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Short-term Effects of a Nutrition Education Program on Food Choices in Adolescents at Risk for Type 2 Diabetes

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Short-term Effects of a Nutrition Education Program on Food Choices in Adolescents at Risk for Type 2 Diabetes

by

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Dedication

This dissertation is dedicated to the memory of my father, Glenn Dale Malbrough, whose belief in me has been influential in the pursuit of higher education, and to my grandmother, Clemelle Henry.

I also would like to dedicate this dissertation to my family and friends who stood by me through this long journey; to my husband who supported me without complaint; to my sons, Christian and Jitter, for your patience, understanding, and words of encouragement, and Juwan and Kayla, my godchildren – may you also be motivated and encouraged to reach for your dreams.

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Short-term Effects of a Nutrition Education Program on Food Choices in Adolescents at Risk for Type 2 Diabetes

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Type 2 Diabetes (T2D) among adolescents has increased over the past several decades. Genetic susceptibility may play a role in the occurrence of this illness. However, the current epidemic of T2D among adolescents reflects, in part, changes in the quality of the adolescent diet, particularly fast food consumption.

Therefore, the aims of this study were to: (1) determine the nutritional intake of adolescents who are at risk for the development of T2D using an interactive CD (*Fast Foods and Families: Making Good Choices for Better Health*); and (2) identify the level of dietary self-efficacy (DSE) for adolescents at risk for the development of T2D following a nutrition education program (NEP).

A quasi-experimental pretest-posttest design with random assignment was used with 40 adolescents (ages 11 to 15) identified as at risk for T2D. Four NEP sessions were conducted with the intervention group and a 45-minute standard education program session was conducted with the control group.

Forty-seven percent (n = 19) of the adolescents were considered at risk for being overweight (17.5%; n = 7) or were overweight (30%; n = 12). A majority (80%) of adolescents consumed some fast food. Approximately 38% (n = 15) of adolescents reported eating fast food more than twice a week. There were no differences between the groups on their selection of calories, fat, sodium, and sugar ($p > .05$) following the intervention. DSE improved significantly ($t = -5.055$, $df = 19$, $p = .000$) following the completion of the NEP. While the NEP did not make a difference in the food selected by the adolescents, an improvement in DSE was noted following these sessions.

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CHAPTER 1: INTRODUCTION TO STUDY

PROBLEM STATEMENT

Type 2 diabetes (T2D) among American youth has become a major health problem for families, communities, health care providers, and public health officials. The US Centers for Disease Control and Prevention (CDC) (2007) recently predicted that more than 33% of all children born in the year 2000 will develop diabetes during their lifetime. Moreover, up to 85% of children and adolescents diagnosed with T2D are classified as overweight or at risk for becoming overweight (American Diabetes Association [ADA], 2000). Perhaps most alarmingly, this is the first generation of children predicted to have a shorter life expectancy than their parents (Dietz et al., 2002; Newby, 2007).

The current epidemic of T2D among youth, especially adolescents, reflects changes in environmental factors and lifestyle behaviors. Researchers have shown that adolescents, striving for independence, spend more time away from home and as a result eat more meals and snacks outside of home (Story, et al., 2002b). On average, adolescents eat one-third of their meals from fast food restaurants (Lin et al., 1996), and their fast food consumption is linked to adverse health outcomes such as weight gain and insulin resistance (IR). These findings suggest that the intake of fast food increases the risk of obesity and T2D (Pereira et al., 2005). Despite strong evidence indicating that the consumption of fast food meals is associated with unhealthy eating behaviors and adverse health outcomes in children, few studies focus on effective strategies to encourage more healthy food choices while dining in the fast food environment, and even fewer studies target adolescents who are at risk for developing T2D.

There is convincing evidence from controlled clinical trials in adults that lifestyle modification can prevent or delay the development of T2D in high risk individuals (Diabetes Prevention Program [DPP] Research Group, 2002; Pan et al., 1997). However, only a few studies have assessed the outcome of lifestyle intervention in adolescents. Based on the principles of health promotion and illness prevention, it is believed that

nutrition health education can positively influence lifestyle behaviors by empowering adolescents to make healthy food choices.

Self-efficacy plays a major role in health promotion behaviors. Adolescents' quality of health is largely influenced by their lifestyle behaviors. By acting on the belief that they can influence their health, adolescents increase the likelihood of engaging in health-promoting lifestyle behaviors.

PURPOSE STATEMENT

The purposes of this study are to: (1) determine the short-term effect of a nutrition education program (NEP) on food choices of adolescents at risk for T2D, and (2) identify whether there is an association between dietary self-efficacy (DSE) and T2D risk factors.

RESEARCH HYPOTHESES

The specific aims and related hypotheses of this study are:

1. Determine the nutritional intake of adolescents who are at risk for the development of T2D using an interactive CD (*Fast Foods and Families: Making Good Choices for Better Health*).

   H1: Adolescents who are at risk for T2D and receive an NEP (Group I) will select fewer non-nutritious foods than at risk adolescents who receive a standard education program (SEP) (Group II).

   H2: There will be a significant difference between Group I (NEP) and Group II (SEP) in the selection of foods in the number of calories, grams of fat, milligrams of sodium, and grams of sugar post-intervention.

   H3: There will be a significant interaction across groups in food selections and the time (pre-test vs. post-test) food selections are measured.
2. Determine the level of DSE for adolescents at risk for the development of T2D following NEP.

   H4: Adolescents at risk for T2D will improve to a greater degree on DSE following the completion of an NEP (Group I) compared to at risk adolescents in the control group (Group II).

H5: The level of DSE for the intervention group will differ significantly following an NEP.

H6: DSE scores will be higher in the adolescents making healthy food choices (low calories, fat, sodium and sugar) compared to the adolescents making unhealthy food choices (high calories, fat, sodium, and sugar).

SIGNIFICANCE OF THE STUDY

T2D is a metabolic disorder in which the body does not produce or properly use insulin (Wong et al., 2006). Prevention of diabetes (DM) and community-based health education are key health status objectives of Healthy People 2010 (CDC & NIH, n.d.). More than 33% of children born in the US in 2000 are predicted to become diabetic (CDC, 2007), and over 80% of children and adolescents with T2D are overweight or at risk for becoming overweight (ADA, 2000). Although genetic susceptibility seems to play a role in the occurrence of T2D (ADA, 2008), the current epidemic of T2D among adolescents reflects changes in environmental factors (fast food restaurants in and near schools and residential communities; vending machines in schools and at school events), and lifestyle behaviors (increased caloric intake and decreased caloric expenditure).

Health education to promote healthy lifestyle behavior among adolescents is even more critical in the prevention and delay of T2D. Research has shown that the development of complications of T2D is related, in part, to the duration of the disease (Pavkov et al., 2006). There are currently only two drugs approved by the Food and Drug Administration specifically for the treatment of childhood obesity in obese adolescents, but their long-term safety is unknown: orlistat (approved for age 12 and older) and sibutramine (approved for age 16 and older) (National Heart Lung and Blood Institute [NHLB], 2005). Likewise, there is only one oral hyperglycemic agent, metformin, approved to treat T2D in children (Alberti et al., 2004; Kaufman, 2005). Because there is limited medication to treat these nutrition-related chronic conditions in adolescents, it is even more important that adolescents are offered nutrition education interventions that focus on strategies to prevent or delay T2D's onset. There is a growing body of research indicating that health education has been effective in addressing other serious conditions (such as HIV and asthma) and facilitating behavior changes (such as smoking and sexual

behaviors) in the adolescent population. Few researchers, however, have investigated the effect of nutrition education on eating behavioral changes among adolescents at risk for T2D.

The prevention of T2D requires behavioral changes by at risk adolescents to improve their health outcomes. According to Bandura (1997), a personal sense of control facilitates change of behavior. Self-efficacy pertains to a sense of control over one's environment, such as fast food frequency or food choices. Studies using interventions aimed at changing self-efficacy have been effective in changing nutrition in children and adolescents (Edmundson et al., 1996). Thus, the proposed study will address strategies for improving DSE in adolescents at risk for T2D.

Practicing healthy eating behaviors during adolescence is essential for: 1) promoting optimal health, 2) preventing immediate health problems such as obesity, and 3) laying the foundation for lifelong healthiness and reducing the risk of chronic diseases, particularly T2D (Story et al., 2002a). Unfortunately, promoting healthy eating behavior has proven to be challenging, largely because many adolescents eat a large number of their meals away from home, often from fast food restaurants. It is essential to reach adolescents where they are, if we expect adolescents to commit to changing their eating behaviors. Offering an NEP that does not include food options commonly consumed by adolescents, e.g., fast foods, may not be realistic, and consequently not as likely to promote changes in eating behaviors. Since adolescents consume one-third of their meals from fast food restaurants, it is necessary for NEPs to educate adolescents on how to make healthier fast food choices.

As a result of this study, the investigator expects to determine whether a nutrition education intervention will be effective in promoting healthier eating choices in adolescents at risk for the development of T2D. The research proposed in this study is significant because clinicians and researchers will have a cost-effective method to use in the prevention of T2D in adolescents. As an outcome of this study, it is expected that adolescents who are at risk for T2D will be able to select the best food options for the fast food selection. "Eating fast food but selecting lower-fat options creates opportunities for adolescents to be with their peers yet limit fat-intake" (Pender et al., 2006, p.186). In so doing, adolescents may engage longer in healthy eating behaviors, since "peer support for

healthy eating practices is also critical, as the desire to be accepted by peers is extremely high during the adolescent years" (Pender et al., 2006, p.186).

THEORETICAL FRAMEWORK

The Health Promotion Model (HPM), originally developed by Pender et al. in 1982 and revised in 1996, was used to guide this study (Pender et al., 2006). HPM is a competence-oriented or approach-oriented model. The HPM focuses on motivation rather than fear or threat (as seen with avoidance-oriented models [AOM]) as a source of motivation for encouraging decision-making that promotes healthy lifestyle choices (Pender et al., 2006). Pender and colleagues emphasize that although immediate threats to health have been shown to motivate action, threats in the distant future lack the same motivational strength. Thus, AOMs of health behavior are of limited usefulness in motivating overall healthy lifestyles, particularly in adolescents who often perceive themselves to be invulnerable to illness. This is of even greater significance to adolescents with T2D or who are at risk for T2D, because T2D poses a threat to long-term health in contrast to the immediate threat experienced by adolescents with T1D.

DELIMITATIONS

1. The time of the study was from May 15, 2009 to June 2, 2009.
2. Only students enrolled in the middle school of two Charter schools located in a city in the Southwestern United States were included in this study.
3. Only the data of adolescents that met the "at risk for T2D" inclusion criteria of the study were analyzed.
4. The setting for the study was during the health/physical education class at the school.

LIMITATIONS

1. Sample size
2. Geographic location

DEFINITION OF TERMS

For the purposes of this study, the following terms were operationally defined:

Acanthosis nigricans (AN). A velvety hyperpigmentation of the skin folds around the neck, over the knees, knuckles, elbows, underarms and in the groin area. However for the purpose of this study, the researcher assessed participants' skin folds around the neck for AN. When measuring the AN skin condition, the following measurements were used for determining the degree of AN: (a) 0 = Negative AN; (b) 1 = Degree 1 AN is a line; (c) 2 = Degree 2 AN is 1 to 2 cm; (d) 3 = Degree 3 AN is 2 to 3 cm; and (e) 4 = Degree 4 AN is greater than 3 cm. The measurements follow the guidelines of the *ANTES: Acanthosis Nigricans The Education and Screening Program* (University of Texas System, Texas-Mexico Border Health Coordination Office, & The University of Texas-Pan American, 2001). However, in contrast to the ANTES scale, this researcher terms the categories as degree instead of grade.

Adolescence. Adolescence, ages 11 to 21 years, is a period of development characterized as a time of transition from childhood to adulthood with rapid physiologic and cognitive changes (Cobb, 2004; Rew, 2005). During this stage, adolescents are in the process of reshaping their own identity in the midst of newly forming relationships with friends, family, and society (Erikson, 1964). For the purpose of this study, adolescents are defined as children who are 11 to 15 years old.

At risk for being overweight. The term at risk for being overweight is defined as a BMI between the 85th to 94th percentile for age and gender. Above normal weight have different labels (at risk for being overweight or overweight).

Body mass index (BMI). In children and adolescents, BMI is a measure of adiposity. Gender- and age-based BMI (weight [kg]/height [m^2]) percentiles were used to evaluate children for overweight and those who were at risk for being overweight. BMI was calculated from measurements used to determine BMI percentiles for children using the CDC (2008) BMI Percentile Calculator for Child and Teens.

Dietary self-efficacy (DSE). DSE was defined as adolescents' perceived ability to choose more healthy foods as determined by the Children and Adolescent Trial for Cardiovascular Health (CATCH) (Parcel et al., 1995) *Health Behavior Questionnaire*,

Section I: Dietary SE for Low Fat and Sodium and the *Fruit-vegetable Consumption SE* (Thombs & Heatey, 1997) scales.

Healthy food choices. Healthy food choices were defined as the simulated dietary intake of calories ≤ 1240 cal/meal, fat ≤ 49 g/meal, sodium ≤ 2107 mg/meal, or sugar ≤ 63 g/meal based on adolescents food selections measured using an interactive CD (*Fast Foods and Families: Making Good Choices for Better Health*. Each nutrient value was determined using the calorie mean split at baseline.

Height. The height is the number of centimeters (cm) tall that an adolescent is when measured in his or her socks using a wall growth chart. The adolescents were standing straight and facing the PI.

High blood pressure. Adolescents with a systolic BP level ≥ 120 mm Hg, or diastolic BP level ≥ 80 mm Hg were categorized as having high or elevated BP.

High calorie group. Adolescents with a simulated dietary caloric intake of 1241 calories/meal or greater were defined as high group based on caloric mean split value at pre-test.

High fat group. Adolescents with simulated dietary fat intake of 50 g/meal or more were defined as high group based on caloric mean split value at pre-test.

High sodium group. Adolescents with simulated dietary sodium 2108 mg/meal or greater designed as high group based on caloric mean split value at pre-test.

High sugar group. Adolescents with simulated dietary sugar intake of 64 g/meal or more were defined as high group based on caloric mean split value at pre-test.

Low calorie group. Adolescents with a simulated dietary caloric intake of 1240 calories/meal or less were designated as low group based on caloric mean split value at pre-test.

Low fat group. Adolescents with simulated dietary fat intake of 49 g/meal or less were designed as low group based on calorie mean split value at pre-test.

Low sodium group. Adolescents with a simulated dietary sodium intake of 2107 mg/meal or less based on calorie mean split value at pre-test.

Low sugar group. Adolescents with a simulated dietary sugar intake of 63 g/meal or less based on calorie mean split value at pre-test.

Non-nutritious food choice. Non-nutritious food choice was defined as the selection of a) a single item having any two combinations of following nutrient values: a caloric value ≥ 400, Fat calories ≥ 35%, or sodium ≥ 770 mg; b) the selection of a SSB great than small portion size; or c) the selection of any size shake.

Nutritious food choice. Nutritious food choice was defined as the selection of a) a single item having any two combinations of the following nutrient values: < 400 calories, < 35% fat calories, or sodium < 770 mg; b) drink selection of a small SSB, or any size unsweetened beverage, or water; or c) no shake selected.

Overweight. The term overweight is defined as a BMI ≥ 95th percentile for age and gender. In this study, the terms overweight or obesity were used interchangeably.

Self-efficacy. Self-efficacy is a person's belief about his/her own capability to accomplish any given task or perform a specific behavior regardless of the circumstance (Bandura, 1977, 1997). Self-efficacy beliefs can influence adolescents' motivation levels and attitudes regarding behaviors that promote health.

Unhealthy food choices. Unhealthy food choices were defined as the simulated dietary intake of calories ≥ 2108 mg/meal, fat ≥ 50 g/meal, sodium ≥ 2108 mg/meal, or sugar ≥ 64 g/meal based on adolescents food selections measured using an interactive CD (*Fast Foods and Families: Making Good Choices for Better Health*). Each nutrient value was determined using the calorie mean split at baseline.

Weight. The weight is the number of kilograms (kg) that an adolescent weighed when measured with the adolescent in his or her socks using a digital scale manufactured by Healthometer.

T2D among adolescents has increased exponentially over the past two decades. The increased prevalence of T2D and its co-morbidities are, in part, due to environmental factors, particularly unhealthy eating behaviors. By promoting healthy eating behaviors, nutrition education interventions during adolescence have the potential of affecting children at that time and later in life (Hoelscher et al., 2002).

Contents of the Dissertation

The dissertation is divided into five major chapters. Chapter One presents the introduction, statement of the problem, purpose and research hypotheses, operational

definitions, limitations, and the significance for the study. Chapter Two presents a review of the literature, including an overview of T2D, environmental factors associate with risks for T2D, self-efficacy, health education, and theoretical framework of the study. Chapter Three presents an overview of the research design, and methodology and procedures utilized in identifying the study population and sample, data collection, and data analysis. Chapter Four presents the results of the data analysis. And Chapter Five presents the findings, summary, implications, and recommendations for further research.

CHAPTER 2: REVIEW OF LITERATURE

INTRODUCTION

Chapter Two presents the purpose of this study, eating behaviors of adolescents, an overview of Type 2 diabetes (T2D) in adolescents including consequences, statistics, and major risk factors, the roles of self-efficacy and health education in promoting healthy eating behavior, and the theoretical framework that guides this study. The purposes of this study are to: (1) determine the short-term effect of a nutrition education program (NEP) on food choices of adolescents at risk for T2D, and (2) identify whether there is an association between dietary self-efficacy (DSE) and T2D risk factors.

This study includes adolescents, ages 11 to 15 years old; however, the terms children, adolescents, and youth will be used throughout this review of the literature (ROL) as used by the authors cited in their respective articles.

EATING BEHAVIOR AND ADOLESCENTS

In recent years, the quality of the adolescent diet in the U.S. has become of increasing concern to researchers and health professionals. This concern has been compounded by both obesity and T2D reaching epidemic rates among adolescents. Healthy eating behaviors play a major role in the prevention of childhood obesity and the decreased onset of T2D (Dietz, 2004). These healthy eating behaviors include decreased consumption of dietary fat, fast foods, sugar-sweetened beverages (such as soda and juices), and other empty-calorie foods. In addition, adolescents require an increased intake of fruits and vegetables. Researchers indicate that eating habits are formed early in childhood (Story et al., 2002a), and that these patterns continue throughout adolescence and into adulthood (Birch & Fisher, 1998).

OVERVIEW OF TYPE 2 DIABETES IN ADOLESCENTS

Historically, T2D has been considered an adult-onset disease, and not a pediatric condition (Libman & Arslanian, 2003). Nevertheless, between 1987 and 2009, T2D among youth, and adolescents in particular, has become a major health problem for

families, communities, health care providers, and public health officials. The increased prevalence of T2D has paralleled the dramatic increase in childhood obesity (Libman & Arslanian, 2007). Indeed, childhood obesity is associated with an increased risk for metabolic disorders, such as insulin resistance (IR) and T2D (Chiarelli & Marcovecchio, 2008). T2D is a metabolic disorder in which the body does not produce or properly use insulin (Wong et al., 2006). Moreover, IR is the most common metabolic alteration related to obesity, and it represents an important link between obesity and T2D (Weiss & Kaufman, 2008). Prevention of diabetes mellitus (DM) and community-based health education are key health status objectives of the Healthy People 2010 initiative (CDC & NIH, n.d.).

Different forms of diabetes can affect the lives of adolescents, such as gestational diabetes mellitus, Type 1 Diabetes (T1D), maturity-onset diabetes of the young, and a new phenomenon called "Hybrid" or "Mixed" Diabetes (National Diabetes Education Program [NDEP], 2008). However, this study focuses on the prevention of T2D in at risk adolescents because T2D is the most common form in this population subset (SEARCH for Diabetes in Youth Study Group, 2007).

T2D in adolescents, although still rare, is being diagnosed more frequently (ADA, 2008). Until recently, diabetes in children and adolescents had been primarily considered T1D (CDC, 2007; Hannon et al., 2005), or as various forms of mature-onset diabetes of the young (MODY). Now, as more children and adolescents in the U.S. are becoming overweight, T2D is occurring more frequently in children over 10 years old and adolescents (NDEP, 2008). Indeed, T2D accounts for an estimated 8 to 45 percent of all new cases of diabetes in children and adolescents (American Diabetes Association [ADA], 2000; Dietz, 2001; Fagot-Campagna, 2000). In 2000, one out of three children, and one in two minorities born in the U.S., are predicted to develop T2D during their lifetime (ADA, 2007; CDC, 2007), and over 80% of children and adolescents with T2D are overweight or at risk for becoming overweight (ADA, 2000). Although genetic and environmental factors influence the development of T2D, being overweight or obese is considered the "hallmark" characteristic of T2D (ADA, 2000). Obesity is the risk factor most strongly associated with T2D and the most important preventable, environmental factor in its development (Libman & Arslanian, 2007; Urrutia-Rojas & Menchaca, 2006).

Therefore, targeting behaviors associated with obesity in adolescents who are at risk for developing T2D may prove to be promising in the prevention of this public health problem.

Consequences

Consequences of T2D include both medical and economic costs (Olshansky et al., 2005; Wang & Dietz, 2002). T2D is a threat to the current and future health of children (ages 2 to 19 years). Medical expenditures for the treatment and management of T2D in youth pose an astronomical financial burden on society at-large. Wang and Dietz (2002) report that the annual hospital cost of obesity-associated diabetes in children (age 6 to 17) tripled from approximately $35 million in 1979-1981 to approximately $127 million in 1997-1999. Current data indicate the overall economic cost of diabetes in 2007 was $174 billion with a direct medical cost of $116 billion, and T2D accounts for nearly all of this expenditure (ADA, 2008). Olshansky et al. (2005) predicted that, "With rapid increases in the prevalence of diabetes, and a decrease in mean age at the onset of diabetes, the cost of treating diabetes-related complications, such as heart disease, stroke, limb amputation, renal failure, and blindness, will increase substantially" (p. 1143). If effective health promotion interventions to encourage healthy lifestyle choices aimed at adolescents at risk for T2D are not implemented, "youth of today may, on average, live less healthy and possibly even shorter lives than their parents" (Olshanksy et al., 2005, p.1143).

Statistics of Type 2 Diabetes in Adolescents

Diabetes is one of the most common diseases in children. According to the National Diabetes Fact Sheet, about 186,300 youth in the U.S. less than 20 years of age had diabetes in 2007. This represents about 0.2% of all the people in this age group. Based on data from a 2002–2003 multiethnic, population-based study called the SEARCH for Diabetes in Youth Study (n = 2435 youth newly diagnosed, nonsecondary DM), approximately 3,700 U.S. children and adolescents under 20 years of age are newly diagnosed with T2D every year (SEARCH, 2007). The incidence of DM per 100,000 persons per years was 24.3.

T2D becomes increasingly common after 10 years of age, especially in members of minority populations (SEARCH, 2007). Researchers of the SEARCH study affirmed that the highest rates of T2D were documented among 15 to 19 year-old adolescent minority groups. T2D represented 14.9% of newly diagnosed cases of DM in non-Hispanic White youths, 46.1% in Hispanic youths, 57.8% in African American youths, 69.7% in Asian/Pacific Islander youths, and 86.2% in American Indian youths (SEARCH, 2007). If this current trend continues, it is predicted that youths will live less healthy and shorter lives (Olshansky et al., 2005).

Risk Factors for Type 2 Diabetes in Adolescents

Multiple factors have been identified as elements that increase adolescents' chances for developing T2D. The most common risk factors for T2D include being overweight, having a family history of T2D, being a member of a high risk ethnic group, having signs of IR, being older than 10 years of age, and pubertal (NDEP, 2008). Some risk factors are not preventable, such as family history, ethnicity, or age, while other factors are in part preventable, such as obesity. Identifying adolescents who are at risk for developing T2D is essential to implement strategies to prevent or delay onset of the disease.

Researchers have examined the prevalence of T2D among children and adolescents and found that it affected those ranging in age from 10 to 19 years (Fagot-Campagna et al., 2000). Reported cases of T2D in children showed a peak age during puberty, although there have been children described as prepubertal. The mean age of diagnosis was between 12 and 16 years (ADA, 2000). One reason for this peak is that changes in growth hormone levels during adolescence cause IR and decreased insulin action (Hannon et al., 2005; Kaufman, 2005).

Ethnicity is another risk factor that seems to play a role in T2D. Results of a multiethnic, population-based study indicated that T2D became increasingly common after age 10, especially in minority populations (SEARCH, 2007). Although the incidence is increasing across all ethnic groups, T2D is more common in certain racial and ethnic groups such as African Americans, American Indians, Hispanic/Latino Americans, and some Asian and Pacific Islander Americans (ADA, 2000). According to

the CDC (2007), 50% of all African Americans and Hispanics who were born in the U.S. in 2000 will develop T2D in their lifetimes. Another risk factor strongly associated with the T2D in adolescents is having a family history of diabetes. While 45-85% of persons with T2D have at least one parent with T2D, an even larger number (74-100%) have a first- or second-degree relative with T2D (ADA, 2000; Kaufman, 2005).

It is well documented that IR is strongly associated with the development of T2D. IR is a condition in which a normal amount of insulin produces an ineffective biological response (Matthaei et al., 2000) to the effects of insulin. IR precedes the development of T2D, sometimes by years (Porth, 2005; Rao, 2001). In particular, IR is characterized by a decrease in the ability of insulin to stimulate the use of glucose by muscles and adipose tissue and to suppress hepatic glucose production and output (Matthaei et al., 2000). To maintain glucose homeostasis, pancreatic β-cells compensate for IR by augmenting insulin secretion, leading to a state of chronic hyperinsulinemia (Gungor et al., 2005). Weiss and Gillis (2008) state that IR is an underlying cause of T2D, and being overweight is frequently associated with and promotes IR (Scott, 2006).

In overweight adolescents, IR is the best predictor for the development of T2D (Alberti et al., 2004). Limited studies on the prevalence of IR have been conducted on adolescents. However, findings from one study (Lee et al., 2006) that used data from the 1999-2002 National Health and Nutrition Examination Survey indicated that there is a high prevalence of IR among overweight adolescents. Lee et al. (2006) performed analyses on fasting laboratory measurements to determine the prevalence of IR in a subsample of 1,802 U.S. adolescents (aged 12-19) without diabetes. Findings from this study indicated that 52.1% of obese adolescents were insulin resistant (Lee et al., 2006).

Measurable non-invasive clinical factors associated with IR are acanthosis nigricans (AN) and high blood pressure or hypertension (HTN). AN is associated with IR and is present in as many as 90% of children with T2D (ADA, 2000; Dietz, 2001; Fagot-Campagna et al., 2000; Kaufman, 2002). Although AN may be an independent risk factor for the disease, evidence suggests that persons with AN are likely to have multiple risk factors for T2D. In a cross-sectional study by Kong et al. (2007), among children and adults alike, the more T2D risk factors that were present, the higher the prevalence of AN ($p < .001$). Another clinical factor associated with IR is HTN. HTN is associated with

obesity and IR and is a contributing factor to the increased risk of cardiovascular disease (CVD) in persons with T2D (ADA, 2000; NHLB, 2005).

IR, which develops as a result of genetic and environmental factors, is strongly associated with obesity (Hannon et al., 2005; Porth, 2005). Moreover, the most common cause of IR in children and adolescents is obesity (Weiss & Gillis, 2008). Unlike other components of IR syndrome (e.g., AN, HTN) that result from IR, obesity promotes IR rather than resulting from it (Rao, 2001). More important, obesity is an important link between IR and the development of T2D; the prevalence of T2D has increased among adolescents (Libman & Arslanian, 2007), and research suggests it is a consequence of childhood obesity (Fagot-Champagna et al., 1999).

Above normal weight in children and adolescents have different labels: at risk of being overweight and overweight (Ahn et al., 2009; Harnack et al., 2009).The CDC (2006) defines at risk of being overweight as children and adolescents having a BMI $\geq$ 85^{th}, but less than 95^{th} percentile, and overweight as children and adolescents with a BMI $\geq$ 95^{th} percentile. Rates of overweight adolescents have increased at an alarming pace in recent decades, particularly in minority adolescents (Ogden et al., 2008). Being overweight increases adolescents' risk for being IR, and overweight adolescents are more likely to develop T2D then adolescents who are of a normal weight.

The prevalence of overweight adolescents in the U.S. has increased at an alarming rate from 1970 to 2006, particularly in minority ethnic groups (Ogden et al., 2008). The percentage of male and female obese adolescents (aged 12-19) has tripled over a twenty-six year period, increasing from 5% in 1970 to more than 17% in 2006 (DHHS, 2002; Ogden et al., 2008; Zeller et al., 2004). Furthermore, Hispanic male and Hispanic and Black female adolescents are now significantly more likely to be overweight than non-Hispanic white adolescents (Ogden et al., 2008). Obese adolescents in 2003 to 2006 made up 18.5% of black non-Hispanic boys, 27.7% of black girls, 17.3% of Hispanic (Mexican American) boys and 14.5% of Hispanic girls (Ogden et al., 2008). Up to 85% of children and adolescents with T2D are overweight or at risk for becoming overweight at the time of diagnosis (ADA, 2000).

It is predicted that U.S. life expectancy will decline for the first time in recent history as a result of increasing rates of childhood obesity (Olshansky et al., 2005). Being

overweight during adolescence is a strong predictor of adult obesity (Whitaker et al., 1997) and the presence of obesity is the "hallmark" of T2D (ADA, 2000). Obesity increases the risk for IR and T2D; it also is associated with increased risk for CVD caused by HTN (Morrison et al., 1999). Obesity is the risk factor most strongly associated with development of T2D among adolescents; thus it is the single most important environmental factor contributing to development of T2D among adolescents (Hannon et al., 2005; Libman & Arslanian, 2007; Urrutia-Rojas & Menchaca, 2006).

The increased incidence of T2D in youth is a "first consequence" of the obesity epidemic among young people, which is a significant and growing public health problem (Fagot-Champagna et al., 1999). In adolescents, obesity is the most common cause of IR, itself a precursor to T2D (Weiss & Gillis, 2008). Up to 85% of children with T2D are overweight or at risk for becoming overweight at the time of diagnosis (ADA, 2000). Although genetics can contribute to the onset of T2D (Libman & Arslanian, 1999), the increased prevalence of T2D among adolescents has been driven in large part by environmental risk factors such as obesity, which is primarily due to adolescents' sedentary and dietary lifestyles. Because obesity is often an outcome of unhealthy food choices and sedentary lifestyle, it may well be the most important preventable environmental factor in the development of T2D (Hannon et al., 2005).

Dietz (2004) proposed that the delay and prevention of T2D can be accomplished by preventing or reducing its associated risk factors, especially obesity and IR. Such intervention strategies are necessary early in life; however, promoting healthy eating behavior is also particularly important during adolescence, another crucial period in the development of obesity (Dietz, 2004). For years, researchers speculated that adolescents' dietary intake in the fast food environment contributed to the growing prevalence of T2D risk factors including obesity, IR, and HTN. "Adolescents represent an under-studied population in terms of analysis of food choices and education intervention for achieving a healthy dietary lifestyle." (Campbell, 2009, p. 171).

HEALTHY EATING BEHAVIOR

Healthy eating is part of the basis for the prevention of a number of chronic conditions, including obesity, diabetes, HTN, CVD, and some cancers (Eyre et al., 2004).

Healthy eating practices are necessary early in life; however, promoting healthy eating behavior is especially crucial during adolescence because this is a time of rapid growth and development, with nutritional needs being higher than at any other period during one's life (Dietz, 2004; Kollar, 2005). Dietz (2004) proposes that the delay and prevention of T2D can be accomplished by preventing or reducing its associated risk factors, especially obesity and IR. Therefore, healthy eating behavior is essential to preventing or delaying the onset of T2D (Dietz, 2004). In addition, eating behaviors adopted during early adolescence are likely to be maintained into adulthood (Story et al, 2002a; Birch & Fisher, 1998), emphasizing the importance of encouraging healthy eating as early as possible. Studies using national (U.S.) databases have revealed that adolescents' diet has changed over past thirty years (Guthrie et al., 2002). These changes in adolescents' diet have been linked to the prevalence of childhood obesity. Increasingly, diets are marked by the consumption of high-fat, high-sugar, and high-salt foods, which in turn are linked to obesity, HTN, CVD, and IR (Eyre et al., 2004).

Barriers to Healthy Eating among Adolescents

Eating behaviors of adolescents have changed and are often unhealthier than in the past. Evidence suggests that eating behaviors of adolescents, both healthy and unhealthy, are influenced by perceived barriers and benefits. An understanding of the influential factors promoting or hindering healthy eating among adolescents at risk for T2D is essential. Although no studies were found during the literature search that explored the perception of healthy eating from the viewpoint of adolescents who are at risk for T2D, several studies (Croll et al., 2001; Neumark-Sztainer et al., 1999; O'Dea, 2003) did explore healthy adolescents' perception of healthy eating, and that of adolescents diagnosed with diabetes (Geller et al., 2007).

Adolescents' perceived barriers can influence their commitment to making healthy food choices. Three studies used focus groups to study factors influencing food choices by adolescents (Croll et al., 2001; Neumark-Sztainer et al., 1999; O'Dea, 2003). Croll et al. (2001) conducted a study using focus group discussions with 203 adolescents enrolled in three senior high schools and one junior high school. The objective of the study was to investigate the meaning of healthy and unhealthy eating and the importance

of healthy eating among adolescents. Findings from the study indicated adolescents have a significant amount of knowledge regarding healthy foods and believe that healthy eating involves moderation, balance, and variety. Croll et al. (2001) found that despite this knowledge, adolescents find it difficult to follow healthy eating recommendations and frequently consume foods that they perceive as unhealthy due to a lack of time, limited availability of healthy foods in schools, and a general lack of concern regarding following healthy eating recommendations. Similar barriers were identified by participants in a study by O'Dea (2003) with 38 focus groups that consisted of 213 children and adolescents in grades second to eleven, and which examined barriers and benefits to healthy eating and physical activity. In an earlier focus group design study by Neumark-Sztainer et al. (1999), adolescents (n = 141) in grades seven and 10 indicated that their food choices were influenced primarily by hunger and food cravings, food appeal, and amount of time available to eat. Because time, convenience, availability, and cost have been identified as major factors that contribute to adolescents' food choices (Croll et al., 2001; Neumark-Sztainer et al., 1999; O'Dea, 2003), it is not surprising that fast food has become a mainstay in the diet among adolescents. Given the findings from the focus group studies, an NEP that focuses on making the most healthful food choices when dining in the fast food environment is imperative.

Adolescents, striving for independence, spend more time away from home and as a result eat more meals and snacks away from home (Story et al., 2002b). Lin et al. (1996) found that, on average, adolescents eat one-third of their meals from fast food restaurants. Adolescents' fast food consumption has been linked to adverse health outcomes such as weight gain and IR (Pereira et al., 2005). These findings suggest that the intake of fast food increases the risk of obesity and T2D (Pereira et al., 2005).

Fast Food Consumption

One environmental factor that is associated with nutrition-related conditions is the presence of fast food establishments. Fast food consumption has increased in the U.S. during the past three decades (Guthrie et al., 2002; Pereria et al., 2005). Fast food has also become commonplace in the diets of many adolescents (Guthrie et al., 2002; Story et al., 2002b) because of time consideration, cost, availability, and convenience, which are

all identified as key contributors that influence adolescents' food choices (Croll, 2001; Kubik et al., 2005). Fast food consumption is the common thread that links unhealthy eating behaviors and obesity-related health problems to the risk of T2D among adolescents (Pereira et al., 2005). Until recently, the link between obesity-related health problems and fast food consumption was only speculation (Allen et al., 2007). Now there is substantial evidence linking fast food consumption, obesity, and IR, which are precursors to the development of T2D (Pereira et al., 2005).

Many adolescents consume higher-than-recommended amounts of calories, fat, sugar, and sodium, thereby increasing their risk of obesity during adolescence and adulthood, among other health problems (Whitlock et al., 2005). The increased prevalence of excessive body weight in adolescents is correlated with escalating risk for T2D (CDC, 2007; Hannon et al., 2005). Although adolescents have a higher caloric intake, adolescents frequently fail to meet the recommended milk requirements, fruit and vegetable intake, and activity levels (Paeratakul et al., 2003; Sebastian et al., 2009). This problem is compounded by increases in food portion sizes and the availability and consumption of calorie-dense, nutrient-poor fast foods (Isganaitis & Lustig, 2005). As a result, adolescents are experiencing an epidemic of obesity-related diseases, including T2D, HTN, CVD, and some cancers (Olshansky et al., 2005).

Research studies (Bowman et al., 2004; Paeratakul et al., 2003) have shown that on the days when adolescents eat fast food, they consume more total calories, more fat, more sugar-sweetened beverages, and fewer fruits and vegetables. Cross-sectional research has found that the percentage of energy intake from fast foods has increased over the past 20 years among adolescents (Nielsen et al., 2002). For example, Paeratakul and colleagues (2003) found that adults and children who consumed fast food had a greater intake of energy and sweetened drinks than those who did not report eating fast food. Additionally, researchers in two cross-sectional studies examined the relationship between fast food restaurant use, dietary intake, and behavioral and psychosocial variables in adolescents (French et al., 2001) and adults (Satia et al., 2004). These two studies reported that the frequency of fast food restaurant use was positively associated with intake of total energy ($p < 0.001$) and percent of energy intake from fat ($p < 0.0001$), and was significantly inversely associated with vegetable intake. Although French and

colleagues (2001) did not find frequency of fast food intake to be associated with obesity among adolescents, Satia and colleagues (2004) did find the participants who were younger and obese reported eating at fast food restaurants often ($p < 0.05$).

Similarly, in a study aimed at examining national patterns of fast food consumption among children and determining whether fast food adversely affects diet quality in ways that might plausibly increase risk for obesity (Bowman et al., 2004), researchers learned that on a typical day, 30.3% of the total sample (n=6,212, children and adolescents 4 to 19 years old) reported consuming fast food. Fast food consumption was highly prevalent across genders, ethnic groups, household incomes, and regions of the country. When the researcher controlled for socioeconomic and demographic variables, they found that increased fast-food consumption was related to being male ($p <$ 0.5), a non-Hispanic Black, and residing in the South. Children who ate fast-food consumed more total energy (132 kcal or 6.4% greater in 9 to 13 year olds [$p <$0.5], and 379 kcal or 16.8% greater in 14 to 19 year olds [$p <$0.5]), more total fat, more total CHO, more added sugar and less milk, and fewer fruit and starchy vegetables than those children who did not eat fast food.

A study (Sebastian et al., 2009) exploring whether fast food consumption was associated with adolescents' food group intakes and their likelihood of meeting recommendations outlined in the MyPyramid Food Guidance System found that fast food consumption was associated negatively with fruit and milk intake among boys and girls, and positively associated with discretionary energy and solid fats among girls. The study's results are consistent with earlier research (Bowman et al., 2004) indicating fast food consumption influences adolescents' eating behavior and is inversely associated with meeting dietary recommendations.

Although only a few longitudinal studies examining fast food consumption have been conducted on adolescents (Schmidt et al., 2005), two studies investigating fast food consumption in adults (Pereira et al., 2005; Satia et al., 2004) and one cross-sectional study in adolescents (French et al., 2001) provide strong evidence to support the argument regarding fast food consumption's association to untoward health outcomes. Of these, the study by Pereira et al. (2005) provides the strongest support for the contention. The Coronary Artery Risk Development in Young Adults (CARDIA) study (Pereira et

al., 2005) was the first long-term (15 year) project to investigate the association between reported fast food habits and changes in body weight and IR. Participants (n=3,031) were young adults (aged 18-30 years), black and white, who were followed-up with repeated dietary assessments. Findings of the study indicated that fast food consumption has a strong positive association with weight gain and IR, therefore suggesting that fast food increases the risk of obesity and T2D. Change in fast food frequency over 15 years was directly associated with changes in bodyweight in white individuals ($p<0.0001$). Changes were also directly associated with IR in both black and white people ($p< 0.0015$ in black people, $p< 0.0001$ in white people). These findings were supported by previous longitudinal studies.

Several longitudinal studies that examined the relationship between eating away from home (EAH) and obesity in adults (Binkley et al., 2000; French et al., 2000) and children and adolescents (Thompson et al., 2004) found results that demonstrated a positive association between EAH and increased BMI and obesity. Thompson and colleagues also assessed the relationship of food purchased away from home and longitudinal change in BMI of healthy girls (n=101), and found that the frequency of eating fast food was positively associated with change in BMI ($p < 0.01$). Adolescent girls who ate fast food twice a week or more at baseline had the greatest mean increase in BMI compared to those who ate fast food once a week or not at all. These findings provide evidence that adolescent girls who eat at fast food twice a week or more are likely to have an increase in BMI over time.

Schmidt and colleagues (2005) conducted a longitudinal multicentered cohort study to examine trends in fast food consumption and their relationship to calorie, fat, and sodium intake in black and white adolescent girls (n = 2379). Results indicated fast food intake was positively associated with intake of energy ($p < .05$) and sodium ($p < .001$) as well as total fat ($p < .05$) and saturated fat as a percentage of calories ($p < .001$). The study found that frequency of fast food consumption increased with age in both black girls and white girls, which supports the contention that eating patterns established during adolescents are likely to persist in adulthood.

Researchers have shown that there is a relationship between eating fast food and an increased risk for T2D. Moreover, there is an association between the frequency of

eating fast food and increased BMI. Therefore, it is imperative for researchers to identify strategies to influence food choices made by adolescents. Despite strong evidence indicating the consumption of fast food meals is associated with unhealthy eating behaviors and adverse health outcomes in children, few studies focus on effective strategies to encourage more healthy food choices while dining in the fast food environment, and even fewer studies target such interventions to adolescents who are at risk for developing T2D.

Frequent fast food intake is associated with poorer diet quality (Larson et al., 2008) and greater weight gain and IR (Larson et al., 2008; Pereira et al., 2005). In addition, unhealthy eating behaviors practiced during adolescence continue into adulthood. Larson and colleagues (2008), using data from Project EAT, a population-based, longitudinal study in Minnesota, conducted a study to describe changes in fast food intake during the transition from middle adolescence to young adulthood, and to identify baseline correlates of this eating behavior in early young adulthood. Surveys were completed by 935 females and 751 males in high school classrooms at baseline (1998 –1999; mean age =15.9 years), and by mail at follow-up (2003–2004; mean age = 20.5 years). Results indicated that 24% of males and 21% of females during adolescence reported frequent intake of fast food (≥ 3 times/week). At follow-up, in early young adulthood the intake of fast food increased among males (33%; $p < .001$), and there was no further increase among females (23%; $p = .16$). These findings suggest that interventions are needed to address the high prevalence of frequent fast food consumption by adolescents, and to increase awareness of long-term consequences for unhealthy eating behaviors by young people. Numerous studies target children ages 10 and under, but there is a gap in nutrition education intervention that target adolescents, ages 11 to 15 years, and fewer still aimed at adolescents who are at risk for T2D.

Sugar-Sweetened Beverage Consumption

Another environmental factor of concern to experts is children's and adolescents' intake of sugar-sweetened beverages (i.e., soft drinks, fruit drinks) that are sold in vending machines, in school stores, at school sporting events, and at school fund drives

(AAP, 2004). Sugar-sweetened beverage (SSB) consumption has increased in the past three decades (French et al., 2003). Between 1977 and 1996, the proportion of individuals consuming SSB increased (from 61.4% to 76%), frequency of consumption increased (from 1.96 to 2.39 servings per day), and portion size increased (from 13.6 to 21 oz/day). Average total calories from SSB more than doubled, from 70 kcal to 189 kcal per day (Nielsen & Popkin, 2004). Between 1977 and 1996, soft drink consumption climbed by 70% for 2 to 18 year-olds (Nielsen et al., 2002). SSB intake has partly replaced dairy beverage intake in adolescents; as SSB consumption increased, milk consumption decreased by 38% since 1971 (Nielsen & Popkin, 2004). Although access to SSB in the school and fast food environments has increased over past years, it is worth mentioning that adolescents still obtain nearly 50% of their beverages at home (Ogden et al., 2008).

Numerous authors have suggested that increased consumption of SSB is associated with greater weight gain (Drewnowski & Bellisle, 2007; Malik et al., 2006). Two prospective cohort studies in children and adolescents have provided strong support for this contention (Berkey et al., 2004; Ludwig et al., 2001). Berkey et al.'s (2004) 3-year follow-up study entitled "U.S. Growing Up Today Study" consisted of more than 10,000 boys and girls; it found a significant association between soda consumption and weight gain in both genders. Boys who increased their soda consumption during the prior year experienced a weight gain of + 0.04 kg/m^2 per additional daily serving ($p = 0.01$). Children who increased intakes by 2 or more servings/day from the prior year gained weight (boys + 0.04 kg/m^2, $p = 0.01$; girls + 0.10 kg/m^2, $p = 0.046$). The smaller study by Ludwig and colleagues was one of the first published longitudinal analyses of SSB intake and body weight changes in children. The researchers followed 548 ethnically diverse 11 and 12 year-old children in a Boston area public school system for 19 months. Results demonstrated significant positive associations among consumption of SSB intake, weight change ($p = 0.03$), and frequency of obesity ($p = 0.02$). Data for this study were obtained as part of the Planet Health intervention project.

In contrast, two other studies found no significant association between the consumption of SSBs and BMI in children. A study by Blum et al. (2005) followed 166 school-age children for 2 years and found no significant association between SSB consumption and year 2 BMI ($p > 0.05$). Similarly, Newby et al. (2004) found no

significant association between soda intake and BMI in low-income preschool children followed for 6-12 months.

Finally, a randomized controlled trial study (Ebbeling et al., 2006) provides empirical evidence to support the link between SSB consumption and body weight among adolescents. Ebbeling and colleagues randomly assigned 103 adolescents aged 13 to 18 years who regularly consumed SSBs to intervention and control groups. The intervention, 25 weeks in duration, relied largely on home deliveries of noncaloric beverages to displace SSBs and thereby decrease consumption of SSBs. Consumption of SSBs decreased by 82% in the intervention group and did not change in the control group. Adolescents in the intervention group had a beneficial effect on body weight that was strongly linked with baseline BMI as a result of decreasing SSB consumption.

Although there is some controversy, a growing body of research strongly suggests that the physical environment in which adolescents reside (Austin et al., 2005; Jago et al., 2007) and their lifestyle behaviors, particularly fast food consumption, play a major role in the development of risk factors associated with T2D. The increased prevalence of T2D in youth has led to a growing interest in understanding the determinants of lifestyle behavior among adolescents who are at risk for developing T2D. Despite the numerous research studies reporting the association of the consumption of SSB to increased BMI, weight gain, or obesity (Drewnowski & Bellisle, 2007; Ludwig et al., 2001; Malik et al., 2006), few intervention studies exist on adolescents at risk for T2D that include an education component which addresses fast food choices.

Self-efficacy

Self-efficacy (SE) is the belief in one's own capability to accomplish any given task or perform a specific behavior regardless of circumstance (Bandura, 1977; 1997). Few studies have examined the relationship between self-efficacy and healthy eating behavior in adolescents at risk for T2D. Nevertheless, self-efficacy has been shown to be a key mediating variable in a variety of health-related behaviors (Bandura, 1995), such as self-care in adolescents and young adults with T1D (Grey et al., 2000; Johnson-Brooks et al., 2002), and adults with T1D (Aljasem et al., 2001), reduction of smoking (Chambliss & Murray, 1997), and adoption of an active lifestyle (Sallis & Owen, 1999).

The concept of SE is applicable to adolescents' food choices. Studies using interventions aimed at improving self-efficacy have been effective in changing physical activities and nutrition (Edmundson et al., 1996). Edmundson and colleagues found in a sample of over 6,000 children and adolescents that self-efficacy and intentions determined healthy food choices. However, few researchers have focused on teaching adolescents at risk for T2D how to make healthy food choices when eating at fast food restaurants.

A study by Long and Stevens (2004) tested the effects of a classroom and World Wide Web educational intervention on self-efficacy for healthy eating, and examined the relationship of the theoretical concepts in a hypothesized model of eating behavior in adolescents; the results were promising. Despite finding no differences in food consumption between groups, the intervention group had significantly higher scores for self-efficacy for fruits and vegetables, self-efficacy for lower fat, usual food choices, and dietary knowledge of fat compared to the control group. Self-efficacy was significantly associated with dietary knowledge of lower fat and usual food choices; it was inversely associated with lower-fat consumption in the hypothesized model of eating behavior.

Self-efficacy is a major predictor of self-care behaviors and health promotion behaviors. Johnson-Brooks et al. (2002) examined the impact of self-efficacy and self-esteem on the variables of self-care and glycosylated hemoglobin [$HbA1_c$] in young adults with T1D (n = 110 young adults, age 18-35 years). Researchers found self-efficacy was a better predictor of all aspects of self-care as well as $HbA1_c$ levels in both cross-sectional and longitudinal analyses. Similarly, a larger (n = 309) cross-sectional, correlational study on self-care behavior of adults (age = 50 to 59) with T2D (Aljasem et al., 2001) revealed greater self-efficacy predicted more frequent blood glucose testing, less frequent skipping of medication and binge eating, and closer adherence to an ideal diet.

In addition to being a major predictor of self-care behaviors and health promotion behaviors in individuals with DM, perceived self-efficacy for healthy eating has been found to be a strong predictor for eating behavior in studies of healthy adolescents. Cusatis and Shannon (1996) found high levels of self-efficacy for making specific, healthful food choices were associated with low consumption of high-fat foods and high-

sugar foods among adolescents. In another study, adolescents who had positive beliefs and higher self-efficacy about low-fat vending snacks were likely to report that they usually choose a low-fat vending snack (French et al., 1999). Since these studies suggest that self-efficacy influences self-care behaviors in adolescents with T2D and food choices in healthy adolescents, it is important for researchers to know self-efficacy's relationship to healthy food choices in adolescents at risk for T2D. Knowing this information may develop interventions to help prevent or delay the onset of T2D in adolescents who are at risk for the disease.

Health Education

Education is a critical component of prevention of chronic conditions, such as obesity and T2D, and is crucial to achieving healthy lifestyle choices and good self-care outcomes in the children and adolescents with T2D (Pinhas-Hamiel & Zeitler, 2003). By promoting healthy eating behaviors, nutrition education intervention during adolescence has the potential of affecting children at that time and later in life (Hoelscher et al., 2002). Experts (Hoelscher et al., 2002) have emphasized that the "development of NEPs for adolescents has become increasingly important with the rising prevalence of chronic diseases with nutritional roots, such as T2D and obesity" (p. S60).

Two studies that examined the effectiveness of nutrition education interventions on healthy eating choices reported significant improvement in food choices and overall number of positive dietary changes. Allen et al. (2007) found a statistically significant ($p<.05$) difference in calories, fat, carbohydrate, and fiber content of the meals chosen by 10 adolescents after a short nutrition education intervention. Abood et al. (2004) also found the nutrition education intervention used in their study had a positive effect on food choices among thirty female athletes. These researchers used a pretest/posttest control group design to evaluate the efficacy of a nutrition education intervention aimed at improving nutrition knowledge, building self-efficacy with respect to making healthful dietary choices, and improving dietary intake. The results showed participants significantly improved nutritional knowledge, self-efficacy ($p < .05$), and the overall number of positive dietary changes ($p < .03$).

Unfortunately, few studies on nutrition education intervention and the impact it has on adolescents' eating choices, either short- or long-term, have been conducted with adolescents at risk for T2D. Major studies of adults, such as the Diabetes Prevention Program (DPP) Research Group (2002) and the Da Qing and IGT and Diabetes Study (Pan et al., 1997), demonstrated that T2D can be prevented or delayed with lifestyle changes such as diet and/or exercise. These studies provide the basis for examining a similar approach in adolescents who are at risk for T2D. It is possible that educational interventions that target adolescents at risk for T2D may decrease the prevalence of pediatric T2D, which eventually can become a significant cause of adult morbidity and mortality (Fagot-Champagna et al., 1999).

Despite recent studies that have shown promise for the effectiveness of education interventions to increase self-efficacy (Long & Stevens, 2004) and improve fast food choices among adolescents (Allen et al., 2007), there remains a gap in the literature for NEPs aimed at improving fast food choices and dietary self-efficacy in adolescents who are at risk for T2D. Education programs aimed at increasing adolescents' awareness of the benefit of making nutritionally sound choices and the negative effects of regularly eating fast food and drinking SSBs are crucial during this period of rising rates of obesity and T2D. This study will offer a nutrition education intervention aimed to empower adolescents to make healthy food choices. By making healthy food choices, including lower total calories, lower high-fat foods, and lower high-sugar foods, adolescents can decrease their risks for becoming overweight. "Reverting obesity through lifestyle modification, that involves nutrition education, behavior modification and exercise, is an important step to prevent the progression of diabetes" (Cali & Caprio, 2008, p. 126). Although exercise is an important step in the prevention of obesity-related diabetes (Cali & Caprio, 2008), this study addresses an educational approach aimed at assisting adolescents to make healthy food choices.

Theoretical Framework

The Health Promotion Model (HPM), originally developed by Pender in 1982 and revised in 1996, was used to guide this study (Pender et al., 2002). HPM is a competence-oriented or approach-oriented model that focuses on motivation rather than fear or threat (as seen with avoidance-oriented models [AOM]) as a source of motivation for encouraging decision-making that promotes healthy lifestyle choices (Pender et al., 2006). Pender and colleagues emphasize that although immediate threats to health have been shown to motivate action, threats in the distant future lack the same motivational strength. Thus, AOMs of health behavior are of limited usefulness in motivating overall healthy lifestyles, particularly in adolescents, who often perceive themselves to be invulnerable to illness. The limited usefulness of AOMs are of even greater significance to adolescents with T2D or at risk for T2D, because T2D possess threats to long-term health in contrast to the immediate threat that adolescents with T1D experience.

One of the major theoretical perspectives from which HPM is derived is Bandura's Social Cognitive Theory (SCT) (Rew, 2004; Srof & Velsor-Friedrich, 2006). The SCT is a model that explains the nature of behavioral change within the context of larger social structures. SE is considered to be directly related to health behavior (Schwarzer & Luszczynska, 2006), and so far has been supported as the strongest predictor of good health-promoting behavior in adolescents (Srof & Velsor-Friedrich, 2006). Indeed, Pender (1996) states that "perceived competence or self-efficacy to execute a given behavior increases the likelihood of commitment to action and actual performance of the behavior" (p. 63). Moreover, belief in one's competence influences the level of motivation and perseverance in the face of difficulties and vulnerability to stress, such as peer pressure (Bandura, 1997).

Other studies have examined the relationship of self-efficacy to smoking in adolescents. Self-efficacy is a predictor of smoking behavior in young adolescents (Lawerence & Rubinson, 1986). Fagan and colleagues (2003) used a cross-sectional approach to examine the beliefs about self-efficacy to avoid smoking by employed adolescents (n = 379), ages 15 to 18, who worked in 10 participating grocery stores in Massachusetts. Results of the study indicated that adolescents who smoked more

frequently had lower self-efficacy scores than those who smoked less frequently. In addition, those who intended to smoke had lower mean self-efficacy scores than those who did not intend to smoke. This is not surprising given that having a high self-efficacy is said to reduce the influence of a peer group pressure that encourages risk behavior (Ando et al., 2007). The assumption that people have the power to shape their own destiny and to control outcomes is a common thread in the SCT and HPM (Bandura, 1997; Pender et al., 2002; 2006).

Major concepts of the HPM are grouped as individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes (Pender et al., 2006). These concepts and their relationships are:

(1) Individual characteristics and experiences, which include

(a) prior related behavior; and

(b) personal factors

(2) Behavior-specific cognitions and affect including

(a) perceived benefits of action;

(b) perceived barriers to action;

(c) perceived self-efficacy;

(d) activity-related affect;

(e) interpersonal influences such as family, peers, care providers, subjective norms, social support, and models; and

(f) situational influences, such as options to make healthy food choices.

A commitment to a plan of action and immediate competing demands and preferences leads one to engage in the targeted behavior (Rew, 2005). The behavioral outcomes demonstrated by individuals are considered health-promoting behaviors.

Although the HPM consists of 14 theoretical propositions (Pender et al., 2002), this study will be guided by the following six theoretical propositions, an adaptation of Pender's theoretical propositions:

1. An adolescent's characteristics, such as prior related behaviors, influence beliefs, feelings, and health-promoting behaviors.

2. As a result of committing to making healthy food choices, adolescents will have decreased risk to T2D.
3. Self-efficacy to enact a behavior increases the likelihood of a person's commitment to take action as well as actual enactment of that behavior (e.g., knowing the right foods to choose increases the likelihood that adolescents will engage in healthy eating behaviors).
4. Perceived barriers to enacting a behavior can stifle a person's commitment to act as well as the actual health-promoting behavior.
5. As dietary self-efficacy increases, perceived barriers such as knowing the right foods to choose decrease the reasons for not making healthy food choices.
6. The probability of commitment to a behavior and an actual enactment of the behavior is increased when there is an associated positive affect.

The HPM is a useful model to guide research that focuses on health promotion behaviors and in adolescents (Pender et al., 2006). The majority of studies using the HPM have explored of factors contributing to physical activity behavior (Srof & Velsor-Friedrich, 2006). Wu and Pender (2002) tested the usefulness of Pender's revised HPM to describe Taiwanese adolescents' participation in physical activity. The results of the study explained an 83% of the variance related to participation in physical activity among these adolescents.

The HPM also has been used as the theoretical framework for two studies that investigated the variables physical activity and diet. One was a descriptive study (Frenn & Malin, 2003) and the other an experimental study (Frenn et al., 2003). In addition, Srof (as cited in Srof & Velsor-Friedrich, 2006) utilized the HPM in an intervention study to enhance health promotion behavior among adolescents with asthma. The HPM is applicable to any health behavior in which threat is not proposed as a major source of motivation for the behavior (Pender et al., 2006; Rew, 2005).

SUMMARY

The epidemic rates of T2D among adolescents are projected to increase if current trends continue (ADA, 2007; CDC, 2007). Weiss and Gillis (2008) reported that the

significant rise in the prevalence of obesity in children and adolescents over the past three decades has led to a rise in the incidence of severe IR and, in turn, T2D in this age group. The quality of the adolescent diet in the U.S. is in part to blame for increase prevalence of T2D in this age group. Fast food has become commonplace in the diets of many adolescents (Guthrie et al., 2004; Story et al., 2002b), which is associated with poorer diet quality (Larson et al., 2008) and greater weight gain and insulin resistance (Larson et al., 2008; Pereira et al., 2005). The delay and prevention of T2D can be accomplished through prevention or reduction of its associated risk factors, especially obesity and IR (Dietz, 2004).

Education is an essential component in the delay and prevention of T2D. Few educational interventions for promoting healthy food choices have been conducted in adolescents (Campbell, 2009). Despite recent studies which show promise for the effectiveness of education interventions to increase self-efficacy (Long & Stevens, 2004) and improve fast food choices among adolescents (Allen et al., 2007), there remains a gap in the literature for NEPs aimed at improving fast food choices and self-efficacy in adolescents who are at risk for T2D. This study addresses an educational approach aimed at assisting adolescents who are at risk for T2D to make healthy food choices when dining in the fast food environment.

CHAPTER 3: METHODS

INTRODUCTION

Chapter Three presents the purpose, a brief description of the problem, an overview of the research design, and the project's methodology, which includes study population and sample, instrumentation, data collection procedures, and data analysis. The purposes of this study are to: (1) determine the short-term effect of a nutrition education program (NEP) on food choices of adolescents at risk for T2D, and (2) identify whether there is an association between DSE and T2D risk factors.

Overview of Problem

T2D among children and adolescents in the U.S. has become increasingly prevalent over the past two decades (ADA, 2008; CDC, 2007). Because obesity has increased among children and adolescents, the prevalence of T2D is predicted to increase even more among this population and eventually become a significant cause of adult morbidity and mortality (Fagot-Campagna et al., 1999). It is well-documented that adolescents spend a significant amount of time away from home, and consequently eat one-third of their meals from fast food restaurants (Lin et al., 1996; Story et al., 2002). One of the first comprehensive, long-term studies indicated a strong correlation between fast food consumption, obesity, and risk for T2D (Pereira, 2005). Despite strong evidence suggesting that consumption of fast food meals is associated with unhealthy eating habits and adverse health outcomes, few studies have focused on effective strategies to enhance more healthy food choices while dining in a fast food environment, and even fewer studies have targeted adolescents at risk for T2D.

RESEARCH DESIGN

A pretest-posttest, quasi-experimental group design with random assignment to two groups was used to examine the research hypotheses of this study. By implementing this design, one is able to assess change as an influence of treatment, measure the dependent variables, reduce risk of selection bias, and control for maturation and the

Hawthorne Effect. In this project specifically, the design controlled for changes in the dependent variables (fast food choices and dietary self-efficacy) as a result of a two week NEP.

SETTING

Two charter schools (referred to as site one and site two) were located in a city in the Southwestern United States and served as the settings for this study. The nutrition education sessions were held during the physical/health education class period in the health education classroom at each school. The computer lab in the schools was used on days when adolescents made simulated food choices using a computer CD-ROM disk with the program *Fast Food and Families: Making Good Choices for Better Health*. Each adolescent worked at his or her own computer station.

Site one had several small physical/health education classes designed for either sixth, seventh, or eighth grade level students. Site two had one large physical/health education class consisting of a combination of students from all three grade levels.

POPULATION AND SAMPLE

Sample population

The population sample for this study consisted of middle school students in sixth, seventh, and eighth grades enrolled in the two charter schools. A total of approximately 76 students were enrolled in the schools at these three grade levels. Sixty-nine percent of the students were African American, 7% were Hispanic, and 23% were White. Although both schools served culturally diverse students, one of the schools (site two) had a 100% African American student body at the middle school level as reported by school personnel. It is worth mentioning that one student at site two was self-identified as Hispanic and was bi-racial (Hispanic and African American). The other school (site one) had an ethnically diverse student body in these grade levels.

Sample

Convenience sampling was used to identify adolescents within the population that met specific criteria. The sample (n=40) of adolescents who were identified as at risk for T2D was selected from the aforementioned schools. However, all middle school students enrolled at the schools had the opportunity to participate in this study regardless of their risk for T2D. This inclusive strategy was used to ensure confidentiality of the students who met the criteria of the study and to protect participating adolescents from being singled out. Only the data of adolescents meeting "at risk for T2D" inclusion criteria for the study were analyzed. The condition of "at risk for T2D" was determined by the adolescents' age, BMI (weight [kg]/height [m^2]), signs of insulin resistance (high blood pressure and AN), and family history of diabetes.

Of the 76 middle school students who were recruited, 59 consented to participate including parental consent; 7 students subsequently withdrew consent, resulting in a consent rate of 68%. One participant did not meet inclusion criteria for the study, and another left prior to completing the study, resulting in a total sample of 50 adolescents from which to randomly select for data analysis. The data analysis sample (n=40) had an age range of 11 to 15 years, with a mean age of 13.3 years. The grade level distribution was 25% in sixth, 45% in seventh, and 30% in eighth. Of the 40 adolescents included for data analysis, the majority was male (55%). Participant race/ethnicity was self-reported as 67.5% African American, 30% White, and 2.5% Hispanic. More than 37% of the adolescents were considered at risk for being overweight (17.5%) or overweight (30%) using the reference data from the CDC growth tables and Teen BMI calculator. While only 2.5% of participants had an elevated DBP, 35% had an above normal SBP—either high normal SBP or elevated SBP. The researcher observed AN in less than 3% of the data analysis sample. The majority of the participants (65%) reported having a family history of DM.

Sample size

This study was used to determine effect size for future studies. Researchers (Abood et al., 2004) who used the same design with a similar intervention as the current study employed a sample size of 15 subjects per group, with a power of ~80% and a

relative effect size of 1.02 SD; Abood and colleagues (2004) reported that participants significantly improved self-efficacy ($p < .05$) and the overall number of positive dietary changes ($p < .03$). These findings support the contention that this sample size is large enough to detect statistically meaningful differences (Abood et al., 2004). Likewise, researchers using the intervention proposed in this study have used small samples (n=10) with significant findings. There was a statistically significant ($p < .05$) difference in calories, fat, carbohydrate, and fiber content of the meals chosen post-intervention (Allen et al., 2007). However, no effect sizes were reported. Based on these outcomes of previous researchers using small sample sizes of 10 (Allen et al., 2007) and experts who suggest it is appropriate to conduct a small study with 10-20 participants in order to get an initial effect size (Cole, 2007), a convenience sample of 40 participants (20 intervention and 20 control) was used in this pilot study.

Adolescents who range in ages from 11 to 15 years old and who are at high-risk for T2D were included in this study for data analysis. Although "the term *teenage* years is used synonymously with adolescence to describe ages 13 through 19" (Kollar, 2005, p. 494), the period of adolescence encompasses more than just the teen years. Adolescence is defined as the second decade of life and is said to begin as early as age 10 (Rew, 2005) or 11 years (Cobb, 2004; Story et al., 2002a) and extends to as late as age 21. It is divided into three general developmental phases: (a) early adolescence; (b) middle adolescence; and (c) late adolescence. For the purpose of this study, adolescence is defined as the period from age 11 to 15 years.

Inclusion and Exclusion Criteria

Demographic data were collected and participants were screened for T2D risk factors to describe the sample being studied. The inclusion criteria for the data analysis sample were: adolescents at risk for T2D, ages 11 to 15 years, the ability to speak and read English, and willingness to participate in the study. Parental consent and participant assent were obtained. Adolescents were excluded for data analysis if they had been diagnosed with diabetes, did not understand English, were not willing to participate, or were classified as not being at risk for T2D. Classification for at risk adolescents was determined using the ADA Consensus Panel recommendations for screening children and

adolescents for T2D (ADA, 2000). Subjects were classified as being at risk for the development of T2D if they had either:

1. A BMI at or above 85th percentile for age and gender. BMI (weight in Kg, height in m²) was calculated from measurements used to determine BMI percentiles for children using the CDC (2008) BMI Percentile Calculator for Child and Teens; or
2. At least two of the following risk factors: a) adolescents (ages 11 to 15), b) family history of T2D, c) self-identified as belonging to one of the high-risk ethnic groups (Americans of African, Hispanic, Asian, or American Indian descent), or d) non-invasive signs of insulin resistance (acanthosis nigricans [AN] of the neck or systolic BP levels ≥ 120 mmHg or a diastolic BP level ≥ 80 mmHg).

INSTRUMENTS

Five instruments were used to measure non-study and study variables in this study. A demographic form, two psychometric instruments, one single item question, and an interactive CD were used to obtain pre- and post-measurements.

Type 2 Diabetes Risk Screening

The researcher developed the Type 2 Diabetes Screening instrument (see Appendix E) for use in this study. The instrument consisted of a section to record participants' self-reported demographic information, and a section to record anthropometric measures and T2D risk factors assessed during screening.

Dietary SE for Lower Fat and Sodium Scale

Dietary self-efficacy, or adolescents' perceived ability to choose more healthy foods, was measured using a section of the Health Behavior Questionnaire (HBQ) developed by the Children and Adolescent Trial for Cardiovascular Health (CATCH) (Parcel et al., 1995). Reliability and validity have been established for the total instrument as well as sections of the instrument. Reliability of section I of the HBQ, the 'Dietary SE for lower fat and sodium' (see Appendix H) has been established through test-retest and internal consistency. The test-retest of the scale was good (r =0.63) (Parcel et al., 1995), and acceptable internal consistency, i.e., Cronbach's alpha coefficient of .83 (Parcel et

al., 1995) and .85 (Long & Stevens, 2005), were reported. In this current study, Cronbach's alpha was .71 and .68 at pre- and post-measurement, respectively. Content validity was achieved by experts reviewing the items (Parcel et al., 1995). Parcel reported that a principal components factor analysis with varimax rotation was conducted to estimate factorial validity. Values of the factor loading provided empirical evidence of construct validity. Section I is a 15-item instrument that took approximately 13 minutes to complete. Reponses are classified according to a three point Likert-type format options of *not sure* (scored as 1), *a little sure* (scored as 2), or *very sure* (scored as 3). The sum of the item responses was used to calculate a total subscale score. The subscale scores could range from 15 to 45. The score was treated as a continuous level measurement. This instrument was designed to be used in sections, and other researchers have used sections successfully in previous studies.

Fruit-Vegetable Consumption SE Scale

The fourth scale used in this study was the Fruit-Vegetable Consumption SE scale (Thombs & Heatey, 1997), which was used to assess adolescents' confidence in their ability to consume fruits and vegetables (see Appendix I). The Fruit-Vegetable Consumption SE Scale (FVC SE) scale is a 15-item five point Likert type scale that consist of two factors. The 12-item environmental resistance factor assesses adolescents' confidence in their ability to consume fruits and vegetables when challenged with various types of environmental resistance. The 3-item persuade others factor assesses adolescents' confidence in their ability to persuade others to eat fruits and vegetables in a variety of situation (Thombs & Heatey, 1997).

The 'environmental resistance' factor subscale has a Cronbach's alpha coefficient of .91 in adolescents (Long & Stevens, 2004; Thombs & Heatey, 1997). For this study, the 'environmental resistance' factor for subscale had a Cronbach's alpha of .81 and .90 at pre-test and post-test, respectively. Thombs and Heatey (1997) reported a Cronbach's alpha of .76 on the 'persuade others' items, and for this study it had a Cronbach's alpha of .70 and .84 at pre-test and post-test, respectively. In the current study, the total scale had a Cronbach's alpha of .83 and .90 at pre-test and post-test, respectively. Responses to each item are measured on a continuum ranging from strongly disagree (scored as 0) to

strongly agree (scored as 4). The scores could range from 0 to 60. The questionnaire took approximately 15 minutes to complete.

Construct validity was established by using a principal components factor analysis with a varimax rotation. The factor loading ranged between .60 and .75 (Thombs & Heatey, 1997).

Frequency of Eating at Fast Food Restaurants Item

Frequency of eating at fast food restaurants during the past week was assessed pre- and post-intervention using a single item (see Appendix J): "In the past week, how often did you eat at fast food restaurants, such as McDonalds®, Pizza Hut®, Taco Bell®, Chic-Fil-A®, or fast food Chinese restaurants?" Participants were asked to select one of the following responses: *never, 1-2 times, 3-4 times, 5-6 times, 7 times,* or *more than 7 times*. For data analysis, response categories were coded as: never = 0, 1-2 times = 1.5, 3-4 times = 3.5, 5-6 times = 5.5, 7 times = 7, and more than 7 times = 8 (Boutelle et al., 2007). In previous studies among men (Satia et al., 2004), women (French et al., 2000), and adolescents (Boutelle et al., 2007; French et al., 2001), this single item was successful at distinguishing frequent from infrequent eaters at fast food restaurants in regard to dietary intake.

Fast Food and Families: Making Good Choices for Better Health

Adolescents used an interactive CD (*Fast Food and Families: Making Good Choices for Better Health*) to "simulate" their meal choices in the fast food environment. The *Fast Food and Families: Making Good Choices for Better Health* CD was developed in partnership between North Carolina (NC) Cooperative Extension, the Physical Activity and Nutrition Branch of NC Division of Public Health, and the NC Academy of Family Physicians. The CD was used in a pilot study with adolescents, aged 13 and 15 years old, by Allen et al. (2007) to gain insight as to how nutrition education would influence adolescents' food choices in a "simulated" fast food environment.

PROCEDURES

Recruitment

Data collection began in May 2009 and was completed by June 2009. After approval by the University of Texas Medical Branch's Institutional Review Board (IRB), participants were recruited from the two schools that had already agreed to participate in the study. On May 13, 2009, participants were recruited by the researcher, who then verbally presented the study to the students. Packets containing an invitation letter (see Appendix A) and informed consent (see Appendix B) and assent (see Appendix C) documents were then sent to parents or guardians of all middle school students. Packets were distributed by the health education teacher (HET) or designated school office personnel (DSOP) to adolescents to take home to their parents, or were given directly to parents by the HET or the DSOP. Students were asked to return the signed consent/assent forms the following day to the HET or DSOP, who agreed to accept and witness these forms. The HET and DSOP called each parent or made face-to-face contact to confirm that they had given permission for their child to participate in the study. Parents were given the opportunity to contact the researcher by email or telephone to see if there were any questions about the study. The researcher followed up on a daily basis with the health education teacher to determine if there were recruited participants.

Screening

On May 15 and 18, 2009, the researcher began the screening phase of the study to determine adolescents' risk for T2D classification at sites one and two, respectively. Only adolescents who had submitted parental consent were screened. The researcher verified assent before assessing risk factors, and reminded the students that participation in the study was strictly voluntary. At site one, the participants were sent to the health education room one at a time. Then the child assent was confirmed by the researcher. At site two, all the females were sent into the room for screening at once. However, the room was large enough that the other students could not hear the conversation between the participant and the researcher or see the documented information. A teacher's assistant was in the room to keep the other students away from the screening section.

Demographic data (see Appendix D) were collected from all participants at the beginning of the study to determine the subjects who were high risk for T2D. The researcher screened participants for T2D risk factors, and obtained blood pressure and anthropometric measures (see Appendix E). To make this determination, all students' heights in cm were measured using a wall growth chart, and weights in kg were measured using a digital scale manufactured by Healthometer.

Adolescents' BMI (weight in Kg; height in m^2) was calculated from measurements used to determine BMI percentiles for children using the CDC (2008) BMI Percentile Calculator for Child and Teens. Adolescents were classified as of normal weight (5^{th} percentile to 84^{th} percentile), at risk for overweight (85^{th} percentile to 94^{th} percentile), and overweight (95^{th} percentile or greater), or underweight (less than the 5^{th} percentile) in accordance with the recommendations of the Expert Committee Recommendations for Obesity Evaluation and Treatment (Barlow & Dietz, 1998). For this study, the major criterion for being classified as at risk for T2D was having a BMI $\geq$ 85^{th} percentile, i.e., being considered at risk for overweight or being overweight.

Blood pressure was measured using an automatic manual blood pressure (BP) monitor manufactured by Omron (HEM-712). This BP monitor has been research tested for use in children. The BP monitor was calibrated each day it was used by comparing readings to that of a manual BP monitor. The BP cuff used was appropriate for the size of the adolescent to assure accurate readings. For consistency, BP measurements were obtained on participants' right arm after 3 to 5 minutes of rest in a controlled environment, which was in accordance to recommendations of the *ANTES: Acanthosis Nigricans The Education and Screening Program* (University of Texas System, Texas-Mexico Border Health Coordination Office, & The University of Texas-Pan American, 2001).

In addition to assessing the aforementioned risk factors, the researcher assessed participants for the presence of AN around the neck. AN is a velvety hyperpigmentation of the skin folds. The most common site is around the neck, but AN also can occur over the knees, knuckles, elbows, underarms, and in groin area (Esperanza & Fenske, 1996). When measuring the AN skin condition, the following measurements were used for determining the degree of AN: (a) 0 = Negative AN, (b) 1 = Degree 1 AN is a line, (c) 2

= Degree 2 AN is 1 to 2 cm, (d) 3 = Degree 3 AN is 2 to 3 cm, and (e) 4 = Degree 4 AN is greater than 3 cm. The measurements follow the guidelines of the ANTES scale with the exception that this researcher referred to the categories as Degree instead of Grade. The researcher notified parents of any abnormal findings (see Protection of Human Subjects).

Random Assignment to Groups

The participants were randomly assigned to the intervention or control groups. The researcher did this by drawing the identification (ID) codes that were assigned to participants at the beginning of the screening process. The ID code pulled on the odd number was assigned to the intervention group and the ID code pulled on even number was assigned to the control group. To ensure that adolescents meeting inclusion criteria are equally distributed into the control or intervention groups, two randomizations steps were conducted. Adolescents meeting inclusion criteria of at risk T2D were randomly assigned to either the control or experimental groups. Adolescents not meeting these criteria were randomly assigned to either group.

INTERVENTION

After the groups were defined, the participants were separated into groups and each group was asked to complete section I of the HBQ, the 'Dietary SE for lower fat and sodium' (Parcel, 1995), the Fruit-Vegetable Consumption SE scale (Thombs & Heatey, 1997), frequency of eating at fast food restaurants single item question, and select a typical meal from their favorite fast food restaurant menu using the interactive CD (*Fast Food and Families: Making Good Choices for Better Health*) at the beginning and at the end of the intervention. Post-measurements were obtained one day after the last session for the intervention group and at the end of second week following the session for the control group.

Questionnaire Administration Procedure

Instructions, each question, and possible choices were read aloud by the researcher. For example, the participants were given the following instructions for section

I of the HBQ, the 'Dietary SE for lower fat and sodium' (CATCH, 1993). This questionnaire asks (CATCH, 1993):

> "How sure are you" that you can eat some of the foods listed. Each question and the possible answers will be read aloud. The possible answers are: "Not sure", "A little sure", or "Very sure". Let's talk about each one of these possible answers: "Not sure" - not sure means you don't know if you can do something or you think that you are not able to do it. "Little sure" - a little sure means you think you can do something, but you also may have some doubts about being able to do it. "Very sure" - very sure means you are positive you can do something. (p. 13)

Also the researcher proctored the survey by walking around and answering questions from the participants. Participants were not allowed to ask questions out loud. They were instructed to raise their hand if they had a question, and the researcher would come to their desks. The researcher was aware that answering questions could cause contamination. After completing the questionnaires, participants relocated to the computer lab to use the interactive CD to select meal choices. The researcher provided instructions and demonstrated how to operate the interactive CD to the participants in each group prior to making meal selections both at pre- and post-measurement. Again, the adolescents were asked to avoid asking questions out loud, rather to raise their hand and the researcher would come to their work station to answer their question. Completion of the pre-test and post-test took approximately 40 minutes each.

DESCRIPTION OF INTERVENTION

After completion of the typical meal selection, the control group received a standard education program (SEP) (one 45 minute session), and the intervention group received a tailored NEP consisting of 4 sessions (45 minutes each) over a 2-week period. These sessions focused on everyday experiences that adolescents encounter, and on how to improve nutrition-related decisions. The intervention topics focused on eating behavioral changes: making healthful food selections in fast food environment; decreasing consumption of high-fat foods, high-salt foods, and sugar-sweetened beverages; and increasing consumption of water, fruits and vegetables. These components were selected on the basis of a review of data collected by the National Center for Chronic Disease Prevention (2008) Youth Risk Behavior Surveillance System

for 2007 and findings from research studies. Research studies indicate that adolescents are at increased risk of becoming overweight or obese and of developing heart disease and T2D when they engage in poor eating behaviors such as increased consumption of high-fat, high-sugar, high-salt foods and decreased consumption of fruit and vegetable. There is a need for adolescent-culturally appropriate health promotion programs, particularly NEP to promote healthful food choices for the prevention of diabetes and its primary risk factor, obesity, among adolescents to prevent chronic disease in the future.

Educational material (see Appendix K) for the intervention came primarily from the *Wisconsin Nutrition Education Program* [WNEP] (2005) and *Empowering Youth With Nutrition and Physical Activity* (EYWNPA) curricula (2007). Food cards, developed by the WNEP, of foods commonly served in fast food restaurants were used in a simulation activity. The participants were given the opportunity to adjust a fast food meal of their own choosing so that it contained less fat.

Curriculum Component

The *Empowering Youth With Nutrition and Physical Activity* (2007) curriculum was the main feature of the NEP intervention and focused on knowledge and skills development related to healthy eating choices; prevention of T2D and its primary risk factor, obesity; and improving health. *Empowering Youth With Nutrition and Physical Activity* is an updated version of the manual, *Nutrition and Physical Activity the 100 Way* (2003), which was developed through a collaborative partnership with the U.S. Department of Health and Human Services (DHHS)/Centers for Disease Control and Prevention (CDC), the U.S. Department of Agriculture (USDA)/Food and Nutrition Service (FNS), the 100 Black Men of America, Inc. (100 BMOA), and the California Adolescent Nutrition and Fitness Program (CANFit). The purpose of this partnership was to create a document that included nutrition and physical activity in leadership development tools for working with 11- to 18-year-old youth, with the intent of helping to prevent obesity and improving health.

The content topics (see Appendix K) were the same for both the control group and the intervention group. For the control group, the method used for the content delivery

included discussion and handout materials (see Appendix L) for each student. The intervention group participated in discussions and received handout materials, in addition to participating in hands-on activities. During week one, sessions one and two were offered; sessions three and four were offered during week two of the intervention.

Nutrition Education Program Session One

For session one, the content topics were general nutrition and food labels. The researcher reviewed nutrition recommendations and facts about DM, fats, and sodium. The content material was delivered in a lecture/discussion format for the first 25 minutes of the session. For 15 minutes, the participants engaged in activity 5, *Reading Food Labels* (Part I) interactive activity that focused on how to read labels (e.g., serving size, nutritional components, what is considered high or low percentage of a nutrient). The last 5 minutes was reserved for a question and answer session. The purposes of this session were for adolescents to: 1) become aware of facts about T2D, 2) learn about the consequences of diets high in fat and sodium, 3) assess their dietary behaviors, 4) identify ways to improve their food choices, 5) learn how to determine amounts of foods, 6) learn how to read food labels, and 6) learn to make healthier snack choices.

Nutrition Education Program Session Two

The content for session two consisted of a review of food labels, which was introduced in session one, and an overview of sugars in food. This session consisted of two interactive activities: activity 5, *Reading Food Labels* (part II), and activity 2, *The Low-Down on Sugar*. Adolescents were asked to share with the group their favorite snack or SSB. Together, the group calculated the teaspoons of sugar contained by reading the labels of their favorite snack. This amount of sugar was counted out into a plastic cup for the participants to get a visual imagery of the amount of sugar they consumed. The purposes of this session were for adolescents to: 1) learn how to read food labels, 2) assess the amount of sugar in popular SSB or their favorite SSB and/or snack, and 3) identify healthier drink and snack alternatives.

Nutrition Education Program Session Three

Session three was held during week 2 of the study. The content for this session consisted of fats in foods and fats in fast foods. During the session, adolescents participated in hands-on activity 3, *The Low-Down on Fat*, and activity 4, *Eating on the Run*. Adolescents were also offered the opportunity to participate in a flash card game *Making Fast Food Choices*. The purposes for these activities were for adolescents to: 1) learn about the different types of fat, 2) learn about the health risks of a diet high in total fat, saturated fat, *trans* fat, and cholesterol, 3) learn how to decrease fat in their diets, 4) assess their fast food choices, 5) identify ways to improve their fast food choices, and 6) adjust a fast food meal of their own choosing so that it contains less fat.

Nutrition Education Program Session Four

During session four, the topic focused on making better snack choices. Adolescents participated in activity 6, *My Snack Options*. The purposes for this activity were for adolescents to: 1) identify the influences on their snack choices, 2) survey the types of snack foods that are available, and 3) plan to make more healthful snack choices.

DATA ANALYSIS

The Statistical Social Sciences (SPSS, Version 16.0, Chicago, IL) software was used for all data analyses. Descriptive statistics were calculated for all variables to determine data range, distribution, completeness, normality, and linearity.

For the purpose of this study, the significance level was set at alpha .05 for all hypotheses. The alpha level (α) or level of significance refers to the risk of committing a type I error or finding significance when significance does not exist (Portney & Watkins, 2009).

Preliminary Analyses

Preliminary analyses to identify or rule out subgroup differences in non-study variables were conducted in order to statistically control for pre-existing differences. Analysis of variance (ANOVA) was performed to explore potential differences (e.g., *grade*, *gender, ethnicity)* in extraneous variables across all dependent variables. For

significant differences identified, separate subgroup and appropriate covariate analyses were conducted to evaluate the impact of these confounding variables.

Analysis of Variance

ANOVA is a statistical procedure for "testing the effect of one or more treatments on different groups by comparing the variability between groups to the variability within groups" (Polit & Hungler, 1991, p. 639). The covariate is an "extraneous, confounding influence on the dependent variable or a pretest measure on the dependent variable" (Polit & Hungler, 1991, p. 642).

Hypothesis One

Adolescents who are at risk for T2D and receive an NEP (Group I) will select fewer non-nutritious foods than at risk adolescents who receive a SEP (Group II). Hypothesis one was analyzed using a One-way analysis of covariance (ANCOVA) comparing Groups (I vs. II) on the number of non-nutritious foods selected covarying on PRE scores to control for initial differences between the groups. Additional analyses were conducted to explore the influence of extraneous variables, i.e., gender and ethnicity with 2-way ANCOVAs.

Analyses of Covariance

ANCOVA is a statistical procedure used "to compare two or more treatment groups while controlling for the effect of one or more confounding variables (called covariates." (Portney & Watkins, 2009, p. 863). According to Polit et al. (2001, p. 460), a covariate is "typically an extraneous, confounding influence on the dependent variable or a baseline measure of the dependent variable." One-way and two-way refers to the number of independent variables in the ANCOVA.

Hypothesis Two

There will be a significant difference between Group I (NEP) and Group II (SEP) in the selection of foods in the number of calories, grams of fat, milligrams of sodium, and grams of sugar post-intervention. Hypothesis two was analyzed using ANCOVA

with covarying on pre-score for differences with expanded analysis of control for confounding variable, ethnicity.

Hypothesis Three

There will be a significant interaction across groups in food selections and the time (pre-test vs. post-test) food selections are measured. Hypothesis three was analyzed using a between and within Repeated Measure ANOVA to assess any interaction between the two Groups (NEP vs. SEP) and Time (pre-test vs. post-test).

Repeated Measure ANOVA

Repeated Measure ANOVA is similar to ANOVA where the means of two or more groups are compared for differences. In a repeated measure ANOVA, there is one factor or independent variable for which the subjects act as his or her own control. This is also called a within-subject factor (Portney & Watkins, 2009).

Hypothesis Four

The DSE level of adolescents at risk for T2D will improve to a greater extent following the completion of an NEP compared to at risk adolescents in the control group. For analysis of hypothesis four, change scores were calculated (Post-scores minus PRE scores) and independent Student's t-test was utilized to compare Groups on DSE change.

Student's *t*-Test

The *t*-test (also called Student's *t*-test) is a parametric statistical test used for analyzing the difference between group means (Polit & Hungler, 1991; Portney & Watkins, 2009).

Hypothesis Five

The level of DSE for the intervention group will differ significantly following an NEP. A paired t-test analysis was conducted to assess change across time for the intervention group on DSE.

Paired t-Test

Portney and Watkins (2009, p. 873) define a paired *t*-test as a "parametric test for comparing two means for correlated samples or repeated measures."

Hypothesis Six

DSE scores will be higher in the adolescents making healthy food choices (low calories, fat, sodium and sugar) compared to the adolescents making unhealthy food choices (high calories, fat, sodium, and sugar). After outliers were eliminated, High/Low calorie, fat, sodium, and sugar groups were determined based on calorie mean split at Time 1. For analysis Group differences were assessed via independent Student's t-tests.

Protection of Human Subjects

Approval by the University of Texas Medical Branch at Galveston Institutional Review Board (IRB) was obtained before recruitment activities and data collection were started. The IRB guidelines for the protection of human subjects were followed at all times. Each participant's enrollment and involvement in this study as a "human subject" was completely voluntary and fully informed. Research participants were informed that they may withdraw from a study at any time. Likewise, their grades in school would not be affected by being in this research project or by *not* being in this research project. Before participating in the study and being screened, participants and their parents or legal guardian were required to sign informed consent documents.

All participants in this study were under the age of 18 years old were required to give written assent (see Appendix C) in addition to the parental consent (see Appendix B) to participate in the study. The assent process included asking the adolescent to read an assent form written in age-appropriate language. The adolescent was asked whether he or she would like to participate. If so, the adolescent signed the assent form. In the event that the adolescent did not have sufficient abilities to read and understand a written assent form, a verbal procedure was used. If the adolescent was not able to understand or respond using either written or verbal language, the investigator did not allow the adolescent to participate in the study.

The screening was conducted in a way to ensure confidentiality and provide privacy for the participant (see **Screening** section). The researcher attempted to contact parents or guardians by telephone, or sent a referral letter (see Appendices F and G) requesting that parent or guardian check with the child's health care provider with regard to abnormal findings observed during the screening. The letters were sealed in an envelope marked "confidential" and given to the adolescent or health education teacher.

Adolescents were not identified by name in study records. A code number was assigned to each participant and only the researcher had access to that number. The key to the code was kept in a locked file in the researcher's office. The study data responses on adolescents' questionnaires will not be linked to him or her as an individual. Instead, the data adolescents provided will be compiled with data from all other participants and reported as a group.

There was no reimbursement of expenses for participation in this study. In appreciation for the time and possible inconvenience associated with participation, adolescents had the opportunity to win door prizes at each session. And at the end of the study, a twenty dollar gift card for the Wal-Mart retail store was presented to each individual for participating in their group assigned sessions.

CHAPTER 4: FINDINGS

INTRODUCTION

This study examined the short-term effects of a nutrition education program (NEP) on food choices of adolescents at risk for type 2 diabetes (T2D), and investigated whether there was an association between dietary self-efficacy (DSE) and T2D risk factors. The Statistical Social Sciences (SPSS) was used to analyze the data. Chapter IV presents the results of the data analysis in three sections. Section one describes the demographic variables and T2D risk factors of the adolescents studied. The findings of preliminary analysis on study and non-study variables are addressed in section two. Section three presents the findings relevant to the six hypotheses. The chapter concludes with a summary of results.

DESCRIPTION OF SAMPLE

The sample was composed of 40 adolescents enrolled in two charter middle schools in the Southwestern U.S. Of the 76 middle school students who were recruited, 59 consented to participate, and 7 of those students subsequently withdrew consent, resulting in a consent rate of 68%. One participant did not meet inclusion criteria for the study and one participant withdrew prior to completing the study, resulting in a pool of 50 adolescents from which to randomly select a sample for data analysis.

The study sample (n=40) ranged in ages 11 to 15 years, with a mean age of 13.3 (SD = 1.018) years. Ten (25%) of the participants were in the sixth grade, 18 (45%) were in seventh grade, and 12 (30%) were in the eighth grade. The mean grade level was 7.05 (SD = .745). Of the 40 adolescents included in the study, a majority of the subjects was male (55%). Table 4.1 shows the mean and standard deviation (SD) of adolescents' demographic characteristics by group on admission to the study. In addition, participants were assessed and classified as being at risk for developing T2D. These demographic results show that 67.5% were African American, 30% were White, and 2.5% were Hispanic. As identified in chapter 3, one participant was self-described bi-racial (Hispanic and African American). Due to the small sample size, race/ethnicity was collapsed into two categories: White and Minority. More than 47% of the adolescents

were considered at risk for being overweight (17.5%) or overweight (30%) when using the reference data from the CDC growth tables and Teen BMI (body mass index) calculator. Further, while only 2.5% of participants had an elevated DBP, 35% had an above normal SBP. The researcher observed AN in less than 3% of the data analysis sample. The majority of the participants (65%) reported having a family history of DM. The means, SD, and Range for BMI and blood pressure (Table 4.2a) as well as frequencies and percentages for other T2D risk factors (Table 4.2b) are shown below.

Table 4.1. Mean and SD of adolescents' demographic characteristics by group on admission to study

	Control (N=20)		Treatment (N=20)	
	Mean	**SD**	**Mean**	**SD**
Age in years	13.05	1.191	13.55	.759
Grade level	6.8	.696	7.3	.733

Table 4.2a. Mean, SD, and Range of Adolescents' Risk Factors

	M	**SD**	**Range**
BMI	76.62	23.09	12 – 99
SBP	116.05	10.79	94 – 145
DBP	63.85	8.76	40 – 82

Table 4.2b. Frequency and Percentage of Adolescents with Type 2 Diabetes Risk Factors (N = 40)

	Frequency	Percentage
Adolescent (11 – 15 years)	40	100.0
Ethnicity		
White	12	30.0
African American	27	67.5
Hispanic	1	2.5
BMI		
Normal weight	21	52.5
At risk for overweight	7	17.5
Overweight	12	30.0
SBP		
Normal systolic	26	65.0
Elevated systolic	14	35.0
DBP		
Normal diastolic	39	97.5
Elevated diastolic	1	2.5
Degree of AN (Neck)		
Not present	39	97.5
A line (1˚)	1	2.5
Family History DM		
No	14	35.0
Yes	26	65.0

Adolescents' frequency of eating at fast food restaurants within the past week by group at pre-test is detailed in Table 4.3. Approximately, 38% of all participants reported eating at a fast food restaurant more than twice in the past week.

Table 4.3. Frequency and Percentage of Adolescents Eating at Fast Food Restaurants in Past Week on Admission to Study (N=40)

	Control Group		Treatment Group	
Times per week	**Frequency**	**Percent**	**Frequency**	**Percent**
Never	2	10	6	30
1 – 2 times	10	50	7	35
3 – 4 times	6	30	7	35
5 – 6 times	0	0	0	0
7 times	0	0	0	0
More than 7 times	2	10	0	0

Description of Major Study Variables

Descriptive statistics for the major study variables of food choices and DSE levels are presented in table 4.4. As shown in Table 4.4, pretest measurements were obtained on adolescents' fast food choices and DSE levels. One-way ANOVA results indicated there was no significant difference between the intervention and control groups in food choices regarding number of calories, grams of fat, milligrams of sodium, or grams of sugar (p = .05, each). The simulated dietary caloric intake ranged from 225 to 5740 calories per meal, simulated dietary fat intake ranged from 7 to 248 grams per meal, simulated sodium intake ranged from 690 to 11,945 milligrams per meal, and sugar ranged from 0 to 441 grams per meal.

In addition to measuring food choices, DSE levels were measured using two instruments. DSE scores were calculated by adding the scores obtained from the Fruit-Vegetable Consumption Self-Efficacy and the Self-Efficacy for Low Fat and Sodium scores. One-way ANOVA results showed there was no significant difference between the intervention and control groups on DSE scores (p = .05, each). The reported Pretest DSE scores for the sample ranged from 27 to 78. The descriptive statistics by groups are presented in the preliminary analysis section.

Table 4.4. Mean and SD of Food Choices and DSE Levels for Adolescents by Groups on Admission to Study for Sample

	Control Group		Treatment Group	
	Mean	**SD**	**Mean**	**SD**
Calories per meal	1939.35	1136.90	1913.95	1479.48
Fat (g) per meal	79.65	41.25	84.70	68.71
Sodium (mg) per meal	3414.95	2454.25	3516.60	2833.43
Sugar (g) per meal	86.35	95.40	94.70	77.84
DSE Score	57.65	13.51	61.90	7.14
SE Low Na Fat Scale	31.30	6.08	31.15	4.82
FVC SE Scale	26.35	8.62	30.75	5.57

PRELIMINARY ANALYSIS

Preliminary analyses were conducted to identify or exclude group differences in non-study variables and to statistically control for pre-existing differences. Analysis of variance (ANOVA) was performed to explore potential group differences on non-study variables (e.g., age, BMI). When significant differences between groups were identified, covariate analyses instead of the planned analysis were conducted to evaluate the impact of these mediators. As identified in Chapter III, alpha was set at .05 for all statistical analyses.

Non-study Variables

One-way ANOVA and Chi-square were used to rule out sub group differences on continuous and nominal level data for non-study variables, respectively. One-way ANOVA indicated there were no significant differences between groups on the non-study variables of age, BMI, SBP, and DBP (see Table 4.5). Age was investigated as a possible covariate on all analyses and was found not to be significant. Chi-square results indicated there was no significant difference between the groups on ethnicity, gender, or family history of DM (see Table 4.6). Of the 40 adolescents randomly selected for data analysis, only one had AN at the neck. This adolescent was randomly assigned to the control

group. Because there were not enough participants with AN (N = 1), no analyses were conducted using this variable.

Table 4.5. ANOVA for Analysis of Group Differences on Non-study Variables

Variable	SS	MS	DF	F	*p*
Age in years					
Between groups	2.5	2.500	1	2.507	.122
Within groups	37.90	.997	38		
Total	40.40		39		
BMI-for-age percentile					
Between groups	378.23	378.223	1	.704	.407
Within groups	20415.15	537.241	38		
Total	20793.38				
SBP					
Between groups	193.60	193.600	1	1.692	.201
Within groups	4348.30	114.429	38		
Total	4541.90		39		
DBP					
Between groups	44.10	44.100	1	.568	.456
Within groups	2949.00	77.605	38		
Total	2993.10		39		

Table 4.6. Chi-Square for Analysis of Non-study Variables by Group

Count	Control	Treatment	X^2	*p*
Ethnicity Collapse			1.90	.168
White	4	8		
Minority	16	12		
Gender			0.00	1.00
Male	11	11		
Female	9	9		
Family History of DM			.440	.507
No	8	6		
Yes	12	14		

Study Variables

The one-way ANOVA showed no significant differences between the intervention and control groups at baseline on the study outcome variables of calories, fat, sodium, and sugar (see Table 4.7). Preliminary analyses obtained at the pretest for the DSE levels by the groups (intervention and control) are presented in Table 4.8.

Table 4.7. One-way ANOVA by Group on Major Study Variables at Pretest (n =40)

Variable	SS	MS	DF	F	p
Calories					
Between Groups	6451.60	6451.60	1	.004	.95
Within Groups	6.61	1740696.30	38		
Total	6.61		39		
Fat					
Between Groups	255.02	255.02	1	.079	.78
Within Groups	122014.75	3210.91	38		
Total	122269.77		39		
Sodium					
Between Groups	103327.22	103327.22	1	.015	.90
Within Groups	2.67	7025822.09	38		
Total	2.67		39		
Sugar					
Between Groups	697.22	679.22	1	.092	.76
Within Groups	288038.75	7579.96	38		
Total	288735.975		39		

Table 4.8. Dietary Self-efficacy Level at Pre test by Group (N= 40)

Variable	SS	MS	df	F	*p*
SE for Lower Fat and Sodium					
Between Groups	.225	.225	1	.007	.932
Within Groups	1142.75	30.07	38		
Total	1142.97		39		
Fruit-Vegetable Consumption Self-efficacy					
Between Groups	193.60	193.60	1	3.68	.063
Within Groups	2000.30	52.63	38		
Total	2193.90		39		
Dietary Self-efficacy					
Between Groups	180.62	180.62	1	1.55	.221
Within Groups	4436.35	116.74	38		
Total	4616.97		39		

HYPOTHESES ANALYSES

Specific aim 1 was to determine the nutritional intake of adolescents who are at risk for the development of T2D by using an interactive CD (*Fast Foods and Families: Making Good Choices for Better Health*). This next section will address the relevant findings for the three related hypotheses to this aim.

Non-nutritious Food Choice

For Hypothesis 1, non-nutritious food choice was defined as the number of selections of: a) a single item having any two combinations of the following nutrient values: a caloric value ≥ 400, fat calories ≥ 35%, and sodium ≥ 770 mg; b) a SSB great than small portion size; or c) any size milkshake.

Hypothesis One

Adolescents who are at risk for T2D and receive an NEP (Group I) will select fewer non-nutritious foods than at risk adolescents who receive a Standard Education Program (SEP) (Group II).

This hypothesis was analyzed using a one-way ANCOVA comparing Groups on non-nutritious food selection with covarying on pre score to control for initial group differences. Results of the one-way ANCOVA indicated that after adjusting for pre scores, the main effect for group, NEP vs. SEP, was not significantly different, F (1, 37) = 1.890, p = .177. However, adolescents who received an NEP selected fewer non-nutritious foods compared to adolescents receiving a SEP. The adjusted mean scores also indicate that adolescents at risk for T2D who received an NEP did select fewer non-nutritious foods compared to adolescents who received a SEP (see Table 4.9).

Table 4.9. Mean, Standard deviation and Adjusted Means of Number of Non-nutritious Food by Groups Posttest

Group	Descriptive Statistics			Adjusted M
	N	M	SD	
Group I (NEP)	20	1.85	1.387	1.844_a
Group II (SEP)	20	2.45	1.605	2.456_a

Hypothesis Two

There will be a significant difference between Group I (NEP) and Group II (SEP) in the selection of foods in the number of calories, grams of fat, milligrams of sodium, and grams of sugar post intervention.

Hypothesis two was analyzed using ANCOVA with covariance on pre score for differences. Because there were significant differences between ethnic groups at prestest on the selection of sugar, a two-way ANCOVA was computed to statistically control for group differences.

Calories

A one-way ANCOVA was conducted to evaluate if there was a significant difference between Group I and Group II in the selection of foods based on the number of calories post-intervention. The independent variable, Group, included two levels: Group I, adolescents who received NEP, and Group II, adolescents who received a SEP. The ANCOVA results indicate that the after controlling for the covariate, the main effect for group was not significant F (1, 37) = 2.005, p = > .05. The descriptive statistics indicate that adolescents who received an NEP had lower dietary caloric intake compared to adolescents who received a SEP, even after controlling for initial group differences (see Table 4.10).

Table 4.10. Mean, Standard Deviation, and Adjusted Means of Calories by Groups at Posttest

Group	Descriptive Statistics			Adjusted M
	N	M	SD	
Group I (NEP)	20	1213.40	501.089	1.217_a
Group II (SEP)	20	1499.55	863.893	1.496_a

Fat

A one-way ANCOVA was conducted to evaluate if there was a significant difference between Group I and Group II in the selection of foods based on grams of fat post intervention. The independent variable, Group, included two levels: Group I, adolescents who received NEP, and Group II, adolescents who received a SEP. The dependent variable was the simulated dietary fat intake post intervention and the covariate was the simulated dietary fat intake pre intervention. The ANCOVA indicates that after controlling for the covariate, the main effect for group was not significant F (1, 37) = 1.994, p = > .05. The descriptive statistics indicate that adolescents who received an NEP had lower fat intake compared to adolescents who received a SEP, even after controlling for initial group differences (see Table 4.11).

Table 4.11. Mean, Standard Deviation, and Adjusted Means of Fat by Groups at Posttest

Group	Descriptive Statistics			Adjust M
	N	M	SD	
Group I (NEP)	20	49.85	26.633	49.124_a
Group II (SEP)	20	60.15	34.184	60.876_a

Sodium

A preliminary analysis evaluating the homogeneity-of-slopes assumption indicated that the relationship between the covariate and the dependent variable differed significantly as a function of the independent variable, F (1,36) = 25.740, p = .000. Thus, the assumption of homogeneity of regression is not met. The ANCOVA was not conducted because the comparison would not be meaningful (Munro, 2005; Portney & Watkins, 2009). Therefore, analysis was conducted without evaluating the effect of the covariate on the dependent variable.

A one-way ANOVA was conducted to determine if there was significant difference between Group I (NEP) and Group II (SEP) in food selection based on milligrams of sodium post intervention. The factor was Group and the dependent variable was milligrams of sodium at posttest. The results for the ANOVA indicate no significant difference between groups, F (1, 38) = 1.876, p = .179. Although not a significant difference, adolescents who received an NEP had a lower dietary sodium intake compared to adolescents who received a SEP (see Table 4.12).

Table 4.12. Mean, Standard Deviation, and Adjusted Means of Sodium by Groups at Posttest

Group	N	M	SD
Group I (NEP)	20	2004.4	898.12
Group II (SEP)	20	2816.1	2493.11

Sugar

A one-way ANCOVA was conducted to evaluate if there was a significant difference between Group I and Group II in the selection of foods based on milligrams of sugar post-intervention. The independent variable, group, included two levels: Group I, adolescents who received NEP, and Group II, adolescents who received a SEP. The dependent variable was the simulated dietary sugar intake post intervention and the covariate was the simulated dietary sugar intake pre intervention. The ANCOVA results indicate that after controlling for the covariate, the main effect for Group was not significant F (1, 37) = .179, p = .675. The descriptive statistics indicate that adolescents who received an NEP had lower dietary sugar intake compared to adolescents who received a SEP, even after controlling for initial group differences (see Table 4.13).

Table 4.13. Mean, Standard Deviation, and Adjusted Means of Sugar by Groups at Posttest

Group	N	M	SD	Adjusted M
Group I (NEP)	20	64.65	41.291	63.779_a
Group II (SEP)	20	67.95	41.388	68.821_a

Based on preliminary analysis performed to explore potential differences in extraneous variables across all dependent variables, there was a significant difference between ethnic groups on the dependent variable sugar at both pre- and post-intervention (p = .009 and p = .029, respectively). Therefore, expanded analysis was conducted using two-way ANCOVA to evaluate the impact of the confounding variable, ethnicity. The independent variables were group and ethnicity. The Group variable included two levels: Group I, adolescents who received NEP, and Group II, adolescents who received SEP. The other independent variable, ethnicity, included two levels: Whites, and one collapsed category for Minorities. The dependent variable was the scores on sugar in grams following the completion of the intervention programs (posttest). Scores on sugar in grams measured at pretest were used as the covariate to control for individual differences.

Two-way ANOVA indicates neither of the main effects were statistically significant—Group: F (1, 35) = .122, p = .73, or Ethnicity: F (1, 35) = 1.819, p = .19. These results suggest that Whites and Minorities did not respond significantly differently to the two types of intervention. Whites who received a SEP had a lower dietary sugar intake compared to Whites in the NEP. On the other hand, Minorities appeared to benefit more from the NEP based on food selections that were lower in dietary sugar compared to Minorities who participated in the SEP (see Table 4.14).

Table 4.14 Mean, Standard Deviation, and Adjusted Means of Sugar by Groups at Posttest

Group	N	M	SD	**Adjusted M**
Group I (NEP)	20	64.65	41.291	63.291_a
White	8	53.00	37.048	59.971_a
Minority	12	72.42	43.669	66.611_a
Group II (SEP)	20	67.95	41.388	58.521_a
White	4	29.00	33.486	41.649_a
Minority	16	77.69	37.945	75.394_a

Hypothesis Three

There will be a significant interaction across groups in food selections and the time (pretest vs. posttest) food selections are measured. Hypothesis three was analyzed using a Repeated Measure ANOVA to assess any interaction between the two Groups (NEP vs. SEP) and Time (pretest vs. posttest) on food selection.

Calories

Repeated Measure ANOVA was used to assess the interaction between the Groups (NEP vs. SEP) and the times (pretest vs. posttest) dietary caloric intake were measured. Results show there was no significant interaction between group and time food

selection on the number of calories that were measured ($F = .51$, $df = 1$, $p = .48$), with both groups showing a decrease in dietary caloric intake across the two time periods (see Table 4.15).

Table 4.15. Mean and Standard Deviation of the Food Selection in Calories for Groups at Pre- and Posttest

	Group I (NEP)			Group II (SEP)		
Time Period	n	M	SD	n	M	SD
Pretest	20	1913.95	1479.48	20	1939.35	1136.90
Posttest	20	1213.40	501.09	20	1499.55	863.89

Fat

Repeated Measure ANOVA was used to assess the interaction between the Groups and the times dietary fat intake were measured. Results show there was no significant interaction between the groups (NEP vs. SEP) and the time (pretest vs. posttest) of the food selection in grams of fat ($F = 1.02$, $df = 1$, $p = .32$), with both groups showing a decrease in dietary fat intake across the two time periods (see Table 4.16).

Table 4.16. Mean and Standard Deviation of Food Selection in Fat for Groups at Pre- and Posttest

	Group I (NEP)			Group II (SEP)		
Time Period	n	M	SD	n	M	SD
Pretest	20	84.70	68.71	20	79.65	41.25
Posttest	20	49.85	26.63	20	60.14	34.18

Sodium

Repeated Measure ANOVA was used to assess the interaction between the Groups and the times dietary sodium intake were measured. Results show there was no significant interaction between group (SEP vs. NEP) and the time (pretest vs. posttest) of the food selection in milligrams of sodium ($F = 1.94$, $df = 1$, $p = .17$), with both groups

exhibiting a decrease in dietary sodium intake across the two time periods (see Table 4.17).

Table 4.17. Means and Standard Deviation of Food Selection in Sodium for Groups at Pre- and Posttest

	Group I (NEP)			Group II (SEP)		
Time Period	n	M	SD	n	M	SD
Pretest	20	3516.60	2833.43	20	3414.95	2454.25
Posttest	20	2004.35	898.112	20	2816.05	2493.11

Sugar

Repeated Measure ANOVA was used to assess the interaction between the Groups and the times dietary sugar intake were measured. Results show there was no significant interaction between the groups (NEP vs. SEP) and the time (pretest vs. posttest) of food selection in grams of sugar measured ($F = .22$, $df = 1$, $p = .64$), with both groups showing a decrease in dietary sodium intake across the two time periods (see Table 4.18).

Table 4.18. Means and Standard Deviation of Food Selection in Sugar for Groups at Pre- and Posttest

	Group I (NEP)			Group II (SEP)		
Time Period	n	M	SD	n	M	SD
Pretest	20	94.70	77.84	20	86.35	95.40
Posttest	20	64.65	41.29	20	67.95	41.39

Specific Aim 2 was to identify the level of DSE for adolescents at risk for the development of T2D following NEP. This section will present the relevant findings for the three related hypotheses.

Hypothesis Four

Adolescents at risk for T2D will improve to a greater extent on the DSE following the completion of an NEP (Group I) compared to at risk adolescents in the control group (Group II). For analysis of hypothesis four, the DSE change scores were calculated (Post-scores and Pre-scores) and an independent Student's *t*-test was used to compare Groups on DSE change. The analysis indicates that adolescents at risk for T2D improved significantly more on DSE following the completion of an NEP compared to at risk adolescents in the control group (see Table 4.19).

Table 4.19. H4 Independent Student's t-test on Dietary Self-Efficacy for Groups

	DSE Change					
Variable	**N**	**M**	**SD**	***t***	**df**	***p***
Group 1	20	7.25	6.414	2.136	38	.039
Group 2	20	1.95	9.052			

Hypothesis Five

The level of DSE for the intervention group will differ significantly following an NEP. A paired t-test analysis was conducted to assess change across time for the intervention group on DSE. There was significant change across time with subjects scoring significantly higher at the second measurement following an NEP than at the first measurement. The correlation between the two DSE scores was .682, significant at the .001 level. The Paired Samples Test table shows that the means differed by 7.250 (see Table 4.20).

Table 4.20. H5: Change across time for the intervention group on Dietary Self-Efficacy (n = 20)

	DSE Change				
Variable	**M**	**SD**	**t**	**df**	***p***
Time 1	61.00	7.144	-5.055	19	.000
Time 2	69.15	8.586			

Hypothesis Six

The DSE scores will be higher in the adolescents making healthy food choices (low calories, fat, sodium and simple carbohydrates) compared to the adolescents making unhealthy food choices (high calories, fat, sodium, and simple carbohydrates).

Outliers

Because there were outlier scores at the high end of the scale, it was necessary to run an analysis to identify and eliminate the outliers. Frequencies were run on the total sample (N= 40), and values on calories that were > 2 SD from the mean were identified as outliers. Four participants were considered outliers since they had a simulated caloric intake over 4,000. Means were run on a sample (n = 36) without the most extreme outliers or calories over 4,000. A new sample mean was recalculated based on the SD of this sample, and values > 2 SD on calories (3147.9 calories) at Time 1. A total of four participants were consider outliers and therefore excluded from data analysis for hypothesis six. After outliers were eliminated, High/Low calorie, fat, sodium, and sugar groups were determined based on calorie mean split.

Low/High Groups

For hypothesis six, it was desirable to dichotomize the calorie, fat, sodium, and sugar variables. Low/High calorie, fat, sodium, and sugar groups were dichotomized as follows: a) the Low calorie group was considered to be adolescents with simulated dietary intake of 1240 calories or less per meal and the High calorie group was adolescents with 1241 calories or more per meal; b) the Low fat group was considered to be adolescents with simulated dietary fat intake of 49 g or less per meal and the High fat group was adolescents with simulated dietary fat intake of 50 g or more per meal; c) the Low sodium group was considered to be adolescents with a simulated dietary sodium intake of 2107 mg or less per meal and the High sodium group was adolescents with a simulated dietary sodium intake of 2108 mg or greater per meal; and d) the Low sugar group was considered to be adolescents with a simulated dietary sugar intake of 63 g or

less per meal and the High sugar group was adolescents with simulated dietary sugar intake of 64 g or more per meal.

Hypothesis six was analyzed using Independent Sample *t*-Tests to compare Low/High calorie group on DSE, Low/High fat group on DSE, Low/High sodium group on DSE and Low/High sugar group on DSE. The independent variables were Low group and High group, and the dependent variable was the DSE scores. A preliminary analysis evaluating the homogeneity indicated that the groups differed significantly on the dependent variable sodium, as assessed by the Levene's Test for Equality of Variances ($p = .04$); therefore, analysis for the "equal variances not assumed" was used evaluated this dependent variable.

Independent Sample *t*-Tests indicate that both Low calorie and Low fat groups were significantly different than their high counterparts on the DSE. This indicates that adolescents making healthy food choices (i.e., Low calorie, Low fat) had higher self-efficacy than did adolescents making unhealthy food choices (i.e., High calorie, High fat). In contrast, there was no significant difference between High sodium and Low sodium groups on the DSE despite self-efficacy being higher in adolescents making healthy food choices (i.e., Low sodium). Similarly, there was no significant difference between the Low sugar and High sugar groups on the DSE. Results indicated that adolescents making unhealthy food choices (i.e., High sugar) had higher self-efficacy than their counterparts (see Table 4.21).

Table 4.21. H6: Independent Sample *t*-Tests comparing Low/High Groups on DSE

Group	N	M	SD	*t*	df	*p*
Calorie						
Low	19	69.11	11.01	2.267	34	.030
High	17	59.76	13.69			
Fat						
Low	18	70.00	10.49	2.639	34	.012
High	18	59.39	13.46			
Sodium						
Low	19	65.74	10.15	.489	26.62	.629
High	17	63.53	15.93			
Sugar						
Low	20	63.80	14.31	-.454	34	.652
High	16	65.81	11.65			

SUMMARY OF RESULTS

Descriptive statistical analysis allowed for examination of the demographic characteristics and risk factors for T2D of the study sample and the major study variables. Preliminary analyses to identify or rule out subgroup differences between the control and intervention groups in non-study variables were conducted in order to statistically control for pre-existing differences. One-way ANOVA and Chi-square were used to rule out subgroup differences in continuous and nominal level data non-study variables, respectively.

One-way ANOVA was used to explore potential differences in extraneous variables between the groups on the outcome variables. Results of the one-way ANOVAs indicated there were significant difference between ethnic groups on the dependent variable sugar at Pretest ($p = .009$) and Posttest ($p = .029$). Based on significant differences identified, separate subgroup analyses were conducted to evaluate the impact of this confounding variable as indicated.

One-way ANCOVA was computed comparing Groups on non-nutritious food selection while covarying on pre score to control for initial group differences. The main effect for Group was not significant, indicating that the adolescents in the intervention group did not differ statistically from the control group post intervention. However, adolescents who participated in an NEP (Group I) did select fewer number of non-nutritious foods compared to adolescents who participated in a SEP (Group II).

One-way ANCOVAs were conducted to evaluate if there was a significant difference between Group I (NEP) and Group II (SEP) in the selection of foods in the number of calories, fat, and sugar post intervention. Separate one-way ANCOVAs showed no significant main effect for groups in the selection of foods in the number of calories ($p > .05$), fat ($p > .05$), and sugar ($p > .05$), indicating the intervention group did not differ statistically from the control group. On the other hand, adolescents receiving an NEP had a lower calorie, fat, and sugar intake than adolescents receiving SEP.

Because preliminary analysis identified significant subgroup differences between ethnicity on the dependent variable sugar, expanded analysis using a two-way ANCOVA was conducted to evaluate the impact of ethnicity on sugar. Results of the two-way ANCOVA indicated no significant main effect for group ($p > .05$) or ethnicity ($p > .05$). These results suggest that White adolescents and Minority adolescents did not respond differently to the two types of interventions. On the other hand, Minority adolescents appeared to benefit more from the NEP based on food selections being in lower dietary sugar than White adolescents. As shown in Table 4.15, after controlling for effects of the covariate, White adolescents who received a SEP had a lower dietary sugar intake (m = 41.649) compared to White adolescents who received an NEP (m = 59.971). On the other hand, Minority adolescents who received an NEP had lower dietary sugar intake (m= 66.611) compared to Minority adolescents who received a SEP (m = 75.395).

One-way ANOVA was conducted to evaluate if there was a significant difference between Group I (NEP) and Group II (SEP) in the selection of foods in milligrams of sodium. This decision was made after preliminary analysis indicated that the assumption of homogeneity of regression was not met. The results for the ANOVA indicate no significant difference between groups ($p = > .05$). Although not a significant difference,

the adolescents who received an NEP had a lower dietary sodium intake compared to adolescents who received standard education.

Repeated Measure ANOVA to assess the interaction between the Groups (NEP vs. SEP), time (pretest vs. posttest), and food selections (i.e. number of calories, fat, sodium, sugar) were measured. Separate Repeated Measure ANOVAs indicated there were no significant interaction effect ($p > .05$, each).

An independent Student's *t*-test was utilized to compare Groups on DSE change. The analysis indicates that adolescents at risk for T2D improved significantly ($p < .05$) on DSE following the completion of an NEP compared to at risk adolescents in the control group.

A paired t-test analysis was computed to assess change across time for the intervention group on DSE. Paired t-test results indicated there was a significant ($p < .05$) change across time with subjects scoring significantly higher at the second measurement following an NEP than at the first measurement.

Independent Sample *t*-Tests were computed to compare Low/High calorie group on DSE, Low/High fat group on DSE, Low/High sodium group on DSE and Low/High sugar group on DSE. Independent Sample *t*-Tests indicate that both Low calorie and Low fat groups were significantly different than the High calorie and fat groups on DSE. This indicates that adolescents making healthy food choices (i.e., low calorie vs. low fat) had higher self-efficacy than did adolescents making unhealthy food choices (i.e., high calorie vs. high fat). In contrast, separate Independent Sample *t*-Tests indicated there were no significant differences between Low/High sodium and Low/High sugar groups on DSE.

CHAPTER 5: DISCUSSION, RECOMMENDATIONS, AND CONCLUSIONS

INTRODUCTION

Chapter 5 summarizes the study, draws important conclusions from the data, and discusses findings with consideration to prior research. The chapter also provides a discussion of the implications for action and recommendations for further research.

SUMMARY OF THE STUDY

Type 2 diabetes (T2D), a condition once seen primarily in older adults, has reached epidemic rates among adolescents. Now, as more children and adolescents in the United States are becoming overweight, T2D is occurring more frequently in children over 10 years old, and adolescents (NDEP, 2008). If this current trend continues, experts predict that one out of three children born in the U.S. in 2000, and one in two minorities, will develop T2D during their lifetime (ADA, 2007; CDC, 2007). Being overweight in adolescents places this group at a greater risk for developing health problems (Spiotta & Luma, 2008), such as insulin resistance (IR) and T2D (Peterson et al., 2007). Over 80% of children and adolescents with T2D are overweight or at risk for becoming overweight (ADA, 2000). The early onset of T2D among young people will affect their present and future lives. Thus, the current epidemic of T2D among youth, and in particular adolescents, is in part reflective of their eating behaviors.

Purpose Statement and Research Hypotheses

The purposes of this study were to: (1) determine the short-term effect of a nutrition education program (NEP) on food choices of adolescents at risk for T2D, and (2) identify whether there is an association between dietary self-efficacy (DSE) and T2D risk factors.

The specific aims and related hypotheses of this study were:

1. Determine the nutritional intake of adolescents who are at risk for the development of T2D using an interactive CD (*Fast Foods and Families: Making Good Choices for Better Health*).

   H1: Adolescents who are at risk for T2D and receive an NEP (Group I) will select fewer non-nutritious foods than at risk adolescents who receive a SEP (Group II).

   H2: There will be a significant difference between Group I and Group II in the selection of foods in the number of calories, grams of fat, milligrams of sodium, and grams of sugar post intervention.

   H3: There will be a significant interaction across groups in food selections and the time (pre-test vs. post-test) food selections are measured.
2. Determine the level of DSE for adolescents at risk for the development of T2D following NEP.

   H4: Adolescents at risk for T2D will improve a greater degree on DSE following the completion of an NEP (Group I) compared to at risk adolescents in the control group (Group II).

   H5: The level of DSE for the intervention group will differ significantly following an NEP.

   H6: DSE scores will be higher in adolescents making healthy food choices (low calories, fat, sodium and sugar) compared to adolescents making unhealthy food choices (high calories, fat, sodium, and sugar).

Review of the Methodology

A pre-test/post-test, quasi-experimental group design with random assignment to two groups was used to examine the research hypotheses of this study. The population for this study consisted of middle school students in sixth, seventh, and eighth grades enrolled in the two charter schools. Convenience sampling was used to identify adolescents within the population that met specific criteria. The sample (n = 40) of adolescents who were identified as at risk for T2D was selected from the aforementioned schools.

The intervention consisted of educating adolescents who are at risk for T2D on making healthful food choices when dining in a fast food environment; decreasing consumption of high-fat foods, high-salt foods, and sugar-sweetened beverages; and increasing consumption of water, fruits, and vegetables. The randomly assigned intervention group received a tailored NEP while the randomly assigned control group received a standard education program (SEP). The control group received a SEP (one 45 minute session), and the intervention group received a tailored NEP consisting of 4 sessions (45 minutes each) over a 2-week period. The intervention was carried out in two middle schools by the researcher during physical/health education class periods.

Five instruments were used to measure non-study and study variables in this study. A demographic form was used to record adolescents' risk factors for the development of T2D at the beginning of the study. DSE levels and fast food choices were measured pre- and post-test using two psychometric instruments and an interactive CD. Section I of the HBQ, the "Dietary SE for lower fat and sodium" was used to measure adolescents' self-efficacy for choosing lower fat and sodium foods. The Fruit-Vegetable Consumption SE scale (Thombs & Heatey, 1997) was used to assess adolescents' confidence in their ability to consume fruits and vegetables. Fast food choices were measured from adolescents' selection of a typical meal from their favorite fast food restaurant menu using the interactive CD called *Fast Food and Families: Making Good Choices for Better Health*. Frequency of eating at fast food restaurants during the past week was assessed pre- and post-intervention using a single item. The Statistical Social Sciences (SPSS) was used to analyze the data.

FINDINGS RELATED TO THE LITERATURE

There was a high prevalence of overweight adolescents in this study. Rates of at risk for being overweight and overweight were 17.5% and 30%, respectively. There was no significant difference in the rate of being overweight across genders and ethnic groups. There are contrasting studies that show a prevalence of being overweight in males (Adams et al., 2008; Veugelers & Fitzgerald, 2005) and in females (Burke et al., 2005). Additionally, recent studies suggest a higher incidence of being overweight in minority adolescents (Ogden et al., 2008). The findings of this study may differ from

previous research since all the participants in this study came from one geographical location.

Similar to the findings of Bowman et al.'s (2004) study, adolescents in this study reported a high prevalence of fast food consumption across genders and ethnic groups. At pre-test, Minority adolescents and White adolescents in this study reported eating at fast food restaurants more than two times during the past week. Furthermore, at baseline, more males than females reported eating fast foods twice in the past week. Although males ate more often at fast food restaurants, females were more at risk for being overweight.

In this study, 47% of adolescents who were considered at risk for being overweight or overweight reported eating more than twice at a fast food restaurant in the past week at pre-test. This finding is consistent with findings from the CARDIA study, which found that young adults who were obese reported eating fast food more than twice a week (Pereira et al., 2005).

Similar to the findings of other researchers (Allen et al., 2007; French et al., 2001), adolescents in this study chose high-calorie and high-fat meals when selecting a typical meal from their favorite fast food restaurant. Additionally, participants in this study selected meals that had a high percentage of sodium and sugar. These findings suggest that fast food consumption is associated with poor diet quality in adolescents, as well as T2D and its associated risk factors, e.g., obesity. Efforts to promote strategies to improve food choices in the fast food environment and eventually reduce fast food consumption may help improve eating behaviors and reduce T2D risk among adolescents.

Hypothesis One: NEP vs. SEP on Non-nutritious Food

Although adolescents selected fewer non-nutritious foods after participating in a nutrition education program (NEP), this change was not significantly different from adolescents participating in a standard education program (SEP). These findings are similar to those of other researchers who found no difference in the dietary sodium and carbohydrates intake in a group of adolescents following an educational program (Allen et al., 2007). Perhaps the findings in this current study may be due, in part, to the length

of the educational program. This is thought to be a possibility since the adolescents who participated in the NEP showed a decrease in their selection of non-nutritious foods. The NEP may need to be longer, giving the adolescents a chance to assimilate the knowledge, commit to the behavior, and then apply it in a simulated setting. Another explanation for the finding may be that the use of a simulated fast food restaurant may have influenced the number of items adolescents selected, which may be different in a real life setting.

Hypothesis Two: Group I (NEP) vs. Group II (SEP) on Food Choices

There was no significant difference between Group I and Group II in the selection of foods based on number of calories, grams of fat, milligrams of sodium, or grams of sugar. Although no statistically significant differences were observed, adolescents who received an NEP selected lower dietary calories, fat, sodium, and sugar intake when compared to adolescents who received a SEP. Other researchers (Anderson et al., 2005) who have used similar interventions have found no significant differences in food selection between groups. Anderson and colleagues concluded that nutrition education improved knowledge of nutrition; however, it did not seem to greatly influence food choices. In contrast, Abood et al. (2004) found the nutrition education intervention used in their study had a positive effect on food choices among female athletes. The Health Promotion Model (Pender et al., 2002) suggests that characteristics, such as prior related behaviors, influence beliefs, feelings, and health-promoting behaviors. Given the difference in the findings among other researchers and in this current study, perhaps it would be important to determine the characteristics of the individuals and/or their motivations for making a change in their behavior toward their food choices.

Hypothesis Three: Interaction between Two Groups (NEP vs. SEP) and Time (pretest vs. posttest)

There was no significant interaction between group and time on food selection in the number of calories, grams of fat, milligrams of sodium, or grams of sugar measured at posttest.

One explanation of these findings may be in the timing of the post-test measurement. It is possible that the test was administered too soon after the completion

of the education program to observe changes in food choices. Perhaps, administering the post-test immediately following the education program and conducting a second follow-up test would capture any delayed retention or assimilation of knowledge.

Hypothesis Four: NEP vs. SEP on DSE

Findings indicate that adolescents at risk for T2D improved significantly more on DSE following the completion of an NEP compared to at risk adolescents in the control group. These findings are similar to those of Long and Stevens (2004), who tested the effects of a classroom and World Wide Web educational intervention on self-efficacy for healthy eating. Although Long and Stevens focused on healthy adolescents, it appears that a nutritional educational program has a similar effect on adolescents who are at risk for T2D.

Hypothesis Five: NEP on DSE

Results indicate that the NEP was effective at improving DSE levels in adolescents at risk for T2D. There was significant change across time, with subjects scoring significantly higher at the second measurement following an NEP than at the first measurement. These findings suggest that an NEP could be used to change DSE in adolescents at risk for T2D. This finding is interesting since the NEP did not make a difference in food selections in this study. The Health Promotion Model (Pender et al., 2002) indicates that the self-efficacy to enact a behavior increases the likelihood of a person's commitment to take action as well as actually enacting the behavior. Perhaps even though the adolescents' DSE improved it was still not a great enough improvement to influence their food choices in the simulated situation.

Hypothesis Six: Low Groups vs. High Groups on DSE

Although there were no differences between the groups on food choices (e.g., non-nutritious foods, number of calories, grams of fat, milligrams of sodium, grams of sugar), there was a strong association between DSE and Low calories and Low fat groups but no association between low sodium and low sugar. The finding of the association between calories and fats is similar to those of Cusatis and Shannon (1996) who found

high levels of self-efficacy for making specific, healthful food choices were associated with low consumption of high-fat foods. Likewise, researchers have shown that self-efficacy influences self-care behaviors in adolescents with T2D (Aljasem et al., 2001; Johnson-Brooks et al., 2002) and food choices in healthy adolescents (Edmundson et al., 1996). One possible explanation for the findings regarding low calories and low fats, in the context of the Health Promotion Model, may be that as the dietary self-efficacy of the adolescents increased and the perceived barriers of knowing the right foods to choose may have decreased. In addition, it is possible, that the adolescents had prior knowledge about calories and fats and were thus better able to integrate their new knowledge into their lessons regarding fats and calories. One consideration for future studies is to add a follow-up portion to evaluate the results of the program longitudinally with regard to DSE. According to the results of Anderson et al. (2005) who studied subjects with T2D, significant improvements in self-efficacy were maintained at six months and at one year.

There is no clear explanation for the finding of no association between DSE and low sodium and low sugar. When placed in the context of the Health Promotion Model, which states that perceived barriers to enacting a behavior can stifle a person's commitment to act as well as do the actual health-promoting behavior, perhaps one reason may be that adolescents see sugar and sodium as being a valued part of their lifestyles which in turns presents a barrier to wanting to reduce the sodium and sugar. Perhaps it would be important to know how adolescents perceive sodium and sugar as a part of their dietary habits.

LIMITATIONS

Limitations of this study include small sample size, geographical location, use of a simulated fast food setting, and lack of follow-up. The small sample size opens the study up to the possibility of a Type I error (i.e., rejecting the null hypothesis when it is really true) and the geographic location limits the generalizabilty to other ethnic minority population. Use of a simulated fast food setting limited the researcher's ability to measure the adolescents' actual fast food choices, which may be different in a real life setting.

STRENGTHS

Strengths of this study include the use of random assignment, both pre-test and post-test, and a control group. The researcher was able to assess change as an influence of treatment, measure the dependent variables, reduce the risk of selection bias, and control for maturation. By adhering to the random assignment of subjects to groups, it can be assumed that the two groups were essentially the same at the beginning of the study. In addition, random assignment reduced the risk of selection bias.

UNEXPECTED FINDINGS

One unexpected findings of the study was the number of adolescents who met the criteria for being at risk for T2D. Of the 59 adolescents who were screened for being at risk for T2D, only one adolescent was not considered to be at risk for T2D according American Diabetes Association and American Academy of Pediatric guidelines. There was a high prevalence of adolescents' who had above- normal BMIs and a family history of diabetes.

There were several remarkable consequences of this study. One, as a result of the screening, parents learned of their child's risk factors and sought medical attention. Two, eight adolescents were identified to have acanthosis nigricans; of the eight adolescents, only one was included in the study sample. This was due to random assignment and in part to adolescents dropping from study prior to intervention to seek medical attention. Three, the screening process and administration of the pretest facilitated the interaction between adolescents and the researcher during the education intervention. As a result of the interaction, adolescents actively participated in hands-on activities.

The final remarkable occurrence of this study is the change that occurred at a family level. The focus of change was expected at the individual level, but it also resulted in a family level of change. One participant verbalized to the researcher that his mother changed her way of preparing his favorite dish in a way that would reduce the fat content (i.e., removing skin from the chicken). Although this only represents one change, it gives hope that an outcome of the NEP may be that it can be used as a family intervention with clinical relevance.

CONCLUSIONS

Implications for Action

Findings from this study support the need for interventions that focus on improving DSE in adolescents at risk for T2D. As more fast food restaurants are built in and near schools, in addition to schools offering fast foods during schools and at school events, school nurses should partner with teachers to offer nutrition education to help adolescents identify healthful food choices for meals. However, schools are not the only place where adolescents consume fast food meals. Therefore, it is important to offer intervention programs in a larger community context.

Recommendations for Future Research

There are several recommendations for future studies. The first recommendation is to conduct the study using a larger sample size and to administer the intervention (NEP) over a longer time period. Increasing the sample size will decrease the likelihood of rejecting the null hypothesis of no differences between the NEP group and the SEP if the hypothesis is false. The benefit to offering the program over an extended time period is that participants may have the opportunity to practice setting goals as well as the chance to evaluate their results. The second recommendation is to study a family-centered approach to promote healthy eating behaviors. This approach is suggested because of the serendipitous finding that the parents made changes in their food preparation as a result of their child being involved in the study. It is this researcher's belief that T2D affects the entire family, and that all family members can benefit from interventions aimed at reducing preventable risk factors, particularly obesity. The third recommendation is to include a physical activity intervention in addition to the NEP. There is evidence that links sedentary lifestyle to obesity, a major risk factor for the development of T2D. Therefore, improving eating behaviors and increasing physical activity may substantially reduce the incidence of T2D in at risk adolescents.

Concluding Remarks

This study provided information on the effectiveness of an NEP on food choices for adolescents navigating the fast food environment. While the program did not make a difference in the food selected by adolescents, there was an improvement in DSE.

This study was the only one to this researcher's knowledge to examine the effectiveness of an NEP on food choices in the fast food environment in adolescents at risk for T2D. The researcher screened adolescents for T2D risk factors and randomly assigned participants to experimental groups. An NEP was implemented through a series of four sessions to the intervention group. While the adolescents who received an NEP demonstrated a greater reduction in the simulated dietary caloric intake, dietary fat intake, dietary sodium intake, and dietary sugar intake at post-test, there were non-significant differences between the groups. Statistical analysis also indicated a significant difference between the groups at post-test on DSE scores.

APPENDIX A: INVITATION LETTER

Your child is invited to participate in a research study titled, "*Short-term Effects of a Nutrition Education Program on Food Choices in Adolescents at Risk for Type 2 Diabetes,* under the direction of Melissa Ethington, RN, MSN who is a student in the Doctoral Nursing Program at UTMB's Graduate School of Biomedical Sciences (GSBS). This study is supervised by Dr. Alice S. Hill, RN, PhD, Professor at the School of Nursing and full member of the GSBS faculty. Ms. Ethington is conducting this study for her dissertation which is part of the Nursing PhD program.

The research study offers a nutrition education program. The goal of the program is to provide information that increases adolescents' ability to make good daily healthy choices regarding food selections. There are two different educational approaches that are being evaluated.

Your child will be randomly assigned to one of the two groups. One group will receive a tailored nutrition education program; and the other group will receive the current standard program on nutrition. We have no way of knowing to which group your child will be assigned. Participation in this study is strictly voluntary. If your child chooses to not participate in the study, she or he will attend regularly scheduled physical education class.

There are no physical risks. Your child may become fatigued during the nutrition education program or show signs of boredom. Your child's grades in school will not be affected by being in this research project or by *not* being in this research project. There are no procedures or treatments associated with this research project. A possible benefit of your child's participation in the program is that you child may learn how to make healthy food choices and to improve his/her eating habits.

Your child will not be paid to participate in this study. There will be no reimbursement of expenses for your child's participation in this study. In appreciation for the time and possible inconvenience associated with your child's participation, your child, at each session, will have the opportunity to win door prizes. And at the end of the study, if your child completes all sessions he or she will be given a Wal-Mart gift card of $20 as a token of thanks for their participation.

If you agree to allow your child to participate in this project, and your child agrees to participate, please read and sign the parental consent form and have your child sign the assent form. Have your child return the forms to his or her health education teacher.

The Institutional Review Board at UTMB has approved this study. Their guidelines for the protection of human subjects will be followed at all times. If you have any questions, please contact Melissa Ethington at mdethington@aol.com or 409-658-6216. Your emails and voicemail messages will be returned as soon as possible.

Thank you,

Melissa Ethington

APPENDIX B: PARENTAL PERMISSION (CONSENT)

PARENTAL PERMISSION FOR A CHILD TO PARTICIPATE IN RESEARCH

You are being asked to give permission for your child to participate as a subject in the research project entitled, "Short-term Effects of a Nutrition Education Program on Food Choices in Adolescents at Risk Type 2 Diabetes (T2D)," under the direction of Melissa Ethington, RN, MSN who is a student in the Doctoral Nursing Program at UTMB's Graduate School of Biomedical Sciences (GSBS). This project is supervised by Dr. Alice S. Hill, RN, PhD, Professor at the School of Nursing and full member of the GSBS faculty. There is no sponsor for this study. Ms. Ethington is not receiving funding in any form from any source to conduct this dissertation project. It is part of her Doctoral Nursing degree program.

PURPOSE OF THE STUDY

The purposes of this study are to determine the short-term effects of a nutrition education program (NEP) on food choices of adolescents at risk for type 2 diabetes, and determine whether there is an association between dietary self-efficacy and type 2 diabetes risk factors. You are being asked to give permission for your child to participate in the study because he or she is between the ages of 11 and 15 and may be at risk for the development of type 2 diabetes.

PROCEDURES RELATED ONLY TO THE RESEARCH

Prior to random group assignment, Ms. Ethington will measure your child's height, weight, and blood pressure. Your child also will be screened for acanthosis nigricans, a skin condition or "skin marker" around the neck that can signal high insulin levels in the body. Acanthosis nigricans can help identify adolescents who are at risk for developing type 2 diabetes in the future.

The screening will be conducted in a matter to ensure confidentiality and provide privacy for your child.

Once all the demographics are obtained and measurements are taken on all students, then the students who are at risk for T2D will be identified based on these measurements. After the groups are defined, the participants will be separated into groups and asked to select a typical meal from their favorite fast food restaurant menu using the interactive CD (*Fast Food and Families: Making Good Choices for Better Health*).

After completion of the typical meal selection group one will receive current standard nutrition education for T2D (one, 45 minute session), and group two will receive a tailored NEP consisting of 4 sessions (45 minutes each) over a 2-week period. These sessions will focus on everyday experiences which adolescents encounter, and on how to

improve nutrition-related decisions such as selecting foods low in calories, fat, and added sugar.

Upon completion of the education sessions your child will be asked to complete three health behavior questionnaires, *Dietary self-efficacy for low fat and sodium*, *the Fruit-Vegetable Consumption SE scale, and Frequency of eating at fast food restaurants;* and asked to select a typical meal from their favorite fast food restaurant menu using the interactive CD. Your child will be asked to complete a form which will ask information about his or her age, gender, educational level, family history of Type 2 Diabetes. This questionnaire will also be coded so that no identifying information can be associated with you or your child.

RISKS OF PARTICIPATION

The potential risks from participation in the study are thought to be minimal. Your child may become fatigued during the nutrition education program or show signs of boredom. Your child's grades in school will not be affected by being in this research project or by *not* being in this research project. There are no procedures or treatments associated with this research project. Ms. Ethington will take all possible steps to assure your child's confidentiality by coding study data and removing your child's name and other identifiers from study materials. However, there remains a minimal risk of the loss of confidentiality.

NUMBER OF SUBJECTS PARTICIPATING AND THE DURATION OF YOUR CHIILD'S PARTICIPATION

The anticipated number of subjects involved in the study is 40. All will be recruited from two Southeast Texas charter schools. The length of time of your child's participation will vary according to study group (one or two) your child is assigned. If your child is assigned to the nutrition education group, he or she will have 4 educational sessions that will last a maximum of 45 minutes each. Each 45 minute session will be held twice a week for two weeks for a total of 4 days. If your child is assigned to the traditional educational group, he or she will have one educational session that will last for a maximum 45 minutes. While this study will go on for approximately 2 months, your child's participation as an individual will last approximately 2 weeks. The sessions will be conducted at your child's school during the regularly scheduled physical education class time. This study will begin in May 2009 and will be completed by June 2009. While this study will go on for approximately 2 months, your child's participation as an individual will last over approximately 2 weeks.

BENEFITS TO THE SUBJECT

There are no direct benefits to your child for his or her participation in this research project. By participating in this Nutrition education project, your child may gain some

insight into how to make healthy food choices for promoting a healthy lifestyle in his or her life.

BENEFITS TO SOCIETY

There are no direct benefits to your child for his or her participation in this research project. However, by serving as a participant, your child may help us learn more about how to help adolescents at risk for type 2 diabetes improve eating behavior in the future.

OTHER CHOICES (ALTERNATIVE TREATMENT)

There are no treatments in this study. Your child will attend Nutrition education sessions. The alternative to participating in this study is for your child to choose not to participate, and attend his/her regularly schedule physical education class. Your child's participation in this study is voluntary and not required.

REIMBURSEMENT FOR EXPENSES

There will be no reimbursement of expenses for your child's participation in this study. In appreciation for the time and possible inconvenience associated with your child's participation, a twenty dollar ($20.00) gift card for Wal-mart retail store will be presented to your child at the completion of the study. Additionally, your child will have the opportunity to win door prizes at each session.

COMPENSATION FOR RESEARCH RELATED INJURY

There are no treatments or substances given to your child as part of this study's procedures. This is a study that only involves participating in an education program conducted by the researcher. The likelihood of your child sustaining any type of physical injury because of his or her participation is extremely rare. However, if your child is physically injured in any way because of his/her participation in this study, UTMB will provide your child with the appropriate medical treatment not covered by your own insurance or health care program at no cost to you to the fullest extent permitted by Texas law. You will be responsible for paying any costs related to illnesses and medical events not associated with being in this study. No other forms of compensation are available. However, you and your child are not waiving any of your legal rights by participating in this study.

COSTS OF PARTICIPATION

There will be no cost to you or your child for participation in this study.

REASONS FOR THE STUDY INVESTIGATOR TO STOP YOUR CHILD'S PARTICIPATION

Your child may be dropped from the study by the study investigator if the study is discontinued or if your child changes his or her mind about participating after consent is given. If this is the case, Ms. Ethington will contact you and explain the situation.

PROCEDURES FOR WITHDRAWAL

If at any time your child wishes to stop his or her participation in this study, simply contact Ms. Ethington at the numbers provided at the end of this consent form. Upon learning of your child's request, his or her participation will be ended.

USE AND DISCLOSURE OF YOUR HEALTH INFORMATION

Even though in this intervention study no health information is accessed, collected, or used, you must know that all study records that identify your child will be kept confidential as required by law. Federal privacy regulations provided under the Health Insurance Portability and Accountability Act (HIPPA) provide safeguards for privacy, security, and authorized access to your child's records. These regulations require UTMB to obtain authorization from you and your child if it or anyone employed there attempts to use and disclose your health information. By signing this consent form, you are agreeing to your child's participation in this study. You are not authorizing the use and disclosure of your child's health information related to this research study.

Except when required by law, your child will not be identified by name, social security number, address, telephone number, or any other direct personal identifier in this study's records. However, you do need to know that study records will be coded without your child's name and be kept confidential as required by law. Your child will not be identified by name in study records. A code number will be assigned to your child and only Ms. Ethington will know that number. The key to the code will be kept in a locked file in Ms. Ethington's office.

There are no sponsors for this research. Ms. Ethington is conducting this study under the supervision of her faculty advisor, Dr. Hill, and the members of her supervisory committee to complete her requirements for dissertation in the doctoral program. The study data, responses on your child's questionnaire(s), will not be linked to him or her as an individual. Instead, the data your child provides will be put together with data from all other participants and reported as a group.

If you sign this form, you are giving Ms. Ethington permission to collect, use and share the information your child provides screening with the dissertation committee. Your child's health information is not part of this study and you will not be asked about it nor will it be assessed. You do not need to sign this form. If you decide not to sign this form, your child cannot be in the research study. Whether or not you agree to your child's participation in this research project or give us permission to collect will not affect the care your child's school activities.

Your child's questionnaire information, without his/her name on it, may be reviewed by Dr. Alice Hill, for purposes of assisting Ms. Ethington with learning to understand the data analysis process. If for any reason your child wants to stop his or her participation in this study, he or she can at any time. However, you or your child needs to inform Ms. Ethington at the contact numbers listed in this consent form. Your child needs to say that he or she has changed his or her mind and does not wish to continue participating in this study. At that time and thereafter, Ms. Ethington may not collect any additional information from your child. However, she may use the information that she has already collected. The results of this study may be published in scientific journals and presented as poster sessions without identifying your child by name.

ADDITIONAL INFORMATION

1. An offer has been made to answer any questions that you and your child may have about these procedures. If you have any questions before, during or after the study, or if you need to report a research related injury, you should immediately contact Ms. Ethington, RN, MSN at (409) 658-6216 or Dr. Alice Hill at (409) 772-8251.

2. Your permission for your child's participation in this study is completely voluntary and you have been told that you may refuse to give permission or stop your child's participation in this project at any time without penalty or loss of benefits and without jeopardizing your child's medical care at UTMB. If you decide to stop your child's participation in this project and revoke your authorization for the use and disclosure of your child's screening and education sessions, UTMB may still need to comply with Federal regulations and disclose your child's health information in some instances. This would include any information that was used or disclosed prior to your decision to stop your child's participation and needed in order to maintain the integrity of the research study. If we get any information that might change your mind about allowing your child to participate, we will give you the information and allow you to reconsider whether or not to continue allowing your child to participate in the study.

3. If you have any questions regarding your child's rights as a subject participating in this study, you may contact Dr. Wayne R. Patterson, Senior Assistant Vice President for Research, Institutional Review Board, at (409) 266-9475.

4. Your child has had the risks and benefits of the research explained to him/her in a language that he/she can understand and agreed to participate in this research.

The purpose of this study, procedures to be followed, risks and benefits have been explained to you. You have been allowed to ask questions and your questions have been answered to your satisfaction. You have been told who to contact if you have additional questions. You have read this consent form and voluntarily agree to participate as a subject in this study. You are free to withdraw your consent, including your authorization for the use and disclosure of your health information, at any time. You may withdraw your consent by notifying Melissa Ethington, RN, MSN at (409) 658-6216 or Dr. Alice Hill at (409) 772-8251. You will be given a copy of the consent form you have signed.

Signature of Parent	Date
Signature of Parent	Date
Signature of Witness	Date

Using language that is understandable and appropriate, I have discussed this project and the items listed above with the parents of the child that will participate in the research.

Date	Signature of Person Obtaining Consent

APPENDIX C: CHILD ASSENT FORMS

Child Assent Form A
For Participation in Research

You are being asked to be in a research study because you are an adolescent between the ages of 11 to 15 years old. For this study, Melissa Ethington, RN, MSN who is in a doctoral program at The University Texas Medical Branch is doing research on adolescents at risk for Type 2 Diabetes. The title of the research study is Short-term Effects of a Nutrition Education Program on Food Choices in adolescents at Risk for Type 2 Diabetes.

Purpose

The purposes of this study are to determine the short-term effects of a nutrition education program on food choices of adolescents at risk for type 2 diabetes, and to determine whether there is an association between dietary self-efficacy and type 2 diabetes risk factors.

Description of the Study

This study requires participation in a nutrition education program. You will be asked to complete a three health behavior questionnaires at the beginning and at completion of the study. Ms. Ethington will also measure your height, weight, blood pressure and check your skin for thickening and darkness in the area of your neck. Your information will be keep confidential. You will be randomly assigned to one of two groups. We have no way of knowing to which group you will be assigned. Group One will receive the current standard nutrition education, one 45 minute session. Group two will receive 4 sessions, 45 minutes each. The education sessions will take place in your school during your physical education class. Each session will last no longer than 45 minutes. The total number of sessions is determined by your group assignment. The education intervention will last 2 weeks. You will have 2 classes each week.

In addition to completing health behavior questionnaires, you will be asked to answer several questions about your age, gender, educational level, and family history of Type 2 Diabetes.

Risks

You may become tired during the educational sessions. If you get tired, you will be allowed to take a break. There are no procedures or treatments associated with this research project. Ms. Ethington will take all possible steps to assure your confidentiality by coding study data and removing your name and other identifiers from study materials. However, there remains a minimal risk of the loss of confidentiality.

Your name or identifying information will not be used.

Benefits

There are no direct benefits to you for your participation in this research project. By participating in the program, you may gain some insight into how to make healthy food choices to promote healthy eating behavior.

BENEFITS TO SOCIETY

Although there are no direct benefits to you for your participation in this research project, by serving as a participant, you may help us learn more about how to help adolescents to improve their eating habits.

REIMBURSEMENT FOR EXPENSES

There will be no reimbursement of expenses for your participation in this study. In appreciation for the time and possible inconvenience associated with your participation, you will have the opportunity to win door prizes at each session. And at the end of the study, a twenty dollar ($20.00) gift card for Wal-mart retail store will be presented to you for participating in all your group assigned sessions.

Other Choices

If you do not want to participate, you do not have to participate. It is entirely up to you whether or not to take part in this research study. I will be discussing this with your parents too. Your parents are not allowed to have you participate unless you agree.

Your grades in school will not be affected by being in this research project or by *not* being in this research project. If you do not wish to participate, you will attend regularly scheduled physical education class.

If you have any questions before, during or after the study, or if you need to report a research related injury, you should immediately contact Ms. Ethington, RN, MSN at (409) 658-6216 or Dr. Alice Hill at (409) 772- 8251.

I agree to take part in the study.

Child's Name	Signature (If age 12-17)	Date
Name of Investigator/Designee	Signature	Date
Name of Witness*	Signature	Date

*Witness is attesting to the fact that the child agreed to participate in the research. This applies to children ages 7-17 years.

Child Assent Form B (if age 11)
For Participation in Research

You are being asked to be in a research study because you are an adolescent between the ages of 11 to 15 years old. For this study, Melissa Ethington, RN, MSN who is in a doctoral program at The University Texas Medical Branch is doing research on adolescents at risk for Type 2 Diabetes. The title of the research study is Short-term Effects of a Nutrition Education Program on Food Choices in adolescents at Risk for Type 2 Diabetes.

Purpose

The purposes of this study is to determine the short-term effect of a nutrition education program on food choices of adolescents at risk for type 2 diabetes, and to determine whether there is an association between dietary self-efficacy and type 2 diabetes risk factors.

Description of the Study

This study requires participation in a nutrition education program. You will be asked to complete a three health behavior questionnaires at the beginning and at completion of the study. Ms. Ethington will also measure your height, weight, blood pressure and check your skin for thickening and darkness in the area of your neck. Your information will be keep confidential. You will be randomly assigned to one of two groups. We have no way of knowing to which group you will be assigned. One group will receive the current standard nutrition education, one 45 minute session. Group two will receive 4 sessions, 45 minutes each. The education sessions will take place in your school during your physical education class. Each session will last no longer than 45 minutes. The total number of sessions is determined by your group assignment. The education intervention will last 2 weeks. You will have 2 classes each week.

In addition to completing health behavior questionnaires, you will be asked to answer several questions about your age, gender, educational level, and family history of Type 2 Diabetes.

Risks

You may become tired during the educational sessions. If you get tired, you will be allowed to take a break. There are no procedures or treatments associated with this research project. Ms. Ethington will take all possible steps to assure your confidentiality by coding study data and removing your name and other identifiers from study materials. However, there remains a minimal risk of the loss of confidentiality.

Your name or identifying information will not be used.

Benefits

There are no direct benefits to you for your participation in this research project. By participating in the program, you may gain some insight into how to make healthy food choices to promote healthy eating behavior.

BENEFITS TO SOCIETY

Although there are no direct benefits to you for your participation in this research project, by serving as a participant, you may help us learn more about how to help adolescents to improve their eating habits.

REIMBURSEMENT FOR EXPENSES

There will be no reimbursement of expenses for your participation in this study. In appreciation for the time and possible inconvenience associated with your participation, you will have the opportunity to win door prizes at each session. And at the end of the study, a twenty dollar ($20.00) gift card for Wal-mart retail store will be presented to you for participating in all your group assigned sessions.

Other Choices

If you do not want to participate, you do not have to participate. It is entirely up to you whether or not to take part in this research study. I will be discussing this with your parents too. Your parents are not allowed to have you participate unless you agree.

Your grades in school will not be affected by being in this research project or by *not* being in this research project. If you do not wish to participate, you will attend regularly scheduled physical education class.

If you have any questions before, during or after the study, or if you need to report a research related injury, you should immediately contact Ms. Ethington, RN, MSN at (409) 658-6216 or Dr. Alice Hill at (409) 772-8251.

I agree to take part in the study.

Child's Name	Signature (If age 11)	Date
Name of Investigator/Designee	Signature	Date
Name of Witness*	Signature	Date

*Witness is attesting to the fact that the child agreed to participate in the research. This applies to children ages 7-17 years.

APPENDIX D: DEMOGRAPHIC DATA

DEMOGRAPHIC

Name of School _____ ID Code _____

1. What grade are you in? _____
2. How old are you? _____ years old
3. Are you a boy or a girl?
   □Boy
   □Girl
4. How do you describe yourself?
   □ WHITE, Non-Hispanic/ Caucasian
   □ BLACK, Non-Hispanic / African-American
   □ HISPANIC, Non-White
   □ ASIAN or PACIFIC ISLANDER
   □ AMERICAN INDIAN or ALASKAN NATIVE

APPENDIX E: TYPE 2 DIABETES RISK SCREENING (SCREENING FORM)

TYPE 2 DIABETES RISK SCREENING

Data Analysis Code _____ Date of Screening _____

Name of School _____ Current Grade _____

Age_____ Date of Birth _____ Gender □Male □Female

Height _____cm Weight _____Kg BMI _____percentile

Blood Pressure _____/_____ mmHg Race/Ethnicity _____

Acanthosis Nigricans Results: □Negative □Positive Degree AN _____

The following measurements are used to determine degree of AN of the neck:
0. Negative AN
1. Degree 1 AN is a line
2. Degree 2 AN is 1 to 2 cm
3. Degree 3 AN is 2 to 3 cm
4. Degree 4 AN is greater than 3 cm

History of Type 2 Diabetes:

No	Yes	
□	□	Has a doctor ever told you that have Type 2 Diabetes?
No	Yes	
□	□	Has a doctor ever told anyone in your family they have Type 2 Diabetes?

Which family member(s) was/were told they have Type 2 Diabetes?

First-degree relatives:
- Mother
- Father
- Brother
- Sister

Second-degree relatives:
- Grandmother
- Grandfather
- Aunt
- Uncle
- Niece
- Nephew
- Half-sibling

Categorized as "at risk for T2D:
□ No □ Yes

Randomly assigned to:
□ Treatment □ Control

APPENDIX F: ACANTHOSIS NIGRICANS PARENTAL REFERRAL LETTER (REFERRAL LETTER)

To: Parents of_____ Date _____

School _____ Grade _____

Re: Acanthosis Nigricans Screening Results

Recently, as part of the research study titled *Short-term Effects of a Nutrition Education Program on Food Choices in Adolescents at Risk for Type 2 Diabetes*, your child was screened for Acanthosis Nigricans. This is a skin condition that can signal high insulin levels in the body. Acanthosis Nigricans can help identify children who are at risk of developing diabetes in the future.

The results of your child's screening are recorded below.

Acanthosis Nigricans Grade 0 1 2 3 4

Height (inches)_____ Weight (pounds) _____

Blood pressure _____/_____mmHg BMI _____

Please take this sheet with you when you consult your child's health care provider.

Thanks for your cooperation in this matter.

_____
Melissa D. Ethington, MSN, RN
Doctoral Nursing Student
University of Texas Medical Branch
Graduate School of Biomedical Sciences

APPENDIX G: BLOOD PRESSURE PARENTAL REFERRAL LETTER (REFERRAL LETTER)

To: Parents of_____ Date _____

School _____ Grade _____

Re: Blood Pressure Screening Results

Recently, as part of the research study titled *Short-term Effects of a Nutrition Education Program on Food Choices in Adolescents at Risk for Type 2 Diabetes*, your child was screened for high blood pressure. High blood pressure means that there is higher than normal pressure inside the arteries either during systole (when the heart contracts and pumps blood through the body), or during diastole (when the heart is at rest and is filling with blood.). High blood pressure is also called hypertension. Blood pressure can be affected by many factors, including, but not limited to, the following: time of the day, physical activity, age and gender, or illness.

The results of your child's screening are recorded below.

Acanthosis Nigricans Grade 0 1 2 3 4

Height (inches) _____ Weight (pounds) _____

Blood pressure _____/_____mmHg BMI _____

Please take this sheet with you when you consult your child's health care provider.

Thanks for your cooperation in this matter.

_____
Melissa D. Ethington, MSN, RN
Doctoral Nursing Student
University of Texas Medical Branch
Graduate School of Biomedical Sciences

APPENDIX H: CATCH HEALTH BEHAVIOR QUESTIONNAIRE SECTION I: HOW SURE ARE YOU? (DIETARY SELF-EFFICACY FOR LOW FAT AND SODIUM)

CATCH - Health Behavior Questionnaire

SECTION I: HOW SURE ARE YOU?

INSTRUCTIONS: The questions in this section ask how sure you are about being able to eat some of the foods below. Please answer by circling either Not Sure, A Little Sure, or Very Sure for each question.

1. How sure are you that you can eat food **without adding salt from a shaker?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
2. How sure are you that you can eat **fresh or frozen vegetables instead of canned vegetables?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
3. How sure are you that you can ask your parents for **popcorn without salt and butter?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
4. How sure are you that you can ask for **lettuce and tomato instead of pickles on your hamburger?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
5. How sure are you that you can drink **low fatwhite milk instead of regular white milk?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
6. How sure are you that you can eat **cereal instead of a donut?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
7. How sure are you that you can eat **fresh fruit instead of a candy bar?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
8. How sure are you that you can eat **toast with margarine instead of real butter?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
9. How sure are you that **you can take the skin off of chicken (and not eat the skin)**?	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
10. How sure are you that you can ask for **frozen yogurt instead of ice cream?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE

11. How sure are you that you can ask your parents to buy **bread sticks instead of salted crackers?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
12. How sure are you that you can eat a **baked potato instead of french fries?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
13. How sure are you that you can drink **fruit juice instead of a soft drink (soda pop)?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
14. How sure are you that you can eat **cooked vegetables without adding real butter to them?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE
15. How sure are you that you can eat a **salad from the salad bar at a fast food restaurant instead of ordering a hamburger and fries?**	1. NOT SURE	2. A LITTLE SURE	3. VERY SURE

STOP HERE

ID Code _____

"SECTION I: HOW SURE ARE YOU?" is open accessed; in addition retyped and used with permission of Parcel, G.

APPENDIX I: I AM CONFIDENT
(FRUIT-VEGETABLE CONSUMPTION SELF-EFFICACY SCALE)

I AM CONFIDENT

Instructions: The following group of questions asks you your own feelings about fruits and vegetables you may eat. Please respond if you do not eat fruits and vegetables. If you never eat fruits and vegetables, indicate how you think you would feel if you did eat them. Circle the answer for each question that best describes how you feel.

1. I am confident I could **purchase only fruits and vegetables in a grocery store without feeling embarrassed.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

2. I am confident that I could **remember to bring fruits and vegetables with me to school for a snack.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

3. I am confident in my ability to **suggest to a friend that they eat more fruits and vegetables.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

4. I am confident in my ability to **persuade a friend to eat fruits and vegetables when we are choosing foods in the school cafeteria.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

5. I am confident in my ability to **eat fruits and vegetables at social events such as parties.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

Fruit and Vegetable Consumption Self-efficacy Scale (Retyped Spring 2009 with permission Thombs, D)

6. I am confident I could **eat lots of fruits and vegetables without looking like a "nutrition freak".**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

7. I am confident that I would **remember to eat fruits and vegetables even if I weren't eating with my parents.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

8. I am confident that I could **enjoy eating lots of fruits and vegetables.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

9. I am confident that I could **eat fruits and vegetables even if no one else at the lunch table was doing so.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

10. I am confident I could **eat fruits and vegetables during a meal at home.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

11. I am confident that I can **increase the number of servings of fruits and vegetables I eat each day.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

ID Code _____

Fruit and Vegetable Consumption Self-efficacy Scale (Retyped Spring 2009 with permission Thombs, D)

12. I am confident that I can **prepare food like fruits and vegetables without adding a lot of fat to them.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

13. I am confident that I could **eat lots of fruits and vegetables even if I had braces.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

14. I am confident that I could **eat fruits and vegetables at school if they look appealing.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

15. I am confident that I could **suggest eating fruits and vegetables to others and at the same time not feel ignorant about healthy eating habits.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

ID Code _____

Fruit and Vegetable Consumption Self-efficacy Scale (Retyped Spring 2009 with permission Thombs, D)

APPENDIX J: FAST FOOD FREQUENCY ITEM

FREQUENCY OF EATING AT FAST FOOD RESTAURANTS

'In the past week, how often did you eat at fast food restaurants, such as McDonalds®, Pizza Hut®, Taco Bell®, Chic-Fil-A®, or fast Chinese restaurants?'

1. ☐ never
2. ☐ 1-2 times
3. ☐ 3-4 times
4. ☐ 5-6 times
5. ☐ 7 times
6. ☐ more than 7 times

ID Code _____

EAT Survey Item-2002 (retype and used with permission of Dr. Dianne Neumark-Sztainer)

APPENDIX K: EDUCATION CURRICULUM OUTLINE

Short-term Effects of A Nutrition Education Program on Food Choices in Adolescents at Risk for Type 2 Diabetes

Nutrition Education Program (Intervention Group)

Session	Topic	Content/Material
Session 1 (Time: 45 minutes)	General nutrition Food labels	Content material will be delivered in lecture/discussion and hands-on activities. All participants will receive handout materials. ○ Review the nutrition recommendations ○ Review facts about diabetes, fats, sodium ○ Activity 5: Reading Food Labels ▪ Handout ▪ Hands-on
Session 2 (Time: 45 minutes)	Food labels (continue)	○ Activity 5: Reading Food Labels (from session 1) ▪ Handout ▪ Hands-on
	Sugars in food	○ Activity 2: The Low-Down on Sugar ▪ Handout ▪ Hands-on
Session 3 (Time: 45 minutes)	Fat in foods Fat in fast foods	○ Activities 3: The Low-Down on Fat ○ Activities 4: Eating on the Run ▪ Handout ▪ Hands-on ○ Making Fast Food Choices ▪ Food cards
Session 4 (Time: 45 minutes)	Making better snack choices	○ Activities 6: My Snack Options ▪ Discussion ▪ Handout ○ Fruit and Vegetable Serving Size ▪ Handout

Short-term Effects of A Nutrition Education Program on Food Choices in Adolescents at Risk for Type 2 Diabetes

Standard Education Program (Control Group)

Session	Topic	Content/Material
Session 1 (Time: 45 minutes)	General nutrition Food labels	Education content will be delivered in lecture/discussion format. Hands-on activities will not be implemented. All participants will receive handout materials. ○ Review the nutrition recommendations ○ Review facts about diabetes, fats, sodium
	Sugars in food	○ Activity 5: Reading Food Labels ▪ Handout ○ Activity 2: The Low-Down on Sugar ▪ Handout
	Fat in foods Fat in fast foods	○ Activities 3: The Low-Down on Fat ○ Activities 4: Eating on the Run ▪ Handout
	Making better snack choices	○ Activities 6: My Snack Options ▪ Discussion ▪ Handout ○ Fruit and Vegetable Serving Size

APPENDIX L: EDUCATION SESSIONS

Content for the education sessions is from The *Empowering Youth with Nutrition and Physical Activity.* The curriculum is a published document posted on the USDA Resource Library. It is open access with permission to use, as indicated by the following statement. “Content of material may be downloaded materials from TEAM Nutrition website.”

Nutrition Education Program Session 1

2005 Dietary Guidelines for Americans

The *2005 Dietary Guidelines for Americans* give science-based advice on food and physical activity choices for health. Its recommendations are for the general public over 2 years of age. To see the full 80-page *Dietary Guidelines* report, go to www.healthierus.gov/dietaryguidelines. Key concepts from the *Dietary Guidelines* are described below.

Finding Your Way to a Healthier You

Adapted from *2005 Dietary Guidelines for Americans*

Feel better today. Stay healthy for tomorrow.

Here's how: The food and physical activity choices you make every day affect your health—how you feel today, tomorrow, and in the future. The science-based advice of the *Dietary Guidelines for Americans 2005* highlights how to:

- Make smart choices from every food group.
- Find your balance between food and physical activity.
- Get the most nutrition out of your calories.

You may be eating plenty of food, but not eating the right foods that give your body the nutrients you need to be healthy. You may not be getting enough physical activity to stay fit and burn those extra calories.

Eating right and being physically active aren't just a "diet" or a "program" – they are keys to a healthy lifestyle. With healthful habits, you may reduce your risk of many chronic diseases such as heart disease, diabetes, osteoporosis, and certain cancers, and increase your chances for a longer life.

Make smart choices from every food group.

The best way to give your body the balanced nutrition it needs is by eating a variety of nutrient-packed foods every day. Just be sure to stay within your calorie needs.

A healthy eating plan is one that:

- Emphasizes fruits, vegetables, whole grains, and fat-free or lowfat milk and milk products.

- Includes lean meats, poultry, fish, beans, eggs, and nuts.
- Is low in saturated fats, *trans* fats, cholesterol, salt (sodium), and added sugars.

Don't give in when you eat out and are on the go.
It's important to make smart food choices and watch portion sizes wherever you are - at the grocery store, at work, in your favorite restaurant, or running errands. Try these tips:

- At the store, plan ahead by buying a variety of nutrient-rich foods for meals and snacks throughout the week.
- When grabbing lunch, have a sandwich on whole-grain bread and choose lowfat/fat-free milk, water, or other drinks without added sugars.
- In a restaurant, opt for steamed, grilled, or broiled dishes instead of those that are fried or sautéed.
- On a long commute or shopping trip, pack some fresh fruit, cut-up vegetables, string cheese sticks, or a handful of unsalted nuts to help you avoid impulsive, less healthful snack choices.

Mix up your choices within each food group.

Focus on fruits. Eat a variety of fruits—whether fresh, frozen, canned, or dried—rather than fruit juice for most of your fruit choices. For a 2,000- calorie diet, you will need 2 cups of fruit each day (for example, 1 small banana, 1 large orange, and ¼ cup of dried apricots or peaches).

Vary your veggies. Eat more dark-green veggies, such as broccoli, kale, and other dark leafy greens; orange veggies, such as carrots, sweet potatoes, pumpkin, and winter squash; and beans and peas, such as pinto beans, kidney beans, black beans, garbanzo beans, split peas, and lentils.

Make half your grains whole. Eat at least 3 ounces of whole-grain cereals, breads, crackers, rice, or pasta every day. One ounce is about 1 slice of bread, 1 cup of breakfast cereal, or ½ cup of cooked rice or pasta. Look to see that grains such as wheat, oats, or corn are referred to as "whole" in the list of ingredients.

Get your calcium-rich foods. Get 3 cups of lowfat or fat-free milk—or an equivalent amount of lowfat yogurt and/or lowfat cheese (1½ ounces

of cheese equals 1 cup of milk)—every day. For kids aged 2 to 8, it's 2 cups of milk. If you don't or can't consume milk, choose lactose-free milk products and/or calcium-fortified foods and beverages.

Go lean with protein. Choose lean meats and poultry. Bake it, broil it, or grill it. And vary your protein choices—with more fish, beans, peas, nuts, and seeds.

Know the limits on fats, salt, and sugars. Read the Nutrition Facts label on foods. Look for foods low in saturated fats and *trans* fats. Choose and prepare foods and beverages with little salt (sodium) and/or added sugars (caloric sweeteners).

Find your balance between food and physical activity.
Becoming a healthier you isn't just about eating healthy—it's also about physical activity. Regular physical activity is important for your overall health and fitness. It also helps you control body weight by balancing the calories you take in as food with the calories you expend each day.

- Adults should be physically active for at least 30 minutes most days of the week.
- Increasing the intensity or the time that you are physically active can have even greater health benefits and may be needed to control body weight. About 60 minutes a day may be needed to prevent weight gain.
- Children and teenagers should be physically active for 60 minutes every day, or most every day.

Get the most nutrition out of your calories.
There is a right number of calories for you to eat each day. This number depends on your age, activity level, and whether you're trying to gain, maintain, or lose weight. (2,000 calories is the value used as a general reference on the food label. But you can calculate your number at MyPyramid.gov.) You could use up the entire amount on a few high- calorie items, but chances are you won't get the full range of vitamins and other nutrients your body needs to be healthy.

Choose the most nutritionally-rich foods you can from each food group each day—those packed with vitamins, minerals, fiber, and other nutrients but lower in calories. Pick foods like fruits, vegetables, whole grains, and fat-free or lowfat milk products more often.

Nutrition: To know the facts…use the label.

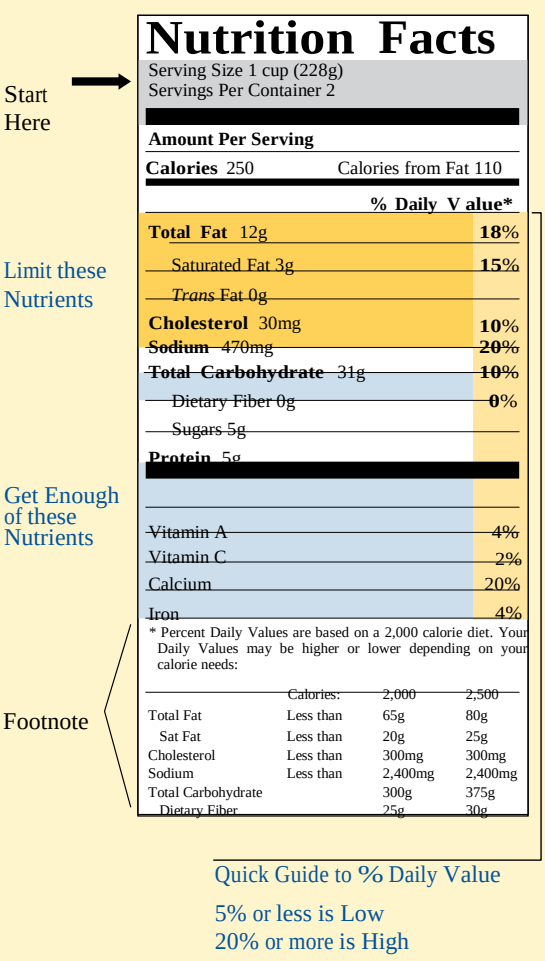
Most packaged foods have a Nutrition Facts label. For a healthier you, use this tool to make smart food choices quickly and easily. Try these tips:

- Keep these low: saturated fats, *trans* fats, cholesterol, and sodium.
- Get enough of these: potassium, fiber, vitamins A and C, calcium, and iron.
- Use the % Daily Value (DV) column when possible: 5% DV or less is low, 20% DV or more is high.

Check servings and calories.
Look at the serving size and how many servings you are actually consuming. If you double the servings you eat, you double the calories and nutrients, including the % DVs.

Make your calories count.
Look at the calories on the label and compare them with what nutrients you are also getting to decide whether the food is worth eating. When one serving of a single food item has over 400 calories per serving, it is high in calories.

HOW TO READ A NUTRITION FACTS LABEL



Don't sugarcoat it.
Since sugars contribute calories with few, if any, nutrients, look for foods and beverages low in added sugars. Read the ingredient list and make sure that added sugars are not one of the first few ingredients. Some names for added sugars (caloric sweeteners) include sucrose, glucose, high fructose corn syrup, corn syrup, maple syrup, and fructose.

Know your fats. Look for foods low in saturated fats, *trans* fats, and cholesterol to help reduce the risk of heart disease. Most of the fats you eat should be polyunsaturated and monounsaturated fats. Keep total fat intake between 20 and 35 percent of calories.

Reduce sodium (salt), increase potassium. Research shows that eating less than 2,300 milligrams of sodium (about 1 tsp of salt) per day may reduce the risk of high blood pressure. Most of the sodium people eat comes from processed foods, not from the saltshaker. Also look for foods high in potassium, which counteracts some of sodium's effects on blood pressure.

Facts About Diabetes

Did you know?

- Diabetes is the sixth leading cause of death in the United States.
- Diabetes is a chronic disease for which there is no cure. Altogether, diabetes contributed to 213,000 deaths in 2000.
- Approximately 20.8 million or 7% of all Americans have diabetes, however one-third of them do not know they have it.
- Each year more than 82,000 amputations are performed on Americans with diabetes.
- Ten to 21 percent of all people with diabetes develop kidney disease.
- The prevalence of type 2 diabetes is on the rise among adolescents. Studies indicate that type 2 diabetes is becoming more common among Native American, African-American, and Hispanic children and adolescents.

What is diabetes?

Diabetes occurs when the body is unable to transport sugar from the blood into the cells in the body. Left untreated, diabetes can lead to blindness, kidney failure, and nerve damage in the feet and the legs.

What are the two types of diabetes?

1. Type 1 diabetes occurs when the body is unable to produce insulin (the hormone that transports sugar from the blood into cells). Type 1 diabetes usually develops in childhood, and its cause is not entirely understood. Some scientists have linked it to both genetic and environmental components.
2. Type 2 diabetes occurs when there is a decrease in the cells' sensitivity to insulin. It usually occurs in adults over the age of 40 who are overweight or obese and physically inactive, but there is now a rise in the number of children and adolescents diagnosed with the disease. It is believed that an increase in overweight rates among young people is one component of the factors that lead to increases in type 2 diabetes.

What are the risk factors for type 2 diabetes?

- Diet
- Physical inactivity
- Obesity and overweight
- Family history of diabetes

How can I decrease my risk of developing type 2 diabetes?

- Follow a healthy diet low in fat and rich in fruits and vegetables to help prevent excessive weight gain.
- Get at least 30 minutes of moderate-intensity physical activity most days of the week, preferably every day for adults and at least 60 minutes of physical activity for children and adolescents on most, preferably all, days of the week.

For more information, contact the American Diabetes Association at 800-342-2383 or visit www.diabetes.org.

Facts About Fats

Fats are the most concentrated source of calories and some fats have been associated with the development of heart disease and other serious illnesses. Although a high intake of fat has been associated with the development of certain diseases, certain types of fats are essential for good health.

Why do we need some fat in our diet?

Fat:

- provides essential fatty acids such as linolenic, also known as Omega-3, and linoleic, also known as Omega-6 (essential fatty acids are fats that the body cannot manufacture);
- is necessary for the absorption of important vitamins (A, D, E, K); acts as an insulator to maintain body temperature; supplies oils to skin and hair follicles for a healthier complexion and shiny hair;
- improves the taste of foods and promotes digestion.

What are the different types of fats?

Saturated fats are usually solid or almost solid at room temperature (e.g., butter, lard). These foods introduce cholesterol into the body which may raise blood cholesterol levels and increase the risk of cardiovascular disease. Saturated fat is found in animal products such as meat, poultry, and whole-fat milk and milk products, such as cheese, butter, and cream, as well as processed and fast foods.

Unsaturated fats (e.g., monounsaturated, polyunsaturated) are usually liquid or soft at room temperature (e.g., vegetable oils and soft margarine). Some exceptions include unsaturated fats found in olives, avocados, and peanut butter. When substituted for saturated fat, unsaturated fat may lower cholesterol levels or help reduce the risk of heart disease.

Trans fats are created when oils are "partially hydrogenated" to turn liquid oils into solid margarine or shortening. Foods that are high in *trans* fat include hard or stick margarine, cakes, cookies, pies, and other fatty foods made with partially hydrogenated (partially hardened) oils. *Trans* fat contributes to elevated blood cholesterol levels and can increase heart disease risk.

How can I know the limits on fat in my diet?

The maximum amount of fat a person should consume daily depends on his or her age, gender, physical activity, growth, and the number of calories he or she consumes. It is recommended that adults should keep total fat intake between 20 to 35 percent of calories, with most fats coming from sources of polyunsaturated and monounsaturated fatty acids, such as fish, nuts, and vegetable oils. The recommendation for children and adolescents is to keep total fat intake between 25 to 35 percent of calories for ages 4 to 18 years old. Make sure your total fat intake is within the recommended range.

1. Limit your use of solid or saturated fats such as butter and hard or stick margarine. Use vegetable oils (canola, olive, safflower, corn, sunflower, sesame seed, or tub margarine low in saturated and *trans* fat) as substitutes.
2. Cut back on foods that contain partially hydrogenated oils such as cakes, cookies, and pies.
3. Avoid foods that are fried such as chicken and fish, French fries, fried cheese and zucchini sticks, donuts, and potato chips. Replace these items with those that are baked.
4. Choose fat-free or lowfat (1%) milk products.
5. Choose lean meats and poultry without skin.
6. Read your Nutrition Facts label to compare the % DV for fat and saturated fat and to choose foods with a lower % DV. Foods with 5% DV or less for fat contribute a small amount of fat while 20% DV or more for fat contribute a large amount.

What is your Limit on Fat?

Total Calories Per day	*Saturated Fat in Grams**	*Adolescents Total Fat in Grams***
1,600	18 or less	44-62
2,000	20 or less	56-78
2,200	24 or less	61-86
2,500	25 or less	69-97
2,800	31 or less	78-109

* This limit is less than 10% of calories from saturated fat.
** This limit is 25-35% of calories from total fat.

Compare the Saturated Fat in Foods

Food Category	*Saturated Fat Content in Grams*	*% Daily Value of Saturated Fat***
Cheese-—-1 oz.		
Regular cheddar cheese	6.0	30.0%
Lowfat cheddar cheese*	1.2	6.0%
Ground Beef-—-3 oz. cooked		
Regular ground beef (25% fat)	6.1	30.5%
Extra lean ground beef (5% fat)*	2.6	13.0%
Milk-—-1 cup		
Whole milk (3.24%)	4.6	23.0%
Lowfat (1%) milk*	1.5	7.5%
Breads-—-1 medium		
Croissant	6.6	33.0%
Bagel*	0.2	1.0%
Frozen Desserts-—-1/2 cup		
Regular ice cream	4.9	24.5%
Frozen yogurt, lowfat*	2.0	10.0%
Table spreads-—-1 tsp.		
Butter	2.4	12.0%
Soft margarine with zero *trans**	0.7	3.5%
Chicken-—-3 oz.		
Fried chicken (leg with skin)	3.3	16.5%
Roasted chicken (breast, no skin)*	0.9	4.5%
Fish-—-3 oz.		
Fried fish	2.8	14.0%
Baked fish*	1.5	7.5%

*Choice that is lower in saturated fat
**Percent Daily Values (DV) are estimated based on a 2,000-calorie diet.

Facts About Sodium

Nearly one in three adults has high blood pressure. Studies indicate that a diet high in sodium can lead to an increase in blood pressure.

What is sodium?
Sodium is a mineral that is essential for life. It is important for maintaining proper fluid balance in the body and aids in nerve transmission and muscle contraction.

How much sodium do our bodies need?
To replace salt lost in urine, feces, and sweat, the body needs about 500 mg of sodium a day (less than ¼ teaspoon of salt). It is recommended for adults to consume no more than 2,300 mg of sodium (about 1 teaspoon of salt) a day. For 9- to 13-year-olds, the recommendation is 2,200 mg/d.

Where do we get sodium from?
Salt is our number one dietary source of sodium. The average American eats 6,000 mg of sodium (2½ teaspoons of salt) a day, which exceeds recommendations: 15 percent comes from the salt shaker, 10 percent occurs naturally in foods, and 75 percent is in processed foods (luncheon meats, bacon, sausage, canned soups and vegetables).

How can I decrease the sodium in my diet?

- Limit your intake of processed foods.
- Choose unprocessed meats.
- Choose fresh or frozen fish, shellfish, and poultry more often.
- Choose fresh, plain frozen, or canned vegetables without added salt more often.
- Do not use salt at the table.
- Do not add salt while preparing meals.
- Substitute herbs, spices, or lemon juice for salt.
- Read Nutrition Facts labels and choose foods with lower levels of sodium and/or salt.

Foods Typically High In Sodium*

- Processed cheese
- Hot dogs
- Catsup
- Soy sauce
- Canned soups
- Pizza
- Many snack crackers
- Luncheon meats
- Bacon
- Many frozen entrees
- Canned entrees
- Flavored pasta and rice mixes
- Most chips

* You can usually find lower sodium versions of these foods.

NUTRITION EDUCATION PROGRAM SESSION 2

Activity 5: Reading Food Labels

Purposes:

- Youth will learn how to determine amounts of foods.
- Youth will learn how to read a food label.
- Youth will learn how to make healthier snack choices.

Session One

Before the session:

Collect materials.

Materials

- 1 box of high-sugar cereal (one that is sugar coated)
- 1 liter of soda (not diet)
- 1 large bag of chips (more than 2 servings)
- 2 large bowls
- One 24-oz. cup
- Measuring cup for dry foods
- Measuring cup for liquids

What to do:

1. Set out a box of high-sugar cereal and a large bowl, a liter of soda and 24-oz. cup, and a large bag of chips and a large bowl. Ask for three youth volunteers to serve themselves from the choices. Do not explain what the activity is about. Simply ask them to take as much as they would normally.
2. Ask three new volunteers to measure out how much of each food was selected. (Use measuring cups.)
   - Ask the group if they think what was selected is equal to one serving size on the food label.
   - How do they know?
   - Ask the group where they can find information about serving sizes.

Have three new volunteers check the label and read aloud what the actual serving size is for each food. Compare what was selected to one serving according to the food label.

- Were the amounts more or less than what the label said is a serving size?

Have youth figure out how many servings were actually selected.

3. Ask the group how much sugar they think is in the amount of cereal and soda selected and how much fat is in the amount of chips chosen. (Remind them that they can find this information on the food label.) Ask them if they think the information on the food label applies to what they served themselves. In other words, is what was served equal to what is considered a serving according to the food's label?
4. Have three new volunteers look at the food label to find out how much fat or sugar is in one serving. Multiply this amount by the number of servings that were selected to find out how much fat or sugar would have been consumed.
5. Review and discuss:
   - The importance of the amount of food consumed and serving sizes. (Refer to *MyPyramid* on page 8 for the sample daily amount information for 2,000-calories.) Sometimes we do not realize how much or what we are eating. It is especially important to think about serving size when it comes to snack foods because they are often high in sugar and fat. What we think might be a reasonable amount of a certain food may actually be an unhealthful amount high in sugar and fat.
   - Remind the youth that they can find out how much one serving is by reading the food label.
   - It is important to realize that all the information on the food label applies to ONE serving as listed on the food label.

Activity 2: The Low-down on Sugar

Purposes:

- Youth will assess the amount of sugar in popular beverages.
- Youth will identify healthier drink alternatives.

Materials:

- Sample high-sugar drinks (actual cans/bottles or labels)
- Sugar (2 lbs. or 5 lbs. depending on size of group)
- Measuring spoons
- Plastic bags
- Clean-up materials

Ahead of time:

1. Collect labels or cans/bottles of drinks.
2. Make copies of *The Low-Down on Sugar* (page 112 and 113) and *Do You Know What Is In Your Soda?* handouts (page 114).

What to do:

1. Introduce the activity:

   Bring in various beverages including ones with added sugar (e.g., soda, fruit drinks) and ones without added sugar (e.g., 100% fruit juice, orange juice).

   Tip: You can substitute other high-sugar foods such as breakfast cereals, candy, or cookies instead of drinks.

2. Ask youth to place the drinks in order of lowest amount of added sugars to the highest without looking at the labels. Make a note of this sequence.

3. Find out if youth agree or disagree that all sugars are the same. Review the types of carbohydrates.

   Complex carbohydrates (starches) are found in grains, such as bread, pasta, and rice, and vegetables. Foods that are high in complex carbohydrates may also contain vitamins and minerals.

   Simple carbohydrates (sugars) occur naturally in foods such as milk and fruits and are also added to foods such as soft drinks, candy, ice-cream, and cookies. Sugars that occur naturally in foods are usually accompanied by other nutrients. These can include vitamins, minerals, protein, and fiber. Refined sugars such as table sugar, corn syrup, honey, and maple syrup that are added to foods provide only calories.

4. Have the youth read the labels on the containers of drinks or other high-sugar foods to find out how much sugar they contain. It is important for them to keep in mind that the amount of sugars listed on the Nutrition Facts label represents "total sugars" in the food. This includes those that have been added and those that occur naturally. For example, 1 cup of milk contains 11 grams of natural sugars and 100% orange juice (without added sugar) contains 20 grams of natural sugar. The same amount of orange soda contains 32 grams of added sugar. Once they have checked their label to identify how much sugar is in their food, have them measure out the amount of sugar.
   Use the 4 grams of sugar = 1 teaspoon rule. Pile the sugar in a plastic bag in front of the container. Then have the youth put the drinks in order from lowest in sugar to highest. Check to see if the order is the same as what they originally thought. Ask if they were surprised by the amount of sugar in particular drinks.

5. Ask youth if they pay attention to how much added sugar they get in their diet. Find out why they do or do not pay attention to what they drink. Review some of the possible consequences of a high-sugar diet:

   - Weight gain
   - Cavities
   - Foods made with lots of refined sugar fill you up and can crowd out other, healthier foods from your diet.

6. Have youth brainstorm healthier drink alternatives. Some possible choices are:

   - Water – 0 calories
   - Sparkling water – 0 calories
   - 1% or fat-free milk (8 fl. oz.) – 80-100 calories
   - Unsweetened iced tea (8 fl. oz.) – 2 calories
   - 100% fruit juice without added sugar (8 fl. oz.) – 110 calories

   Tip: Taste test a healthier alternative to soda: 100% fruit juice with club soda.

7. Distribute *The Low-Down on Sugar* handout. Review ways youth can decrease the amount of added sugar in their diet.

   - Cut back on soda and juices or fruit drinks with added sugar.
   - Drink 100% fruit juice with no added sugar, unsweetened iced tea, water, or fat-free or 1% milk. Always check the ingredients list for added sugars.
   - Reach for fresh, canned, and dried fruit. Make sure to buy canned fruits packed in water, juice, or light syrup rather than in heavy syrup, and dried fruit with no added sugar. Always check the ingredients list to make sure!
   - Buy fewer snack foods that are high in sugar such as cookies, cakes, and candies. Try vanilla wafers, graham crackers, bagels, English muffins, nuts (dry roasted), sunflower seeds, air-popped popcorn, or baked tortilla chips instead.
   - Watch out for cereals with added sugar by checking the Nutrition Facts label for the amount of sugar. Look at the ingredients list to make sure that sugar isn't one of the first two ingredients. Other names for added sugars include corn syrup, high-fructose corn syrup, fruit juice concentrate, maltose, dextrose, sucrose, honey, and maple syrup.

The Low-down on Sugar

Handout 6.4

Everyone likes the sweet taste of sugar. But eating too many sugary foods and drinks can make you gain extra weight and develop cavities. Plus, sugary stuff eliminates your hunger and if you are not hungry, you won't want to eat the types of foods that you need to help you grow and feel your best.

What is sugar?
Sugar is a type of carbohydrate and it is found naturally in healthful foods such as milk and fruits. These foods may also have vitamins, minerals, protein, and/or fiber. However, some foods such as soft drinks, candy, ice cream, and cookies may contain large amounts of added sugar. This sugar is called table sugar, corn syrup, high-fructose corn syrup, fructose, maltose, dextrose, corn sugar, honey, or maple syrup. Unless they are fortified, sugary foods and drinks provide plenty of calories but relatively small amounts of vitamins and minerals.

Have you ever thought about how many teaspoons of added sugar you eat each day?
Take a closer look at how much sugar is added to some of the foods you might be eating throughout the day.

Food	*Teaspoons of added sugar*
Strawberry frosted toaster pastry	5
Large fruit roll-up	2
Hard candy, 6 pieces	4
Fruit drink, 1 cup canned	7
Vanilla cream stuffed cupcake	6½
Chocolate flavored puffed cereal, 3/4 cup	4
Jelly beans, 10 large	4
Soda, 12 ounces	10

Got a Sweet Tooth?

Here are some things you can do to eat less sugar.

- Cut back on soda and juices or fruit drinks loaded with sugar. Instead try 100% fruit juice with no added sugar, unsweetened iced tea, water, or fat-free or 1% milk. Always check the ingredients list for added sugars.
- Reach for fresh, canned, and dried fruit. Make sure canned fruits are packed in water, juice, or light syrup instead of heavy syrup; and the dried fruit has no added sugar. Always check the ingredients list to make sure!
- Buy fewer cookies, cakes, and candies. These snack foods are high in sugar. Try vanilla wafers, graham crackers, bagels, English muffins, nuts (dry roasted), sunflower seeds, popcorn without butter, or baked tortilla chips instead.
- Watch out for added sugars in cereals. A good rule is to check the Nutrition Facts label for the amount of sugar. Look at the ingredients list to make sure that sugar isn't one of the first two ingredients.

Tip: If you still want the fizz, dilute 1 cup of 100% fruit juice with ½ cup club soda.

Buyer Beware

Check your foods' Nutrition Facts labels for sugar content. Keep in mind that the sugar column on the Nutrition Facts label includes both naturally occurring sugars (like those in fruit or milk) and sugar that has been added to food (cakes and cookies) or drinks (soda and fruit drinks). No % DV has been established for sugars because no recommendations have been made for how much sugar to eat in a day.

Always check your ingredients list for more information on added sugars. Make sure sugar isn't one of the first two ingredients. Other names for sugar include: table sugar, corn syrup, high-fructose corn syrup, fructose, maltose, dextrose, corn sugar, honey, or maple syrup.

Nutrition Facts

Serving Size 3 Cookies (35g/1.3oz)
Servings Per Container 5

Amount Per Serving	
Calories 190	Calories from Fat 90
	% Daily Value*
Total Fat 10g	**15%**
Saturated Fat 3.5g	**18%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 100mg	**4%**
Total Carbohydrate 22g	**7%**
Dietary Fiber 1g	**4%**
Sugars 13g	

Made froM: Sugar, partially hydrogenated vegetable Shortening (Soybean and cottonSeed oilS), unbleached enriched wheat flour [flour, niacin, reduced iron, thiaMin Mononitrate (vitaMin b_1), riboflavin (vitaMin b_2), folic acid], SeMi-Sweet chocolate [Sugar, chocolate liquor, cocoa butter, chocolate liquor proceSSed with alkali (dutched), Milk fat, Soy lecithin added aS an eMulSifier, vanilla extract], egg whiteS, oatMeal, containS 2 percent or leSS of: butter, Salt, leavening (creaM of tartar, baking Soda), Soy lecithin and natural flavorS.

Did you know that fat-free or reduced-fat foods are sometimes high in sugar? Sugar is added to replace flavor that is lost when the fat is taken out.

Handout 6.4

Nutrition Education Program Session 3

Activity 3: The Low-down on Fat

Purposes:

- Youth will learn about the different types of fat.
- Youth will learn about the health risks of a diet high in total fat, saturated fat, *trans* fat, and cholesterol.
- Youth will learn how to decrease the amount of total fat, saturated fat, *trans* fat, and cholesterol in their diet.

Materials:

- Sample foods with labels, or food labels alone
- Solid vegetable shortening
- Plastic bags
- Measuring spoons
- Cleaning materials

Before the session:

Decide how you will introduce the activity. Collect food labels if you will be placing foods in order of fat content.

What to do:

1. Introduce the activity:

   Ask youth to place the foods in order of fat content from lowest amount to highest. Have the youth read the labels to find out how much fat each food contains. Then have them measure the fat (using the 4 grams of fat = 1 teaspoon rule) into a plastic bag, and placeit in front of each food. Discuss how to read the label for the % DV information, and that 5% DV or less is a small amount, but 20% DV or more is a large amount. Also see *READ IT before you EAT IT!*, Handout 6.7, page 126.

   Ask the youth if they are surprised by the amount of fat in some foods.

2. Review the different types of fat.

   Saturated fats are found in animal products like meats (ground beef, sausage, hot dogs, bologna), fatty milk and milk products (whole milk, cheese, and ice cream), and other foods that are made with butter (most pies and pastries). They can also be found in some vegetable oils (such as coconut and palm oils) and in hydrogenated vegetable fats, like shortening and stick margarine. Saturated fats are solid at room temperature and, when consumed, can increase cholesterol in the blood, which can lead to increased risk for heart disease.

   unsaturated fats are found in oils (vegetable oil, canola oil, safflower oil, soft margarine). They are liquid at room temperature. When substituted for saturated fat, unsaturated fat helps reduce risk of heart disease.

   Trans fats are created when oils are "partially hydrogenated" to turn liquid oils into solid margarine or shortening. Foods that are high in *trans* fat include hard or stick margarine, cakes, cookies, pies, and other fatty foods made with partially hydrogenated (partially hardened) oils. *Trans* fat contributes to elevated blood cholesterol levels and can increase heart disease risk.

3. Ask the group if they feel it is important to pay attention to how much total fat, saturated fat, *trans* fat, and cholesterol they get in their diet. Choose one of the following activities to demonstrate how too much fat and cholesterol in your diet can affect your health.

   A. Ask everybody to stand up. Ask if they know anyone who has heart disease or high blood pressure or who has had a heart attack. If they do, have them sit down. Next ask those who remain standing to sit down if they know anyone who has cancer or who has died from cancer. Finally, ask those who remain standing to sit down if they know anyone who has diabetes or who has died from diabetes. Most or all participants should be seated after all the questions have been asked. Explain that these are some of the diseases that are related to poor eating habits, particularly a diet high in total fat, saturated fat, *trans* fat, and cholesterol.

   B. Review the risks of a diet high in total fat, saturated fat, *trans* fats, and cholesterol.

      - Heart disease, high blood pressure, stroke
      - Weight gain
      - Cancer (specifically colon)

Make reference to a movie star, musician, or professional athlete who has been afflicted with or died as a result of these types of diseases. You can also use a personal story or experience.

C. Use models of a clogged artery or a replica of triglycerides in the blood to provide a visual example of how total fat, saturated fat, and *trans* fat affects our health. (See Nasco Nutrition Aides in the Resources chapter for information on how to purchase these models.)

4. Ask youth to come up with ways they can decrease the amount of saturated fat, *trans* fat, and cholesterol in their diet.
   - Cut back on fried foods such as fried chicken, fried fish, potato chips, and French fries.
   - Avoid high-fat snacks such as cookies, donuts, and cakes. Instead choose fresh, dried, or canned fruit, a lowfat granola bar, a bagel with jelly or peanut butter, or fig newtons.
   - Avoid drinking whole milk; instead choose fat-free or lowfat milk.
   - Hold the mayo on sandwiches and burgers; try just mustard and/or ketchup instead.
   - Remove the skin from chicken.

Activity 4: Eating on the Run

Purposes:

- Youth will assess their fast food choices.
- Youth will identify ways to improve their fast food choices.

Materials:

- Solid vegetable shortening
- Plastic bags
- Measuring spoons
- Clean-up materials

Depending on the activity you choose, you may also need:

- Nutrition Facts information from fast food restaurants

Ahead of time:

1. Collect materials.
2. Make copies of *Eating on the Run* handout (pages 120 and 121).
3. Put the recommended daily value of fat for an active youth (about 80 grams, 20 teaspoons, or 6 ½ tablespoons of fat) into a plastic bag.
4. Decide which activity option you will choose.

What to do:

1. Introduce the activity.

   Ask youth how many times a week they eat fast food. Find out whether they think it's possible to eat healthy at a fast-food restaurant.

2. Choose *one* of the following activities to measure out the amount of fat in fast foods. Use the 4 grams of fat = 1 teaspoon rule.

   A. Youth can bring in Nutrition Facts information from their favorite fast-food restaurant. It is available at the restaurant or on its Web site. Have them choose the meal that they usually order, find out how much fat is in the food or meal, and measure out the amount of fat into a plastic bag.

B. Assign foods from the *Eating on the Run* handout.

C. Collect nutrition information from various fast-food restaurants, or make copies of the *CANFit Fast Food Survival Guide* booklet. (See CANFit in Resources Section of Chapter 7 for information on how to order.) Assign a menu item for each youth to measure.

3. Have youth share the amounts of fat in their meal/foods and what they thought about those amounts. (Were they surprised? Disgusted? Did they already know?)

4. Review the maximum daily amounts of fat that should be consumed by adolescents (moderately active males ages 11-18 should consume no more than 78-109 grams of fat per day; moderately active females ages 11-18 should consume no more than 70-78 grams of fat per day). Compare the bag of 80 grams of fat to the bags of fat from the fast foods. Does their fast-food meal contain more than the maximum amount for the entire day?

5. Distribute the *Eating on the Run* handout. Discuss ways that youth can make healthier choices when they eat fast food.

Eating on the Run

Although fast food is often quick and easy, many fast foods are loaded with fat, added sugars, calories, and salt. Eating fast food on a regular basis can be bad for your health unless you learn to make better fast-food choices.

Here are some simple guidelines:

Pass on the soda
Most soda is loaded with sugar and calories. One 12 oz. soda contains about 10 tsp. of sugar. Most fast-food chains offer more healthful drinks such as orange juice, 1% or fat-free milk, unsweetened iced tea, or bottled water.

Watch out for fried foods
Fried chicken and fish sandwiches, chicken nuggets, and fries are loaded with fat. To reduce fat and calories order a broiled or grilled chicken or fish sandwich, or stick to a regular hamburger. Instead of fries, try a baked potato or a side salad. Choose Mexican food with soft (rather than fried) tortillas, such as burritos, soft tacos, or fajitas. Try lowfat Chinese foods like won-ton soup and stir-fried dishes. Order steamed rice instead of fried rice or chow mein.

Watch out for added fat
Not having cheese or mayo can decrease the amount of fat and calories in your fast-food meal. Avoid specialty burgers that have special sauces or bacon. Bacon and sauces are loaded with fat and cholesterol (see "Facts About Cholesterol" in Chapter 1, on page 19).

Watch your amounts
If you decide on a burger and fries, order the regular or small-sized versions. You can get two smaller-sized hamburgers without cheese instead of eating a quarter-pound cheeseburger for fewer calories and less fat.

Never "SuPER SIZE"
A regular cheeseburger meal provides 680 calories. When you order a super size the extra fat from the fries and sugar in a 42-oz. super-size soda add another 660 calories, bringing the total calories in a super-size cheeseburger meal to a whopping 1,340. This is more than half of the calories you need for an entire day.

Handout 6.6

Ask to see the nutrition information
Most fast-food restaurants now have nutrition information on all of their menu items available at the restaurant or on the Internet. Take some time to look and see what is in each menu item before you place your order.

See the difference for yourself.
What choice will you make next time you eat fast food?

Higher Fat	*Calories*	*Fat*	**Lower Fat**	*Calories*	*Fat*	*Calories/ Fat Saved*
Quarter-pound burger w/cheese	520	29	Regular hamburger	260	9	260/20
Deluxe crispy chicken	500	50	Classic grilled	250	3	250/47
Large fries	450	22	Small fries	210	10	240/12
Large burger	630	39	Regular	260	10	370/29
Double large burger w/cheese	950	63	Regular hamburger	260	10	690/53
Chicken sandwich	700	43	Broiled chicken	267	8	433/35
Bacon cheeseburger	1,150	89	Regular	260	10	890/79
Spicy crispy chicken	560	27	Fajita chicken pita	280	9	280/18
Double bacon	1,030	63	BBQ chicken	310	6	720/57
Regular fries	370	20	Light baked	290	1	80/19
Original chicken breast	400	29	Chicken breast without	169	4	231/25
Potato wedges	280	13	Mashed potatoes and	120	6	160/7
			Red beans and rice	130	3	150/10

NUTRITION EDUCATION PROGRAM SESSION 4

Activity 6: My Snack Options

Purposes:

- Youth will identify the influences on their snack choices.
- Youth will survey the types of snack foods that are available.
- Youth will plan to make more healthful snack choices.

Session One

Before the session:

- Make copies of *What Are My Snack Options*? (pages 133 and 134).

What to do:

1. As a group, ask youth to share some of their usual snack habits.
   - What types of food do you eat for snacks?
   - At what times during the day?
   - Where do you usually get your food? (e.g., snacking on vending machine foods between classes, visiting fast-food restaurants or corner stores on the way home from school, or snacking on what's available at home).

2. As a group, discuss some of the things that influence their snacking habits.
   - What is the first thing you think about when you want a snack?
   - What is of most importance to you when choosing snack foods? (e.g., cravings, taste, cost, convenience, availability, peer pressure, family, advertising, nutrition).

   Have each youth identify three things that frequently influence his or her snack choices. Find out if they think these influences help them to make healthful choices or lead them to make unhealthful choices.

3. Take a few minutes and discuss the types of snack foods that are available to youth at home, in school, and in their neighborhoods. Ask them if they feel they have a wide variety to choose from, including healthful foods.

- What do you snack on at home?
- On the way to/from school?
- With friends?

4. Distribute the *What Are My Snack Options*? handout. Explain to the youth that they will be keeping track of the snack options they have at school, at home, and in their neighborhoods. Using the handout, they will record the available snack foods in the columns listed. Have youth fill in an example for each location (school, at home, and their neighborhood).

   Tip: Take a few minutes to review examples. (See "*MyPyramid Food Guidance System*" on page 7.)

5. Tell youth to bring their completed handouts to the next session.

Ways to Tell If Your Snack Is a Healthy Choice

Handout 6.8

Is it low in fat?
Use the % Daily Value (DV) column. Recall that if a food has 5% DV or less for a nutrient, it contributes a low amount, while foods having 20% DV or more for a nutrient contribute a high amount. Choose most often snack foods that are lower in total fat, saturated fat, and *trans* fat. Watch out for fried snack foods. Try baked instead. A bag of regular fried potato chips has 15% DV for fat and a bag of baked chips has 5% DV for fat.

Is it low in sugar?
Check the ingredients list. If sugar is one of the first two ingredients, the food is high in sugar. Other names for sugar that you might see on the ingredients list are: table sugar, corn syrup, high-fructose corn syrup, fructose, maltose, dextrose, corn sugar, honey, or maple syrup. Soda and certain kinds of fruit juices are high in sugar. Choose to drink water or 100% fruit juices that have no added sugar.

Be sure to check the ingredients list!
The ingredients list tells you everything that's in your food. Ingredients are listed from the largest quantity to the smallest quantity by weight. Whatever ingredient your food has the most of will be first on the list, and so on.

Is it high in fiber?
Use the % DV column. Foods with 20% DV or more contribute a large amount of fiber, while foods with 5% DV or less contribute a small amount of fiber. Snack foods that are a good source of fiber are whole-wheat English muffins, pears, almonds, apples, broccoli, and whole-grain cereals.

Is it a whole grain?
Check the ingredient list for the words "whole" or "whole grain" before the grain ingredient's name to decide if a food is made from a whole grain, rather than a refined grain. The primary grain should be the first ingredient in the ingredient list to be considered a "whole grain." Some whole grains, like popcorn or brown rice, do not have the word "whole" in front of their names. Snack foods that are a good source of whole grain are whole-wheat bagels or crackers, whole-grain cereals, oatmeal, or popcorn.

Is it full of vitamins and minerals?
Use the % DV for vitamin A, vitamin C, calcium, and iron. If the snack has 20% or more of the % DV it contributes a large amount of a nutrient, while foods with 5% or less of the % DV contribute a small amount.

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VITA

Melissa Domingeaux Ethington was born in Lafayette, Louisiana, the daughter of Gloria Henry Malbrough and Glenn Dale Malbrough. She has one sister, Youlanda. Melissa attended Sunset Elementary School and graduated from Sunset High School in 1985. She is married to Darryl Ethington and has two sons, Christian and Jitter.

Melissa began her nursing career in Louisiana as a licensed practical nurse after graduating from T.H. Harris Vocational-Technical School in Opelousas, Louisiana. She was employed by Lafayette General Medical Center in Lafayette, Louisiana and Children's Medical Center of Dallas in Dallas, Texas as registered nurse. Melissa became the Assistant Director of Nursing at Southeast Texas Homecare, Inc. in Beaumont, Texas. She was later promoted to Director of Nursing for the branch office in Baytown, Texas. In 2004, she began her career in education as an instructor of nursing in the associate degree and baccalaureate nursing programs at Lamar University, Beaumont, Texas. Melissa worked as a teaching assistant in the graduate nursing program while at UTMB. She was the recipient of the GAANN Fellowship funded by the United States Department of Education.

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Publications

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