelphia College of Osteopathic Medicine (PCOM) Healthcare Centers: Roxborough Health Center, Lancaster Avenue Healthcare Center, Cambria Healthcare Center, and City Avenue Healthcare Center. Each healthcare center has one medical director and two to three other attending physicians who identified and referred patients to the Nutri One-on-One research program based on the patients’ medical and physical history. At each of the four healthcare centers there were five to twelve rotating fourth year PCOM medical students. Each group of fourth year medical students rotated through the healthcare center to complete an eight-week family medicine and primary care urban rotation requirement. These students played an important role in the referral process.

Figure 2.1 PCOM Healthcare Clinic
2.2 Participants

The Institutional Review Board (IRB) of Philadelphia College of Osteopathic Medicine approved the use of human subjects in the Nutri One-on-One protocol.

2.2.1 Recruitment Inclusion Criteria

Adult subjects were required to meet the criteria of exhibiting one of the five major complications of metabolic syndrome: diabetes type 2, obesity, hypertension, high triglyceride panel, or low HDL count. If the subject exhibited any one or more of the five complications, then he or she was referred by an attending, a fourth year medical student, or personal request on the subject's behalf to participate in the study.

The overall study sample included only adults over the age of eighteen years, all of which were current patients at one of the four PCOM Healthcare Clinics. The age range for subject's varied from twenty-one to seventy-nine years of age.

Subjects were informed of the goals and purpose for the Nutri One-on-One study, asked to give verbal consent to participate, and given an opportunity to withdrawal from the study at any time.
2.2.2 Exclusion Criteria

All subjects under the age of eighteen years and not having at least one of the five metabolic syndrome complications were excluded from the study and Nutri One-on-One Program. Patients with diabetes type 1, Crohn’s disease, and chronic kidney failure were directly ineligible for participation in the study even if the subject was of age and exhibited one of the five major complications of metabolic syndrome.

Direct exclusion to the aforementioned diseases was due to the multitude of complications caused by the diseases, as well as, the diseases not directly relating to metabolic syndrome or nutritional intake.

Attending physicians decided whether or not to refer mentally disabled patients by assessing the patient’s communication skills and ability to function on his or her own.

2.3 Initial Session Procedures

The initial session was conducted in one of the four PCOM’s healthcare center exam rooms.

2.3.1 Obtain Vitals and Patient Information

Upon referral from either the attending physician or fourth year medical student, the physician updated the health coach on the participant’s current and past relevant medical conditions, newly recorded vitals, and major concerns regarding lifestyle or nutritional habits.
2.3.2 Initial Meeting and Counseling Session

The initial meeting and counseling session was conducted in the subject’s exam room and done in a one-on-one environment. The health coach gave a brief introduction, explaining the major goals of the study, what participation entails, and informed the subject of the length of time it will require to complete the session.

Once verbal informed consent was given, the health coach began to discuss the patient’s lifestyle and major health concerns in the one-on-one environment.

Figure 2.2 One-on-One Intervention Room
2.3.2.1 Health Form

Once gaining effective insight into the subjects nutritional and relevant medical health concerns the health coach proceeded to collect the needed data to complete the Health Form.

Subjects name, gender, age, and initial session date was first recorded. Then anthropometric measurements such as: weight, height, waist circumference, and BMI were measured and recorded. A daily caloric intake was calculated as follows:

Daily Caloric Intake= (weight in pounds)(0.45kg/1lbs)(24kcal.kg/d)

The subject’s current lab values such as: blood glucose level, blood pressure, and full cholesterol panel (including LDL, HDL, triglycerides, and total cholesterol) were obtained from the patient chart.

The subject was then asked to give a history concerning the relevance of diabetes type 2, heart disease, hypertension, and obesity to himself or herself, as well as, his or her family members.

A personal and social history was obtained regarding whether the subject is a smoker, former smoker, drinks alcoholic beverages, cooks his or her own meals at home, or was taking any medications. The subject was also asked how often in a week he or she ate dinner specifically at home, ate any meals at fast food restaurants, ate any meals at a full service restaurants, and shopped for groceries.

The Health Form information was then used and discussed by both the health coach and the subject to isolate any major health, nutritional, or lifestyle issues and concerns. The Health Form was created by Dr. Daghigh, a professor in the Department of Biochemistry and Molecular Biology at PCOM (See Appendix A.).
2.3.2.2 Primary Health Goal

The subject was encouraged and guided by the health coach to set one Primary Health Goal. This goal was to be relevant to the subject’s medical conditions and deemed obtainable by both the subject and the health coach (See Appendix A.).

2.3.2.3 Readiness Score

With the completion of the Health Form the health coach was able to give the subject a Readiness Score value. This score gave a baseline stage of readiness pertaining to the subject at the initial meeting. The Readiness Score was given on a one to five scale (See Appendix A.):

1= Not ready to make any change
2= Moderately ready to make change
3= Ready to make change
4= Already making change
5= Actively making change and pursuing new change

2.3.2.4 Nutritional Education Lesson Plan

The health coach then assessed the Health Form, subject’s health issues, measurements, lab values, metabolic complications, and Primary Goal to determine which Nutritional Education Lesson Plan to give.

There were ten Nutritional Education Lesson Plans available to each subject: Eat Better, Eat the Right Salt, Healthy Portions, Holiday Healthy Eating, Get Active, Lowering Cholesterol, Stop Smoking, Eat the Right Carbs, Cooking Class, and Lowering Caloric Intake.
The Nutritional Education Lesson Plan took approximately fifteen to twenty minutes for the health coach to deliver and tailor to each individual subject. There were Five Key Messages presented in each of the ten Nutritional Education Lesson Plans (See Appendix B).

Each Nutritional Education Lesson Plan was developed by Dr. Daghigh and later reviewed and modified by Dr. Harris a Chairperson of the Department of Nutrition and a Didactic Program Director at West Chester University of PA for the nutrition and dietetics program. Dr. Harris is the current nutritional consultant for the Nutri One-on-One study.

2.3.2.5 Three Health Actions

After completion of the Nutritional Education Lesson Plan the health coach encouraged the subject to use the new nutritional knowledge gained to set Three Health Actions allowing the subject to reach his or her Primary Goal. The health coach encouraged the subject to define three attainable health actions that both the subject and health coach believed to be achievable.

The health coach then guided the subject in the right direction by ensuring that the Health Actions were reasonable, would result in observable positive outcomes, and were perceived as obtainable by the subject. It is at this time that the health coach discussed the prospective barriers that the subject could face while attempting to reach his or her Primary Goal through the Three Health Actions (See Appendix A.).
2.3.2.6 **Take-Home Flyer**

After completion of the goal setting the subject was given a Take Home Flyer relevant to the Nutritional Education Lesson Plan received. Each flyer was a single page, giving reference to the “My Perfect Plate” diagram and the Five Key Messages from the particular Nutritional Education Lesson Plan that the subject received. The Take-Home Flyer was created by Dr. Daghigh (See Appendix C.).

2.3.2.7 **Reminded about Follow-up**

The subject was then reminded that the health coach would follow-up with his or her progress by telephone in one month. He or she should record any questions or concerns that are encountered along the way.

2.3.3 **Initial Patient Satisfaction Survey**

In conclusion to the initial session, the subject was asked to complete an Initial Patient Satisfaction Survey. The survey contains five questions addressing the patient’s overall satisfaction with the initial session experience.

Each subject was asked to report a score, one (strongly disagree) to five (strongly agree), reporting his or her perception of whether he or she learned something new, received valuable information, could apply what he or she learned to achieve a goal, thought the session was long enough to encourage change, or considered the session to be an asset to his or her doctor’s visit. The survey was created by Jennifer King and reviewed by Dr. Daghigh (See Appendix D.).
2.4 Follow-Up Procedures

The follow-up session was conducted approximately one month after the initial meeting session. The follow up was conducted via telephone, in which the health coach called the subject at the telephone number provided during the initial session. During the follow-up telephone call the health coach discussed the patient’s perceived progress towards his or her overall Primary Goal, questions, concerns, and obstacles encountered by the subject.

The purpose for the one-month follow-up telephone call was to install continued support and motivation to the subject’s. It was also conducted to evaluate the patient’s perceived and self-reported progress for achieving a healthier lifestyle, satisfaction with the Nutri One-on-One Program, achievement towards goals, and evaluate how much nutritional knowledge was retained by the subject.

Dr. Harris, was consulted for guidance on the approach taken for the follow-up methods.

2.4.1 Assess Three Health Actions

After a brief introduction the health coach asked the subject to assess how well he or she accomplished each of the Three Health Actions set during the initial session. This was a participant self-reported score given on a scale of 1 (10% completion of the Health Action Goal) to 10 (100% completion of the Health Action Goal) (See Appendix E.).

2.4.2 Determine if Goals are Still a Priority

The Health coach then asked the subject if completing his or her Health Actions and Primary Goal were still a priority. Subject gave a yes or no response (See Appendix E.).
2.4.3 Patients Perceived Benefit from Initial Session

Next the health coach instructed the subject to evaluate how valuable and effective the Nutri One-on-One Program was for motivating change increasing nutritional concern. The subject evaluated his or her response according to a Likert scale, 1 (not at all valuable) to 5 (extremely valuable) (See Appendix E.).

2.4.4 Primary Goal Success

The health coach then asked the subject to evaluate his or her overall success in obtaining the Three Health Actions set at the initial session. This self reported score was also given on a scale, 1 (not at all valuable) to 5 (extremely valuable) (See Appendix E.).

2.4.5 Additional and Future Actions

The health coach then asked the subject if he or she had taken any other additional actions towards improving his or her health. This yes or no response allowed the health coach to assess how motivated for healthy change the patient was and again answer any questions the subject might have concerning nutrition or further implementation of new goals (See Appendix E.).

2.5 Follow-Up Educational Assessment

As a completion to the follow-up telephone call, the health coach delivered a five-question multiple-choice quiz to the subject. Each of the five questions directly corresponds to one of the Five Major Key Messages learned in the Nutritional Education Lesson Plan that the subject received during the initial visit session.
There were ten different Educational Assessment sets of questions, each corresponding to a specific Nutritional Education Lesson Plan, each of the five questions addressing one of the Five Major Key Messages from the lesson, and each question was composed as a multiple choice question with five possible answer choices.

The purpose of the Educational Assessment was to address the key topics learned in the initial session, reinforce the knowledge with the subject, and correct any misconceptions he or she might have. With every question the health coach explained why the answer given by the subject was correct or incorrect. Insuring that the information was thoroughly understood and properly applied to the subject’s nutritional habits and knowledge.

Dr. Harris, reviewed and modified the Follow-up Education Assessment questions for each of the ten Nutritional Education Lesson Plans after initially created by Jennifer King and revised by Dr. Daghigh. The questions were then revised and reworded after the first initial weeks by King and Daghigh to improve participant understanding (See Appendix F.).

2.6 Physician’s Satisfaction Survey

In conclusion to the Nutri One-on-One study each of the participating attending physicians at each of the four PCOM Healthcare Centers were asked to fill out a Physician’s Satisfaction Survey. The Physician’s Satisfaction Survey addressed the perceptions and attitudes the attending physicians had towards the study, their perceived success of the Nutri One-on-One program, the benefit provided to the patients, and the benefit provided to the healthcare center (See Appendix G.).
2.7 Five Assessment Tools

In conclusion, there were five assessment tools used throughout the NutriOne-on-One study:

1. Patient Satisfaction Survey
2. Educational Assessment
   Presented in the Nutritional Education Lesson Plan and the Follow-Up Educational Assessment multiple-choice questions
3. Subject Goal Setting and Readiness Assessment
4. Subject Lab Values
5. Physician's Satisfaction Survey

2.8 Hard Data and Subject Information

All subject data, patient history, and survey forms were collected and the hard copies were kept in a locked room in a locked file cabinet. Each subject was given a unique identification number and filed according to initial session date and healthcare center.

2.9 Statistical Package for the Social Sciences (SPSS)

The health coach transferred all data and variables from the subject’s initial session, Health Form, Patient Satisfaction Survey, lab values, Follow-up questionnaire, and Nutritional Education Assessment to the SPSS program version 20. The information was stored in a locked room on a single computer. The SPSS was the program used to run all statistical data for the study (See Appendix H.).

Dr. Harris, who also currently serves on the statistical team of the Board of Editors for the Journal of the Academy of Nutrition and Diabetics and teaches
biostatistics in the graduate Masters of Public Health program at West Chester University, was the statistical consultant for the Nutri One-on-One study.
Chapter III.
Results:

SPSS was used to analyze the Nutri One-on-One data. Data were statistically analyzed with the assistance of Dr. Harris.

3.1 Demographics

A total of 74 subjects who participated in the Nutri One-on-One study, 46 female and 26 male. The age range was 21 to 79 years of age with an average subject age at 52 years (See Tables 3.1 and 3.2).

Table 3.1 Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>48</td>
<td>65</td>
</tr>
<tr>
<td>Male</td>
<td>26</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.2 Age

<table>
<thead>
<tr>
<th>Age</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>21</td>
</tr>
<tr>
<td>Maximum</td>
<td>79</td>
</tr>
<tr>
<td>Mean</td>
<td>52</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>13</td>
</tr>
</tbody>
</table>
3.2 Anthropometric Measurements

The Nutri One-on-One study utilized anthropometric measurements of each subject to classify the participant’s metabolic risk factors. The most relevant values in regard to the study were BMI, weight, and waist circumference of the participant from the initial session (See Table 3.3). Due to limitations on time, patient record confidentiality, and anticipated patient follow through, a second set of anthropometric values was not obtained. Table 3.4 shows the values determined by the CDC as a healthy waist circumference and BMI (Centers of Disease Control and Prevention, 2011).

<table>
<thead>
<tr>
<th>Table 3.3 Subject’s Anthropometric Measurements at Initial Visit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI</strong></td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Std. Deviation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3.4 CDC Recommended Anthropometric Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMI</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Waist Circumference (in)</strong></td>
</tr>
</tbody>
</table>
3.3 Metabolic History

Subjects were questioned about their patient and family history in regards to metabolic syndrome complications.

As Table 3.5 shows, 53% of the subject population was diabetic and 29% of that population was diabetic and proved to also have a history of Diabetes Type 2.

<table>
<thead>
<tr>
<th>Table 3.5 Type 2 Diabetes Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Not Diabetic, No Family History</td>
</tr>
<tr>
<td>Diabetic, No Family History</td>
</tr>
<tr>
<td>Not Diabetic, Has Family History</td>
</tr>
<tr>
<td>Diabetic, Has Family History</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Table 3.6 shows that the majority of subjects, 89%, did not suffer from heart disease. In fact only 3% of the subject population was diagnosed with heart disease and did not report a family history of it, while 8% were diagnosed and reported having a family history of heart disease.

<table>
<thead>
<tr>
<th>Table 3.6 Heart Disease Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>No Heart Disease, No Family History</td>
</tr>
<tr>
<td>Heart Disease, No Family History</td>
</tr>
<tr>
<td>No Heart Disease, Has Family History</td>
</tr>
<tr>
<td>Heart Disease, Has Family History</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>
Table 3.7 displays that 87% of the subject population suffered from hypertension. It also provides evidence that an additional 4% who did not have hypertension, are at risk of an onset of hypertension due to family history. In total, a subject population of 91% is hypertensive or is at risk of becoming hypertensive.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Hypertensive, No</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Family History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertensive, No</td>
<td>28</td>
<td>38</td>
</tr>
<tr>
<td>Family History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Hypertensive, Has</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Family History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertensive, Has</td>
<td>36</td>
<td>49</td>
</tr>
<tr>
<td>Family History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.8 shows that obesity was prevalent in 78% of the total subject population, with 26% of that 78% having a genetic background predisposing them to obesity.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Obese, No Family</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obese, No Family</td>
<td>38</td>
<td>51</td>
</tr>
<tr>
<td>History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not Obese, Has Family</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obese, Has Family</td>
<td>19</td>
<td>26</td>
</tr>
<tr>
<td>History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100</td>
</tr>
</tbody>
</table>
Figure 3.1 shows that a majority of the subjects were hypertensive and/or obese. Diabetes Type 2 was also prevalent among the population.

![Figure 3.1 Metabolic Syndrome Factors Seen in Participants](image)

3.4 Social History

Table 3.9 shows that only 23% of the subject populations were smokers and of the non-smoking population, 57% were at one time a smoker.

**Table 3.9 Smoking Habits and History**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Valid % Yes</th>
<th>Valid % No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker</td>
<td>17</td>
<td>57</td>
<td>23</td>
<td>77</td>
</tr>
<tr>
<td>Former Smoker</td>
<td>42</td>
<td>32</td>
<td>57</td>
<td>43</td>
</tr>
</tbody>
</table>

Table 3.10 indicates that 51% of the subject consumed alcohol at least once a year.

**Table 3.10 Current Alcohol Consumption**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does Not Consume Alcohol</td>
<td>36</td>
<td>48</td>
</tr>
<tr>
<td>Consumes Alcohol</td>
<td>38</td>
<td>51</td>
</tr>
</tbody>
</table>
Table 3.11 shows that 74% of the subjects in the study prepared and cooked their meals at home. The remaining 26% rely on a caretaker, significant other, family member, or communal dining commons to prepare the consumed meals.

**Table 3.11**  Personally Cooks Meals at Home

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does Not Cook</td>
<td>19</td>
<td>26</td>
</tr>
<tr>
<td>Cooks the Meals at Home</td>
<td>55</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.12 indicates that 60% of the subject population ate dinner at home 6 to 7 days per week and only 10% of subjects ate dinner at home less than twice a week.

**Table 3.12**  Days/Week Subject Eats Dinner at Home

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/ Week</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-2/Week</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>3-5/Week</td>
<td>22</td>
<td>30</td>
</tr>
<tr>
<td>6-7/Week</td>
<td>43</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.13 shows that 78% of the subjects ate out less than twice a week or not at all and only 21% of the subjects ate out regularly or more than 3 times per week.

**Table 3.13**  Days/Week Subject Eats Fast Food

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/Week</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>1/Month</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>2/Month</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>1-2/Week</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>3-5/Week</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>6-7/Week</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 3.14 indicates that 65% of subjects ate at full service restaurants less than twice a month and only 2% ate at full service restaurants more than 3 times per week.

**Table 3.14  Days/Week Subject Eats at Full Service Restaurant**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/Week</td>
<td>28</td>
</tr>
<tr>
<td>1/Month</td>
<td>10</td>
</tr>
<tr>
<td>2/Month</td>
<td>8</td>
</tr>
<tr>
<td>1-2/Week</td>
<td>24</td>
</tr>
<tr>
<td>3-5/Week</td>
<td>2</td>
</tr>
<tr>
<td>5-7/Week</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
</tr>
</tbody>
</table>

3.5 Lesson Plans Delivered

Table 3.5 reports which Educational Lesson Plans were delivered. A Majority, 75%, of the subjects decided to be educated on the “Healthy Portions” lesson plan.

**Table 3.15  Educational Lesson Plans**

<table>
<thead>
<tr>
<th>Lesson Plan</th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat Better</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Eat the Right Salt</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Healthy Portions</td>
<td>55</td>
<td>75</td>
</tr>
<tr>
<td>Holiday Eating</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Get Active</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lower Cholesterol</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Stop Smoking</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Reduce Sugar</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cooking Class</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Lower Your Calories</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>100</td>
</tr>
</tbody>
</table>
3.6 Readiness Score

Table 3.16 shows that only 9% of the subject population was not ready to make any degree of change in regards to healthy nutritional habits. The remaining 91% of the subject population was ready to make varying degrees of change to their nutritional health.

<table>
<thead>
<tr>
<th>Readiness Score</th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Ready</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Moderately Ready</td>
<td>12</td>
<td>21</td>
</tr>
<tr>
<td>Ready</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Currently Making Change</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>Actively Making Change and Pursuing New Change</td>
<td>12</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 3.17 states that the average readiness to change score was a 3, ready to make change (on a scale of 1-5).

<table>
<thead>
<tr>
<th>Readiness to Change Score</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3</td>
</tr>
</tbody>
</table>
3.7 Initial Survey Questionnaire

Table 3.18 shows the responses given by each subject to the initial survey question, “Do you feel like you learned something new during this meeting?” 79% responded that they learned something new about nutrition during the initial session.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Moderately Agree</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>51</td>
<td>79</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.19 shows the results for how valuable each subject felt the information presented during the initial session was. As a result, 86% of subjects reported that the information received was very valuable to their overall health.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Moderately Agree</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>56</td>
<td>86</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 3.20 provides the results reported by the subjects to the initial survey question, “Can you apply what you have learned to achieve your new health goal?” 80% stated that they could utilize the information received to ensure successful outcomes for their set goals.

Table 3.20 Ability to Apply Learned Knowledge to Personal Goals

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Moderately Agree</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>52</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.21 addresses whether the initial session was long enough to encourage the participants’ nutritional change. 88% of the subject population reported that it was long enough to create make change and behavioral modifications.

Table 3.21 Session Length Appropriate to Encourage Subject Change

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Moderately Agree</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>57</td>
<td>88</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 3.22 states whether the subjects believed the Nutri One-on-One Program was an asset to their doctor's visit. 93% of all subjects reported that they strongly agreed that the program was a benefit to their overall visit.

Table 3.22  Nutri One-on-One Session a Benefit to Doctors Visit

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Moderately Agree</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>57</td>
<td>93</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>100</td>
</tr>
</tbody>
</table>

3.8 Meeting Health Actions and Primary Goals

Table 3.23 provides the percentage of the goals set in the initial session that the subject successfully achieved by the follow-up session. At 100% all of the subjects’ set goals would have been achieved and fulfilled in completeness. This is a self-reported and self-rated score given at the one-month follow-up. On average, subjects met their three health action goals at 63%. One subject achieved his goals only to 17% and another felt that she had achieved her set goals to 97%.

Table 3.23  The Percentage of Goals Met at Initial Session

<table>
<thead>
<tr>
<th></th>
<th>Percentage of Goals Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>63%</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>5</td>
</tr>
<tr>
<td>Minimum</td>
<td>17%</td>
</tr>
<tr>
<td>Maximum</td>
<td>97%</td>
</tr>
</tbody>
</table>
3.9 Health Goal Priority During Follow-Up

Table 3.24 states how the subject felt about goal priority at the one-month follow-up call. 98% of participants reported that their health goals were still a priority.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not a Priority</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Still a Priority</td>
<td>50</td>
<td>98</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

3.10 Patient Perceived Intervention Value

Table 3.25 shows the participants perceived overall value of the study on their personal nutritional health at the one-month follow-up session. 100% of the subject population found the intervention to have some value and to help create nutritional change.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Valuable</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Very Small Value</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Somewhat Valuable</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Moderately Valuable</td>
<td>14</td>
<td>27</td>
</tr>
<tr>
<td>Extremely Valuable</td>
<td>31</td>
<td>61</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>
3.11 Patient Perceived Overall Success in Obtaining Primary Goal

Table 3.25 shows how successful the subjects felt in obtaining their primary health goal through completing the three set health actions at the one-month follow-up session. 98% of subjects reported some success in obtaining a varying degree of their goals and only 2% reported not being successful at all with goal attainment.

<table>
<thead>
<tr>
<th>Patient Perceived Overall Success in Obtaining Primary Goal</th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Successful</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Slightly Successful</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Somewhat Successful</td>
<td>20</td>
<td>39</td>
</tr>
<tr>
<td>Moderately Successful</td>
<td>16</td>
<td>31</td>
</tr>
<tr>
<td>Extremely Successful</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

3.12 Additional and Future Actions

Table 3.26 provides data on how many subjects were motivated during the one-month follow-up period to make additional changes to their nutrition. Of the subject population, 63% continued with their nutritional change by setting new targets.

<table>
<thead>
<tr>
<th>Patient Took Additional Actions Before One Month Follow-up</th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Additional Actions</td>
<td>19</td>
<td>37</td>
</tr>
<tr>
<td>Additional Action Taken</td>
<td>32</td>
<td>63</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 3.27 shows that 80% of the subject population planned to take more health actions in the future to further increase their overall nutritional health at the one-month follow-up session.

**Table 3.27 Patients Plans to Take More Future Actions**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Future Actions Planned</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Future Actions Planned</td>
<td>41</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

3.13 Educational Assessment

Table 3.28 shows the results from the subject multiple-choice assessment at the one-month follow-up. Each subject was asked five questions testing the amount of knowledge retained from the distributed nutritional lesson plan. The average subject was able to recall 75% of the five key messages for the lesson he or she received.

**Table 3.28 Education Assessment Multiple-Choice Questions**

<table>
<thead>
<tr>
<th>% Correct</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>75%</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>18</td>
</tr>
<tr>
<td>Minimum</td>
<td>20%</td>
</tr>
<tr>
<td>Maximum</td>
<td>100%</td>
</tr>
</tbody>
</table>
3.14 Non-Responder Subject Rate

20% of the total subject population became a “non-responder” by not completing the follow-up session one-month after the initial session. Table 3.29 discusses the varying subject motives for discontinuing prior to the follow-up session or explains how subjects became non-responders during the follow-up study. The majority of subjects, 47%, had a disconnected contact telephone number.

Table 3.29 Reasons for Subject Non-Responders

<table>
<thead>
<tr>
<th>Reason</th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>TelephoneDisconnected</td>
<td>7</td>
<td>47</td>
</tr>
<tr>
<td>Unable to Reach</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td>Refused Follow-Up</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Provided Wrong Follow-Up Telephone Number</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 3.30 shows the month that the initial session was held for the subjects who became non-responders by their follow-up session. All non-responders participated in the initial session during the winter months, 65% of the non-responding participants had their initial session during the months of November or December.

Table 3.30 Subject Non-Responder Dropout Month

<table>
<thead>
<tr>
<th>Month</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 2012</td>
<td>18</td>
</tr>
<tr>
<td>November 2012</td>
<td>39</td>
</tr>
<tr>
<td>December 2012</td>
<td>26</td>
</tr>
<tr>
<td>January 2013</td>
<td>4</td>
</tr>
<tr>
<td>February 2013</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
3.15 Physicians’ Survey

Table 3.31 shows the attending physicians’ perspective on the value of the Nutri One-on-One program in the primary healthcare setting. This survey was given as a conclusion to the eight-month long study. The majority, 89%, felt that the program was strongly valuable to the primary healthcare setting.

Table 3.31 Clinical Value in Nutritional Coaching and Goal Setting

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>8</td>
<td>89</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.32 represents how the attending physicians viewed the implementation of the Nutri One-on-One Program affected the flow within their offices. A total of nine physicians participated in the study. 5 physicians reported that the program had a positive effect on office flow, 3 reported that it had no effect on office flow, and 1 reported the program had a negative effect on office flow.

Table 3.32 Effects of Nutritional Counseling on Office Flow

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negatively</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Neutral</td>
<td>3</td>
<td>33</td>
</tr>
<tr>
<td>Positively</td>
<td>5</td>
<td>56</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 3.33 shows how the attending physicians felt the Nutri One-on-One Program affected the patient’s nutritional habits, behavior, and lifestyles. All physicians reported a neutral feeling, as they were unable to gain good insight, at the time, concerning the effects of the program on patients.

**Table 3.33** Observed a Noticeable Change in Patients Habits and Behavior

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Change</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>Large Change</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.34 shows the attending physicians perspective towards the Nutri One-on-One Program’s value as an additional service to the clinic. 89% of the physicians felt that the program was an asset to the services offered at the clinic.

**Table 3.34** Nutri One-on-One an Asset to Services Offered

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Neutral</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>8</td>
<td>89</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3.35 displays the degree of value the attending physicians believed the program had on their patients. 98% of the physicians stated that the program was extremely valuable to the patients.

**Table 3.35** Perceived Nutri One-on-One Value to Patients

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Valuable</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Neutral</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Very Valuable</td>
<td>8</td>
<td>89</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>100</td>
</tr>
</tbody>
</table>
3.16 Other Analysis

Table 3.36 shows how both gender and readiness scores of the subjects affected the dropout percentage of the non-responders during follow-up. There were no differences between males and females for dropping out of the study. As well there was no association between readiness for change and dropping out (t-test for non-responders and gender and one-way anova for non-responders and readiness).

**Table 3.36** Non-Responder Subjects and Comparing Variables

<table>
<thead>
<tr>
<th></th>
<th>Significance Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Responders and Gender</td>
<td>0.28</td>
<td>NS</td>
</tr>
<tr>
<td>Non-Responders and Readiness</td>
<td>0.651</td>
<td>NS</td>
</tr>
</tbody>
</table>
Table 3.37 shows that the initial subject readiness for change score was not significantly associated with age, subject perceived intervention value, or gender. Also, there was no significant relationship between readiness score and subject goal achievement or nutritional facts/knowledge retention. However, BMI showed to be associated with a subject’s initial readiness score. As BMI increased more individuals showed to be ready for change, however once reaching Class 3 Obesity the participant’s readiness for change dropped (anova for: readiness and age, readiness and achievement, readiness and knowledge, and readiness and BMI. Chi-square test for readiness and gender and readiness and perceived intervention value).

**Table 3.37 Readiness Score and Comparing Variables**

<table>
<thead>
<tr>
<th></th>
<th>Significance Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readiness and Age</td>
<td>0.691</td>
<td>NS</td>
</tr>
<tr>
<td>Readiness and Gender</td>
<td>0.393</td>
<td>NS</td>
</tr>
<tr>
<td>Readiness and Achievement</td>
<td>0.673</td>
<td>NS</td>
</tr>
<tr>
<td>Readiness and Perceived</td>
<td>0.444</td>
<td>NS</td>
</tr>
<tr>
<td>Intervention Value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readiness and Knowledge</td>
<td>0.818</td>
<td>NS</td>
</tr>
<tr>
<td>Readiness and BMI</td>
<td>0.012</td>
<td>Significant</td>
</tr>
</tbody>
</table>
Table 3.38 addresses how the percentage of retained nutritional knowledge from the initial session was not significantly associated with a subject’s gender, age, or readiness to make nutritional change (anova for education retention and age and education retention and readiness; t-test for education retention and gender).

**Table 3.38 Educational Assessment Retention and Comparing Variables**

<table>
<thead>
<tr>
<th></th>
<th>Significance Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education Retention and Gender</td>
<td>0.357</td>
<td>NS</td>
</tr>
<tr>
<td>Education Retention and Age</td>
<td>0.201</td>
<td>NS</td>
</tr>
<tr>
<td>Education Retention and Readiness</td>
<td>0.256</td>
<td>NS</td>
</tr>
</tbody>
</table>

Table 3.39 shows how subject’s satisfaction with the overall Nutri One-on-One study was not significantly associated with initial BMI value, readiness for change score, gender, or age (anova for satisfaction and BMI and satisfaction and age; chi-square test for satisfaction and readiness and satisfaction and gender).

**Table 3.39 Subject Satisfaction of Intervention and Comparing Variables**

<table>
<thead>
<tr>
<th></th>
<th>Significance Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction and BMI</td>
<td>0.632</td>
<td>NS</td>
</tr>
<tr>
<td>Satisfaction and Readiness</td>
<td>0.298</td>
<td>NS</td>
</tr>
<tr>
<td>Satisfaction and Gender</td>
<td>0.071</td>
<td>NS</td>
</tr>
<tr>
<td>Satisfaction and Age</td>
<td>0.076</td>
<td>NS</td>
</tr>
</tbody>
</table>
Table 3.40 provides the analysis showing how a subject’s overall nutritional goal achievement was not significantly associated with gender, age, initial BMI value, or initial readiness to change score. The subject’s ability to retain nutritional education knowledge also proved to not significantly effect overall goal achievements (T-test for goal achievement and gender and goal achievement and age; Scheffe test for goal achievement and BMI and goal achievement and knowledge; anova for goal achievement and readiness).

**Table 3.40** Subject Goal Achievement and Comparing Variables

<table>
<thead>
<tr>
<th></th>
<th>Significance Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal Achievement and Gender</td>
<td>0.475</td>
<td>NS</td>
</tr>
<tr>
<td>Goal Achievement and Age</td>
<td>0.373</td>
<td>NS</td>
</tr>
<tr>
<td>Goal Achievement and BMI</td>
<td>0.199</td>
<td>NS</td>
</tr>
<tr>
<td>Goal Achievement and Readiness</td>
<td>0.673</td>
<td>NS</td>
</tr>
<tr>
<td>Goal Achievement and Knowledge</td>
<td>0.083</td>
<td>NS</td>
</tr>
</tbody>
</table>
Chapter IV.
Discussion:

4.1 Implications of Results

Demographics. There were a total of 74 participants in the initial Nutri One-on-One study, 65% of the participants were women and 35% were men. Research shows that women are more inclined to participate in weight management programs and often prove to respond more favorably to intervention (Ma J, Yank V, Xiao L, et al, 2013). This statistic proves true for the Nutri One-on-One study as of the total 74 participants, more than half were women (65%), and the women were more willing to implement change, embrace the ideas of goal setting, and modify their behavior.

The Nutri One-on-One study was limited to adults; therefore, no one under the age of 18 years was permitted to participate. The observed subject age range was 21 to 79 years with a mean of 52 years of age. This middle age population was primarily due to the subjects that regularly visited the four PCOM Healthcare Clinics for primary care. This age population is also the population that is more often metabolically compromised.

Anthropometric Measurements. The physicians used anthropometric measurements to assess and refer qualifying patients to the Nutri One-on-One Program. Once a subject qualified and agreed to the initial session, the health coach took a waist circumference measurement. Although, the height and daily caloric intake were recorded for each individual, it seemed that the data was not vital to report statistically. Height plays only a small role in determining metabolic factors, and the daily caloric intake did not take into account activity level, gender, race, or age. These numbers can vary significantly and produce overwhelmingly different results for each individual and their weight classification.
The minimum BMI reported was 23, which falls at the high end of normal weight. This BMI came from an individual who suffered from hypertension, and thus, her intervention was directed towards lowering her blood pressure through salt reduction, exercise, and smoking sensation. The average BMI was 38, which falls into the morbidly obese BMI values, Class 2. This high BMI value indicates that a majority of the participants in the study suffered from weight and obesity complications, and also explains why the majority of the study's focus pertained to weight loss and portion control methods.

In this study, the mean waist circumference of participants, indicative of visceral obesity, was reported to be 48 inches. The CDC recommends less than 40 inches for males and less than 35 inches for non-pregnant females (Centers of Disease Control and Prevention, 2011). Visceral obesity has proven to be a health complication for the majority of the study's subjects. It is a risk factor for comorbidities associated with obesity and a significant player in defining metabolically compromised patients (Centers of Disease Control and Prevention, 2011).

**Metabolic History.** Participants were very responsive to questions about their own health and family history in regard to diabetes type II, heart disease, and hypertension. However, with questions about obesity, subjects were very reluctant to commit to the term obese due to social stigma and lack of knowledge about what classifies one as obese. When hesitation was exhibited in respect to answering family history questions, the health coach would often rephrase to, “do weight issues run within your family?” This restatement appeared to elicit more accurate results from subjects.

A majority of the participants proved to be hypertensive, 87%, and another 78% were diagnosed as obese. However, it was found that the majority of subject health goals were focused on weight loss and less than 1% addressed any concern with high blood pressure. Subjects expressed a desire to rectify hypertension with
prescription medications and not lifestyle modifications. The subjects communicated that they were not motivated to focus on changing current lifestyle habits to combat hypertension, due to the perceived efficacy of medications.

Weight was an issue of concern and focus for the majority of subjects. As a result, participants were willing to create goals and implement change in their lifestyles to assist with weight loss specifically.

**Social History.** The majority of subjects did not smoke, 77%; however, it was found that many of the 77% who did not currently smoke were former smokers. This shows that there is an addictive personality trait to account for, but also provides observable success history with behavior modification methods (Vallis, Piccinini-Vallis, Sharma, & Freedhoff, 2013).

Alcohol consumption is a notable cause for weight gain and can also lead to over consumption of food (Poli et al., ). It was found that 54% of the subject population admitted to consuming some form of alcohol, however, this information provided very little significance to the study, as amount and consistency was not recorded.

The majority of the subjects, 74%, reported that they prepared and cooked meals in their household. This proved to be vital information because this group of participants had control over what they planned to eat for each meal. These participants’ nutritional issues and health concerns stemmed from lack of nutritional knowledge, poor nutritional habits, poor food choices, or cooking in a less nutritious method.

The remaining 26% of the participants who did not cook their own meals in the household had little to no control over the prepared foods. These individuals did not prepare their meals for a variety of reasons: social norms, work schedules, living situations, and health complications. Due to the obstacle of not being able to
prepare their own foods, their ability to make smart nutritious choices were often limited. In households where family members or significant others prepared the meals, there was more flexibility for addressing healthier choices and food preparation techniques, such as, baking, broiling, steaming, and grilling.

It should also be noted that 60% of the subject population ate dinner at home 6 to 7 days per week. This result implicated that it is indeed the methods of cooking, food preparation, food choices, and portion sizing that led to the majority of the subjects metabolic concerns.

Subjects consumed fast food much less frequently than originally anticipated, less than twice a week for 78% of the subject population. This statistic further proved that poor nutritional choices were being made when preparing foods at home. It was also noted that it was not a lack of accessibility to good foods that prevented healthy consumption because only less than 2% of subject population reported being unable to buy vegetables or get to a grocery store. For the 21% of subjects who consumed fast food regularly, there was a notable understanding and acceptance that fast food was unhealthy and often considered a “fatty food”.

A very low percentage of the population, 2%, dined at full service restaurants more than 3 times per week. This was likely due primarily to cost as the study was conducted in clinics, which included low economic areas. However, the majority of the subjects expressed that they were unaware that full service restaurants often used excess salts and fats when preparing foods, as well as, provided larger than one serving portion sizes. Therefore, it was still essential that the health coach addressed these facts during all educational lessons.

**Readiness Score.** The readiness score was found to be extremely beneficial for directing the initial intervention session. The readiness score was implemented into the study after the first month, and proved to be a vital component for an effective Nutri One-on-One Program. The readiness score helped focus the health
coach on the appropriate method of action for each participant. By defining a readiness score, the overall efficacy and benefit of the program was increased because the health coach addressed change on a level that the subject was willing to implement (Ronda, Van Assema, & Brug, 2001a).

The majority of participants, 91%, were interested in making varying levels of change, this was most likely due to the fact that they willingly consented to the program. The remaining 9% who were not ready to implement change were either interested in learning the benefits of change, but not currently ready to implement them; or, were subjects who only participated in the study because the overseeing physician highly encouraged it and left them little opportunity to opt out.

**Lesson Plans Delivered.** The majority, (57%), of participants were interested to learn about the “Health Portions” lesson plan during the initial session meeting. This was primarily due to the fact that the majority of subjects were eating their meals at home and had taken multiple nutritional classes giving them a good understanding of which foods were healthy, what foods to avoid, and how to cook in a healthy manner. As a result, focus during the interventions often was directed towards proper food portioning, meal planning, and limiting serving size. Many of the subjects were eating the right foods, but eating in excess or over consuming proteins and carbohydrates, while not eating enough vegetables and fiber. In addition, subjects were skipping meals as well as exhibiting poor meal planning methods that lead to unhealthy food choices and a slowed metabolism.

**Initial Survey Questionnaire.** Not all subjects were able to fill out the initial questionnaire; only 61 of the 74 subjects completed the initial survey questionnaire. This was due to a variety or reasons: not having time at the end of the visit to fill the survey out, taking the survey with them after filling it out, or being disinterest in completing the survey.
Those participants who completed the Initial Survey questionnaire expressed an overall interest in the study and gratitude for the meeting. It is believed that this high percentage of “Strongly Agree” scores is due to the fact that the initial survey was completed in front of the health coach, to ensure retrieval. As a result subjects were more inclined to report more positive scores even when experiencing actual high sentiment.

**Health Actions and Primary Goals.** The average subject reported obtaining his or her set nutritional goals at 63%. This score was self-reported; therefore, the score had varying accuracy from subject to subject. Some subjects would report a high score when they made effort towards their goals, but did not actually succeed with them; while other subjects would discuss their high success with the health coach, yet report a low score for goal achievement.

**Patient Perceived Intervention Value.** Subjects unanimously reported that the Nutri One-on-One intervention was somewhat, moderately, or extremely valuable to their health and lifestyle choices. No subject reported being dissatisfied or seeing no value with the program. This was most likely because the subjects self-selected to be in the program, and a majority of them were ready to implement change.

**Patient Perceived Overall Goal Attainment.** Overall 98% of subjects felt that they had made some progress towards achieving their health related goals. The participants were asked to quantify how successful they felt they were in attaining the three health actions. When openly discussed during the follow-up, patients were very positive and reported success in meeting their health actions. However, when asked by the health coach to quantify this success, the subjects reported lower than expected scores, only 51% of subjects felt they moderately or extremely achieved their overall primary health goal. Many of the participants reporting lower overall goal achievement stated that they quantified their success lower because, “they still have a lot of room for improvement” or “could have done better”.
The intervention proved to be successful for a majority of the population due to the fact that, 63% of the subjects were motivated by their initial success and results of their health actions so that they personally decided to take additional health actions. Also, 80% of the participants planned to take additional actions in the future.

**Educational Assessment Multiple-Choice Questions.** The educational assessment of the patient’s nutrition knowledge proved to be fairly difficult for the subject population, since the format of a multiple-choice question over the telephone confused many of the participants. Some were continuously giving answers based on what they actually do and not what they believed to be the correct answer choice. This skewed the results in a manner that portrayed less information was retained after one-month than actually was. However, an average of 76% of the participants retained the five key messages indicating that a brief intervention in a one on one environment proved to be successful.

**Patient Dropout and Non-Responders.** Due to the subject population primarily residing in underserved areas and a majority of the participants expressing that they were currently unemployed, disconnections of provided telephone numbers created a major problem for completing follow-up calls. 47% of the dropout population resulted from disconnected telephone numbers during the time of the one-month follow-up.

100% of the fallout subjects were subjects who participated in the initial study during the winter months, 65% of the non-responder subject population participated in the initial session from the months of November and December. This was theorized to be a result of subjects being unsuccessful in attaining their goals during the winter holiday months and as a result unwilling to report their results. In the future special attention to goals taken during the winter months should be discussed between the subject and the health coach.
Physicians Survey. Nine of the 11 participating attending physicians filled out the physician's survey. The attending physicians were all supportive of the projects aim and in referring patients. Perceptions on the success and the effects of the program within the primary healthcare clinic were varied, however, specific statements as to why a physician felt the effect was positive, negative, or neutral were not discussed.

Variable Comparison Analysis. The only variables that had a statistically significant relationship were the participant's initial readiness score and his or her BMI value. The association resulted from individuals with increased BMI values being more ready to implement change, however, once an individual reached a Class 3 Obesity BMI value the participant's readiness for change dropped. This was most likely due to the Class 3 participant having low motivation to change as the change needed would need be significant, would greatly effect his or her current lifestyle habits, and the individual is accustomed to dealing with the complications of weight gain such as hypertension and diabetes. Subjects in Class 1 Obesity usually experienced a wake-up call at diagnosis and wanted to do what was needed to prevent other associated complications and weight gain progression.

4.2 Initial Session Findings

The Nutri One-on-One study was conducted at four Primary Healthcare PCOM Clinics allowing for a variety of subjects with different levels of education, socioeconomic status, and ethnic backgrounds. The participating PCOM attending physicians and rotating fourth year PCOM medical students were notably receptive to the study, project objectives, and health services, providing for a positive and encouraging intervention setting.

Initially, the health coach targeted the participating attending physicians for subject referrals. However, after the first week, the health coach noted that the
fourth year medical students were the key persons to target for successful patient referrals. The fourth year medical students were key because they spent a considerable amount of time with the patient, assessing overall health, issues, concerns, lab results, vitals, blood sugar levels, etc. The students were the first healthcare professionals to speak to the patients, and were the healthcare professionals determining the individual patients needs and health complications.

After a thirty to forty minute exam or visit assessment, the medical student then reported the findings to the appropriate attending, “presenting the patient”. The patient-presenting interval proved to be the most efficient time for the medical student to refer a qualifying patient to the Nutri One-on-One health coach. This time was found to be ideal because the medical student was first able to distinguish if the patient qualified as a candidate for the program, and also because the patient-presenting often took fifteen to thirty minutes in a separate space, providing reasonable “down time” for the nutritional intervention. This interval was also found to be the most ideal time to conduct the nutritional intervention because most participants were unwilling to stay after their doctor’s appointment due to lack of time, disinterest, or obligations to work and family.

4.3 Complications with Participant Referrals

The Nutri One-on-One Program experienced a lower number of participant referrals than originally anticipated. The low number of referrals was due to a variety of contributing factors. First, many qualifying patients were simply not interested in participating in the program. This lack of interest was often due to not having a willingness for personal health change; as previously stated, if the participant is not ready for change, very little progress can be made during an intervention (Ronda, Van Assema, & Brug, 2001b). Secondly, some patients felt they did not have time to participate in the study or implement new lifestyle habits into their current lifestyle. Thirdly, during the winter months, many qualifying patients were at the clinics due to influenza or other seasonal ailments, and were
not in a state to positively focus on lifestyle modifications and nutrition. Lastly, the fourth year medical students rotated through the participating PCOM clinics every eight weeks. This meant that every eight weeks the Nutri One-on-One study and referral system needed to be re-explained to the new students, and often the students would initially forget to refer their qualifying patients at the beginning.

4.4 One-on-One Environment

Conducting the Nutri One-on-One Program in a one-on-one environment proved to be extremely successful. The more personal setting allowed for a tailored focus on each specific patient. The concentrated attention addressed preconceived ideas, nutritional concerns, goals, current lifestyle habits, and health complications of each participant. The one-on-one format also allowed for the participants to be more open and honest about nutritional habits and concerns. As a result, better educational information was distributed, sessions helped the participant evaluate where he or she believed issues presented, personal obstacles were addressed, and the participant was found to be more inclined to make positive changes by setting specific goals.

4.5 Health Goals

Allowing the subject to set his or her own health related goals ensured that the participant was interested in making the specific goal change or lifestyle modification. It helped ensure that the set goals were obtainable and effective to the participant. During the goal setting, it was important for the health coach to only intervene when the Health Goal or Health Actions were unobtainable, not effective, or going to cause harm to the health of the subject.

The health coach often recommended keeping goals small during the initial session, so that the goals did not become overwhelming or too extreme for the participant to implement. The small goals were found to be more easily obtained,
and through achieved success the participants were positively encouraged to continue making healthy lifestyle alterations.

When the participants were given specific health modification by a healthcare professional, it was found that often the individuals became overwhelmed by the change prescribed, did not understand why the change was important to them, or did not know how to tailor the health change to fit their current lifestyle. As a result, many of the patients left their doctors’ visits and made no health changes at all. Or if the patient did make some of the changes requested by the healthcare professional, he or she would often run into an unforeseen obstacle and not know how to overcome it, leading to a lack of success in the long-term.

Many common health goals were seen in the subject population. Among the most prevalent were: wanting to lose weight, getting more active, practicing better portion control and meal planning, taking medications more regularly, quit smoking, stop skipping meals, stop drinking soda, cooking healthier at home, stop eating at restaurants, and increasing daily fruits and vegetable intake.

Some of the common obstacles participants experienced while making an effort to maintain their goals were: lack of time to make change, not having any support at home, unable to afford healthy foods, work schedules not allowing for them to make healthy choices, health complications, and the holidays impeding on their efforts.

4.6 Initial Patient Satisfaction Survey

Participants most frequently reported 5’s (strongly agree) during the Initial Patient Satisfaction Survey. The high percentage of 5’s was misleading because individuals wanted to be extremely supportive of the program and the health coach, and gave 5’s to every question. Often the participant was in a rush to leave and
would not fully read the questions, marking only 5’s. Some subjects were concerned that poor scores would negatively affect the health coach and her position as a healthcare provider, as a result gave 5’s. Lastly, the individuals when filling out the form directly in front of the health coach felt pressured to report higher scores.

Unfortunately, sending the form home with the participant or asking them to fill it out at the front desk and turn it in most often resulted in the loss of that data. Patients either did not have the time to complete it or they did not return the form. Therefore, to ensure recovery of the survey, it had to be conducted in the presence of the health coach.

4.7 Initial Session Challenges

**Time.** Lack of time was the most challenging obstacle during the initial session. Many patients were initially uninterested in participating in the study, because they felt that they did not have the personal time to devote to it. The participants had either taken off work to come to the doctors, were relying on another individual for transport, planning to take scheduled public transportation, or had children that needed tending. Due to many of these circumstances, meeting with a patient after their doctor’s visit was very unsuccessful. In addition, because the individual had just experienced a forty to sixty minute doctors appointment, many were uninterested in staying at the clinic any longer to participate in the study.

In order to rectify this issue of time, the intervention was conducted during the patient presenting period. This ensured that the patient would participate and also increased overall satisfaction of patients doctor’s visit.

Conducting the Nutri One-on-One intervention during the patient presenting period presented another obstacle in regard to time. Now that the initial Nutri One-on-One session was conducted in the time between the medical student exam and
the arrival of the attending, the time allowed for the intervention became unpredictable. The time frame varied significantly with clinic, physician, day, and time of day. Sometimes the health coach would only have fifteen minutes and other times forty-five minutes to conduct the entire initial session. This time inconsistency created a more rushed atmosphere, as it was vital to the study to complete all components of the health form, lesson plans, tailored goal settings, and patient surveys before the arrival of the attending. As previously noted, once the patient met with the attending, they were frequently unwilling to conclude the Nutri One-on-One initial session, even if advised by the attending to do so; therefore, the health coach was forced to make every effort to complete the study during the patient presenting time.

One important element to note concerning time is that conducting the Nutri One-on-One Study during the time period, in which the fourth year medical student was presenting the patient to the attending physician, was that it allowed for an increase in patients’ overall doctors visit satisfaction. Before conducting the study at this time the patient would frequently wait twenty to sixty minutes in the exam room for the attending. With the introduction of the Nutri One-on-One Program, the patient no longer experienced this down time, and as a result the program increased patients’ overall doctors’ visit satisfaction.

**Unwillingness to Learn.** Another challenge during the initial session of the Nutri One-on-One Program was a lack of understanding the nutrition education material because the participant felt he or she already knew the information. Some subjects were unwilling to set specific goals or meet with the health coach because they where “already very aware of what to do and the facts about nutrition, but have not had the time to actually implement them.” When questioned by the health coach, the individuals were merely regurgitating information they had previously learned, without actually understanding the information or how to apply it directly. Participants often reported lifestyle habits that were desirable healthy habits, but after beginning the intervention it was discovered that the individual was not
actually implementing them or implementing the habits/knowledge correctly. In conclusion, some individuals were unwilling to hear the new information because they were unwilling to begin change.

4.8 Follow-Up

Follow up was more successful than anticipated, with 80% of participants successfully contacted during follow-up, and only 15 of the initial session participants lost to follow-up. More participants completing the Nutri One-on-One program than originally expected was due to the participant's initial willingness to participate in the study, as well as, their preexisting desire for change. During the follow-up many subjects expressed a great deal of gratitude, stating, “this was one of the most influential health meetings I have ever had”, “I am so grateful, because without this meeting I would not have had the motivation to make any health change”, and “I learned a lot from our meetings.”

The two subjects who declined to follow-up were most the subjects who were had a low readiness to change score and showed little interest during the initial session. Also, of the subjects who dropped out of the study 100% of the non-respondent subjects were pulled out of the study during the months of October to January. This is most likely due to the winter holidays. It was speculated that the participants were unable to focus during this stressful and celebratory time, and as a result, were unwilling to report their lack of success.

Follow-up session was conducted on self-reported scores. Participants were more inclined to give positive feedback about their success in the conversations, but then would report lower scores when asked to directly quantify their success in attaining goals. When questioned about the score they gave themselves, the most common response was, “I have a lot more room for improvement” or “I think I could have done better.” However, due to the previous conversations between the health
coach and participant, self-reported scores seemed to be slightly lower that what was conveyed in the conversations.

Complications were originally experienced in the initial implementation of the Follow-up Education Assessment. The multiple-choice questions proved to be too lengthy for proper understanding during the telephone session. Therefore, the questions were reworked and created to be shorter and more precise. This alleviated a lot of stress from the participants, and resulted in more accurate answers that better evaluated what each participant had learned. Language barriers did make it difficult to obtain answers from some individuals; however, issues in regards to language were rare, only two cases. Most often, participants had not been exposed to the multiple-choice methods of questions, and were confused as to whether they were reporting their actual habits or the desired habit as an answer, which skewed the results.

4.9 The Three Benefits on the Study

Benefit to the Participant. The benefit that the Nutri One-on-One coaching had on the patients was readily apparent throughout the study. Participants continually commented on how their nutritional knowledge increased throughout both the initial session and the follow-up. Some stating, “I was unaware … was unhealthy”, “I never thought about … before”, “I did not realize processed foods had added sugars, sodium, and fats”, or “I did not understand portion control had such a large impart on weight gain”. Personal nutritional knowledge was continually built upon during the initial session as the Health Form was completed, personal lifestyle habits were discussed, the Nutritional Education Lesson Plans distributed, personal goals set, and Health Actions derived.

The participant also received one-on-one nutritional counseling and coaching that focused on creating personal change and positive progression. Each participant
was able to apply learned nutritional knowledge directly to his or her own personal
schedules and lifestyles by setting effective health goals and actions that were
perceived by both the health coach and participant as achievable.

The subject also received support and ongoing motivation from the health
coch. Many subjects stated that without the initial push and known follow-up, they
would have been unable to start making positive change or on willing to carry
through with set goals. One patient stated, “I had been wanting to make changes in
my health for the last year, but just never got around to doing it until I was
introduced to the study.”

Patients reported notable changes such as weight loss, more energy, and a
motivation to keep focused on personal health. They seemed to understand that if
they continued, the results would progress further into a greater quality of life,
increased longevity, and decreased health expenses. One patient stated, “I have
been wanting to make change because I know I am unhealthy, but did not know how
to go about it, or where I could afford it, as a nutritionist often has a $45 co-pay that
I can not afford.”

**Benefit to the Student Investigator.** The student, taking the role of the
health coach, was submerged into the primary healthcare setting, where much
knowledge pertaining to the healthcare professions, medical dynamics, issues in the
clinical settings, common ailments, and approach methods for addressing patient
care was imparted. The student was also able to gain a better understanding of
healthcare issues such as, obesity and the complications that arise from it.

In addition, the student was afforded the opportunity to experience the
benefit of one-on-one interactions and how difficult behavior modifications are to
implement in a patient without this particular interaction. The health coach was
able to observe the effectiveness of different behavioral modification method and
how readiness factors allow for different variations of change. It was noted by the
health coach that, “it is impossible to make some participants aware of the damage they are causing themselves, because they are so unwilling to make any change or accept their current health status and its complications.”

The student also learned a great deal of nutritional information and knowledge that could be applied in her own daily life. The myths and misconceptions of sweeteners vs. sugars were addressed, the overall benefits of exercise, and specific diet methods were discussed at length.

**Benefits to the Clinic.** The study presented notable benefit to each of the four participating PCOM Healthcare Clinics. Through evaluation of the Initial Satisfaction Survey, patients reported an overall improvement in their primary care visit due to the participation in the Nutri One-on-One study. One man stated, “I appreciated the extra care taken towards my health during my visit, and felt my time was spent wisely participating in the program.” Another woman stated, “The session was enjoyable because I felt that I did not have as much down time during my doctor’s visit.” As previously stated, 93% of the participants were extremely satisfied (reporting a score of a 5) with the addition of the program to their doctors visit. However, this might have been skewed due to the method in which the Initial Survey was distributed.

The implementation of the Nutri One-on-One study also allowed for the fourth year student and attending physician to focus more heavily on the patient’s current health issues and lab results. Both healthcare professionals were then allowed the time to discuss health issues and concerns in greater detail, because they did not have to heavily address the nutritional aspects of health. The healthcare professionals placed major concern on nutritional change by first addressing how important nutritional modifications were, and then recommend that the patient meet with the Nutri One-on-One health coach, to discuss it at length. Resulting in more time to efficiently combat health concerns with each patient and potentially create better outcomes for the patient as a consequence.
The Nutri One-on-One Program was also another free service that the clinics could offer the underserved communities it provided for.

4.10 Five Assessment Tools

**Patient Satisfaction Survey.** The Initial Patient Satisfaction Survey, as well as the Follow-Up patient satisfaction survey addressed how gratified each participant was with the information they received, time spent participating in the study, quality of the intervention, ability to apply learned knowledge, and overall happiness with the results achieved. Patients expressed gratitude during follow-up calls, thanking the health coach continually for the support and program. Even patients who did not implement the set goals communicated appreciation for the program and its ability to motivate them to be continually thinking about their health and making efforts to create positive change. Only a small percentage, 3%, expressed that they were displeased with the program, and it can be assumed that some of the drop out subjects who were unwilling to participate during the follow-up were either displeased with the intervention or unhappy with their own personal progress in the program.

**Educational Assessment.** There were two key elements presented for the educational assessment portion of the study: the Nutritional Education Lesson Plan and the follow-up Educational Assessment multiple-choice questions. Participants were receptive to the tailored nutritional information; however, the majority of the participants seemed to already have a good idea of what foods were healthy, how to cook in a health manner, and sodium reduction. Due to 53% of participants being diagnosed with Type 2 Diabetes, a majority of this population had previously participated in diabetic nutritional classes and learned about healthy foods, lowering carbohydrate intake, and avoiding processed foods. Although this knowledge was taught in the class, many did not understand how to apply it to their
daily lives specifically, the concepts of portion control, or the importance of meal planning.

As previously discussed, the follow-up evaluation of the Five Key Messages retained from the Nutritional Education Lesson Plan showed positive results.

**Subject Goal Setting.** Goal setting was a vital part of the study. The goal setting focused on the individual and the individual’s desires. This proved to be very motivational for the participants and installed a sense of power within the individual that allowed for success. For example, one twenty-three year old female subject stated that, “I understand I am a diabetic, I also understand soda is bad for me; however I can not stop drinking regular soda as the doctor has asked me to do for the last six months because I do not like water. I just can not drink water.” The health coach was able to work with the individual to set a health goal that better suited her lifestyle and was effective for positive progression. The subject set two goals pertaining to this issue: first, she would try to drink only two sodas a day instead of the current six sodas; second, she would look into a zero calorie powder to add to water. The subject reported at the one month follow-up that she had lost eleven pounds over the month because she had completely eliminated soda from her diet, stating, “after seeing the weight loss effects of cutting down to two sodas/day within the first two weeks of starting my goals, I realized the damage soda was doing to my body and that was all the motivation I needed to quit. In addition, I had found the water flavoring to be a great alternative to soda.” The subject’s goals were small enough to encourage change and because she set the goal they were perceived as obtainable. As a result, successful intervention was achieved and it progressed into larger than expected impact on her overall health. The patient then later reported being further motivated to make other changes in her life to continue improving her health.
**Subject Lab Values.** Lab values proved to not be as critical as originally expected. The values were beneficial for distinguishing metabolically compromised patients and patients who continually made poor nutritional lifestyle choices. However, currently the lab values did not play a large role in the study because one month was not efficient time to receive a second set of lab values for comparison to the initial values. It was found that medical insurance would not cover the cost of lab work for the participant in one month’s time, and also the amount of observable change would likely be too small or undetectable within the first month.

**Physician's Satisfaction Survey.** The last assessment tool evaluated was the Physician’s Satisfaction Survey. The physicians were initially very supportive of the study and openly offered acceptance to have the study conducted in the clinics. Many of the physicians referred patients and encouraged the patients to participate in the Nutri One-on-One study. The physicians often discussed nutritional information with their patients and readily distributed advice on different approach methods to take for particular patients.

### 4.11 Limitations of Study

Lack of time was a major issue experienced throughout the initial session of the study. A scale was bought to take direct measurements of the individual’s body fat, as this value proved to be more helpful for accurate assessment of actual body adipose and BMI. The scale was transported by the health coach to the clinics the first few initial weeks, but soon it was apparent there was not ample time to conduct the full initial session as well as to obtain another weight and BMI value. The scale required the participant to remove his or her shoes and socks in order to provide accurate values, and this time was not available.

The study also anticipated that another set of anthropometric measurements and lab values would be obtained after a two-month interval from the initial session. Gaining the second set of values would provide for a valuable way to further access
the success of the intervention, beyond the self-reported success rates given by the subjects. However, due to patient medical insurance formalities and inability of the health coach to access patient files, these values were unable to be obtained.

Access to patient information was also another obstacle faced by the study. The health coach had to rely on medical students or attending physicians to gain access to lab values and anthropometric measurements, which took valuable time away from the one-on-one intervention session. In the future, it would be valuable to include medical records access in the IRB so that information can be accessed when needed.

There was also a large study dropout rate from the subjects who had their initial session conducted in the months of November and December; 65% of the dropout subjects terminated their participation within these two months. Many subjects expressed that the holidays were too hard to implement change due to stress, vacation, travel, and holiday eating. Therefore, in the future it would be wise to talk about holiday stress and eating with every lesson given in the holiday months.

4.12 Future Research

A prospective research direction for the current Nutri One-on-One study would be to address the pediatric population. Childhood obesity proved to be very prevalent at the four PCOM clinics, and the pediatrician at one clinic showed a great deal of interest in the project and its overall aims. Many families could have benefited from family nutritional education, as addressing the pediatric population would require parent involvement and action. Therefore, one health coach would be targeting both parents and the children affected by the parent’s nutritional habits in a single meeting.
A retrospective study would also provide valuable insight concerning the impact of the Nutri One-on-One Program on its participants. Subjects could be contacted six months to a year after the initial session and questioned about their current goals, overall goal achievement, health interests, retained nutritional knowledge, and continued motivation for health success. Lab values and anthropometric measurements could be obtained from the participants acting physicians for comparison to the initial values recorded by the health coach. This would provide better insight into long-term results of the program, actual effects on the metabolic syndrome, and goal maintenance. It would strengthen the study with numerical data not solely relying on participant self-rated success.
Chapter V.
Conclusion:

Personalized one-on-one nutritional health coaching through the Nutri One-on-One study has proven to be successful, as 98% of the study’s participants reported that their health goals were still a priority at the one-moth follow-up, and the average subject had completed his or her three health actions at a rate of 75%. The tailored education for healthy nutritional living and behavior change continued to create positive behavior modifications within subjects and installed a support system that kept subjects motivated to continually work at achieving their health goals. In addition, 93% of the study population reported that the intervention was an asset to their health and overall primary healthcare visit, and 88% of subjects reported that the intervention was moderately to extremely valuable for initiating positive nutritional health change. Overall the intervention was successful as significant retention of knowledge was retained, an increase in patient primary care visit satisfaction was reported, and considerable achievements of health goals through patient health actions were reported.
References


Chaudhary, N. F., & Kreiger, N. (0129). Nutrition and Physical Activity Interventions for Low-Income Populations


De Backer, G., Ambrosioni, E., Borch-Johnsen, K., Brotons, C., Cifkova, R., Dallongeville, J.,… European Society of Cardiology Committee, for Practice. (2003). European Guidelines on Cardiovascular Disease Prevention in Clinical Practice: Third Joint Task Force of


FAU, B. P., FAU, M. K., & Stevens, J. (0318). Metabolic Syndrome in Healthy Obese, Overweight, and Normal Weight Individuals: The Atherosclerosis Risk in Communities Study


# Health Form

**Participant’s Name:** Male/ Female  
**Age:**  
**Clinic:**  
**Date (1st session):**  
**Date (2nd session):**

## Anthropometric Measurements

<table>
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<tr>
<th>Measurements</th>
<th>First Session</th>
<th>Second Session</th>
<th>Daily Caloric Intake</th>
<th>Lab Values</th>
<th>First Session</th>
<th>Second Session</th>
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<tbody>
<tr>
<td>Weight (lbs)</td>
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<td>Blood Glucose</td>
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<td>Blood Pressure</td>
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<td></td>
<td>HDL</td>
<td></td>
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<td>Skin Fold Measure (inches)</td>
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<td></td>
<td></td>
<td></td>
<td>Total Cholesterol</td>
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## Metabolic Syndrome History

- **Family hx:**  
  - □ Type 2 diabetes,  
  - □ Heart disease,  
  - □ Hypertension,  
  - □ obesity

## Personal and Social History

- **Do you smoke?**  
- **Are you a former smoker?**  
- **Do you drink alcohol?**  
- **Do you cook meals at home?**  
- **Are you taking any medications?**  
- **How many days a week do you eat at home?**  
- **How many days a week do you eat at a fast-food restaurant?**  
- **How many days a week do you eat at a full-service restaurant?**  
- **How often do you shop for groceries?**  
- **What store do you shop for groceries?**

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<tr>
<th>Readiness Score</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</table>

## MY HEALTH GOAL

The health actions I will take are:

1)  
2)  
3)  

## LESSON

Follow up phone call in a month: date ( ); Phone no. ( )  
Physician order 2 month follow up blood work:
Lesson 4: Holiday Healthy Eating

I. Holiday goals and planning
   a. Explain to the patient that it is common for people to gain weight during the holiday season due to the excess of fatty foods. It is also difficult for people to lose that weight after the holidays.
   b. This is a perfect goal to create for the holidays: avoid fatty foods and maintain your current weight.
      a. In particular, avoid high carbohydrates (sugars, sweeteners, white grain)
      b. Good carbs= carbs full of fiber (fruits and vegetables, whole grains)
   c. Another goal could be to create and maintain an exercise schedule
      a. Weighing yourself regularly will keep you on track

II. Healthy Recipes and Substitutions
   a. Turkey:
      i. white meat is leaner than dark meat
      ii. Buy turkey that is not pre-seasoned
   b. No white rolls; use whole grain
   c. Sweet potatoes instead of white potatoes
   d. Low fat yogurt instead of fatty cheeses
   e. Green bean casserole: use fresh green beans with chucks of potatoes instead of cream soup. Top with almonds instead of friend onions
   f. Mashed Potatoes: use skim milk, chicken broth, garlic or garlic powder, and Parmesan cheese instead of whole milk or butter
   g. Desserts:
      i. Make a crust less pumpkin pie.
      ii. Substitute two egg whites for each whole egg in baked recipes.
      iii. Replace heavy cream with evaporated skim milk in cheesecakes and cream pies
iv. Top cakes with fresh fruit, fruit sauce, or sprinkle with powdered sugar instead of using frosting
v. Reduce the sugar and substitute sweetness by adding more vanilla, cinnamon or nutmeg.
vi. Eat apple crisps instead of pie

III. **Eating healthy on a budget**
   a. Buying plain turkey, as opposed to preseasoned turkey is cheaper
   b. Plan ahead for what you will eat; stick to that amount. Buying just what you need as opposed to an excess of food will prove to be less expensive
   c. Buy foods in season for the winter such as carrots, beets, squash, and broccoli
   d. Limit alcohol consumption

IV. **Tips for sticking to your goals**
   a. Eat slower to feel full on less food. It usually takes 20 minutes for the stomach to signal the brain that it’s full (opens up opportunity for friendly conversation with guests)
   b. Don’t skip a meal before going to a holiday party. Eat a healthy snack about an hour before the meal to help curb your appetite
   c. Spicy or sour foods can reduce your cravings for sweets
   d. Preplan your meals for the week and stick to it!
      i. This will keep you from overeating
   e. Make water or herbal teas your drink of choice

V. **Staying active during the holidays to keep the weight off**

1. It’s easy to gain weight during the holiday season, and it’s really hard to lose that weight after the holiday season
2. Decide each night, when/how long you will exercise the next day. Even walking for 30 minutes each day can help maintain your weight
3. Get a partner; hold yourselves to exercising every day
4. If you think you overindulged on a meal, try to add an extra 10 minutes of exercise into your routine for the next day
Appendix C. Take Home Flyer

FIVE KEY MESSAGES

Holiday Eating

1. **EAT SLOWER.** It takes your body time to register you are full, you will eat less if you eat slow
2. **REACH YOUR GOALS.** Plan your meals and your exercise routine and stick to it, make it work for you
3. **DON'T SKIP MEALS.** Make sure to eat properly and healthy before a party and eat a healthy snack before you go to avoid overeating fatty foods while there
4. **DON'T OVER BUY.** Try not to over cook or buy for your parties and guests. It causes over eating and the leftovers may not be the healthiest options
5. **COOK FOR THE SEASON.** Buy local and seasonal veggies/fruits to save $
Appendix D. Initial Patient Satisfaction Survey

**Initial Session Survey**

Please answer the following questions by Circling a number from 1-5.

1) Do you feel like you learned something new during this meeting?
   1-------------------2-------------------3-------------------4-------------------5
   Strongly disagree   Neutral   Strongly agree

2) Do you feel the information you received is valuable?
   1-------------------2-------------------3-------------------4-------------------5
   Strongly disagree   Neutral   Strongly agree

3) Can you apply what you've learned today to achieve your goal?
   1-------------------2-------------------3-------------------4-------------------5
   Strongly disagree   Neutral   Strongly agree

4) Was the session long enough to encourage you to make a change?
   1-------------------2-------------------3-------------------4-------------------5
   Strongly disagree   Neutral   Strongly agree

5) Do you think this meeting was an asset to your doctor’s visit? Was it worth your time?
   1-------------------2-------------------3-------------------4-------------------5
   Strongly disagree   Neutral   Strongly agree
Appendix E. Follow-Up Session Survey

Follow up Session Survey Specific to Health Actions

Initial date: ______ Lesson Plan: ______________ Follow up date: ______

Personal Goal: ____________________________________________.

Answer the following questions using a scale of 1-10

What % do you think you accomplished your Health Action:

1) Health Action 1:
1-----2-----3-----4-----5-----6-----7-----8-----9-----10

2) Health Action 2:
1-----2-----3-----4-----5-----6-----7-----8-----9-----10

3) Health Action 3:
1-----2-----3-----4-----5-----6-----7-----8-----9-----10

4) Is completing your health goal still a priority?
Yes----No

5) To what degree do you think this intervention has been valuable/helpful to you?
1---------2---------3---------4---------5
not at all    somewhat    extremely

6) How successful do you feel you where in attaining your goal?
1---------2---------3---------4---------5
not at all    somewhat    extremely

Please comment on the following questions:

7) Have you taken any additional actions?
Yes-----No

8) Are there any actions you plan on taking in future?
Yes-----No
Appendix F. Follow-Up Educational Assessment

**Educational Lesson Survey Results:**

Initial date: __________ Lesson Plan: ________________ Follow up date: __________

For each lesson, educational questions related to the lesson should be asked and one answer choice should be entered here (A, B, C, D, or E):

1) A----B----C----D----E  Correct Answer:
2) A----B----C----D----E  Correct Answer:
3) A----B----C----D----E  Correct Answer:
4) A----B----C----D----E  Correct Answer:
5) A----B----C----D----E  Correct Answer:

**Self-reported Anthropometric Results:**

Weight: ____________ LBS.

Waist circumference: ____________ IN.

Skin Fold: ____________ IN.
Appendix G. Physician’s Satisfaction Survey

**Physician’s Survey**

Please answer the following questions by circling a number from 1-5.

1.) I see value in nutritional coaching and goal setting during a primary care visit?
   1  2  3  4  5
   Strongly disagree  Neutral  Strongly agree

2.) In what way do you feel the Nutritional Counseling affected the flow of your office?
   1  2  3  4  5
   Negatively  Neutral  Positively

3.) Did you see a noticeable change in patient’s nutritional habits, behavior, or lifestyles?
   1  2  3  4  5
   No change  Neutral  Large change

4.) Do you feel the nutritional coaching and goal setting is an asset to the services offered at the clinic?
   1  2  3  4  5
   Strongly disagree  Neutral  Strongly agree

5.) Do you think the nutritional coaching and goal setting was valuable to your patients?
   1  2  3  4  5
   Not valuable  Neutral  Very valuable
### Appendix H. Variables Used for SPSS Program

**Initial Session**

<table>
<thead>
<tr>
<th>PATIENT INFORMATION:</th>
<th>INITIAL SURVEY:</th>
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<tbody>
<tr>
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<tr>
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<td>Age</td>
<td>Application to Goal</td>
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<tr>
<td>Clinic Attending</td>
<td>Session Length</td>
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<td></td>
<td>Assets to Doctors Visit</td>
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**ANTHROPOMETRIC MEASUREMENTS:**

- Weight
- Height
- Waist Circumference
- BMI
- Daily Calorie Intake

**LAB VALUES:**

- Blood Glucose
- Blood Pressure
- LDL
- HDL
- Triglycerides
- Total Cholesterol

**FAMILY HISTORY:**

- Diabetes II
- Heart Disease
- Hypertension
- Obesity

**PERSONAL/SOCIAL HISTORY:**

- Smoker
- Former Smoker
- Drink Alcohol
- Cook Meals
- Take Medications
- Days Eating at Home
- Days Eating at Fast Food
- Days Eating at Restaurant
- How often Grocery Shop

**READINESS SCORE:**

**LESSON PLAN:**

**Surveys**

**Follow-Up Session**

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<th>HEALTH ACTIONS:</th>
<th>HEALTH GOAL PRIORITY:</th>
<th>INTERVENTION VALUE:</th>
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<tbody>
<tr>
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<td>Goal #3 Achievement</td>
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<tr>
<th>PHYSICIAN’S SURVEY:</th>
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<tbody>
<tr>
<td>Value of Nutritional Coaching</td>
<td>Flow of Office</td>
<td>Program Asset</td>
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<td>Patients Habits</td>
<td>Noticeable Change</td>
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<table>
<thead>
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<th>EDUCATIONAL ASSESSMENT:</th>
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