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I am submitting herewith a thesis written by Manasi Barot entitled "Home Food Availability, Dietary Intake and Child Weight Status." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

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Home Food Availability, Dietary Intake and Child Weight Status

A Thesis Presented for the
Master of Science
Degree

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ABSTRACT

Background: Childhood obesity is a critical public health problem. There is a crucial need to identify environmental factors that either encourage or prevent obesogenic behaviors. The home food environment is one of the primary environments in which children are exposed to food. Therefore, it is crucial to study how the home food availability influences dietary intake and weight status.

Objective: This study examines parental report of household food availability of fruits, vegetables, and milk, and its association with child weight status and child dietary intake of these foods.

Methods: This is a cross-sectional study, based on surveys from 489 students in grades 3-12 their parents in 2009. Child participants were Destination ImagiNation® finalists. Child data collection included surveys based on the Youth Risk Surveillance Survey and anthropometric measurements of height and weight used to calculate child z-BMI. Parents self-reported their heights and weights and home food availability. Descriptive statistics were conducted and multiple linear regression was used to predict whether or not a relationship existed between home food availability, child weight status, and dietary intake of fruits, vegetables, and milk.

Results: Overall, 12.5% of participants were overweight and 6.7% were obese. Approximately 26% of participants consumed 5 or more servings of fruits and vegetables per day and 17% consumed 3 or more glasses of milk per day. However, a no significant relationship was found between home availability of fruits, vegetables, and milk and the reported intake of these foods. Although a significant association was also found between parent and child weight status, no significant association was found between home food availability and child weight status.

Conclusions: Compared to national data, a larger proportion of this sample was classified as normal weight and consumed the recommended intake of fruits and vegetables and milk. Parents reported high availability of fruits, vegetables, and milk products. However, no significance was found between the reported availability of these foods and weight status or dietary intake of fruits, vegetables, or milk.

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Chapter I

Introduction

Problem Statement

Overweight and obesity rates have been increasing for the past three decades and have reached epidemic levels (1). Approximately 67% of American adults are overweight. However, the most alarming rise in the epidemic has been among children. In 2007, among 6 to 19 year-old males, 16.6% were overweight (age- and gender-specific BMI $\geq 85^{\text{th}}$ percentile and $< 95^{\text{th}}$ percentile) and 18% were obese (age- and gender-specific BMI $\geq 95^{\text{th}}$ percentile) and among females, ages 6 to 19 years, 13.2% were overweight and 16% were obese (1). Many believe that the obesity epidemic among adults and children is the result of an “obesogenic” environment, which is characterized by the ubiquitous availability of unhealthy food options, large consumptions of these types of foods, and increasingly sedentary lifestyles (1). Much research must still be done to fully understand the environmental factors that contribute to the childhood and adolescent overweight and obesity epidemic.

Risk factors

In Tennessee, obesity in 10 to 17 year-olds is approximately 20%, which is the fourth highest prevalence rate in the nation (2). This is a concern because obesity puts children and adolescents at significant health risk. Health conditions that were once considered to be adult diseases are readily being observed in children (3). These conditions include, but are not limited to, hypertension, atherosclerosis, type I and II diabetes, metabolic syndrome, asthma, and nonalcoholic fatty liver disease (4). Further,

many obese children have been observed to suffer from psychosocial problems such as depression, which is often associated with low body satisfaction (3). It is difficult to assess the exact cause of the obesity epidemic, as researchers believe that there are many contributing factors (3-4). However, there does seem to be general consensus that two major factors contribute to the epidemic: greater caloric consumption and decreased physical activity levels (3-4). Children's primary environments, including both home and school, can greatly impact these factors (4-8). Although research regarding the school food environment is increasing, little research exists on the home food environment. For this reason, this study will examine the home food environment of children using a home food inventory (HFI). The home food environment is often shaped by parental food preference, as parents are the "gatekeepers" for what is available in the home (4-5). Home food availability is believed to drive children's food preference and eating behavior (4-5). Therefore, it is important to study the role of the foods available in the home environment on children's weight status.

This study was part of a larger study of 2,800 children. Child participants were part of a creative afterschool program, Destination ImagiNation® (DI). Children were asked to complete a questionnaire when they came for the DI finals in Knoxville, TN. Their heights and weights were measured and recorded by trained research assistants. In addition, parents were asked to complete an online survey and self-report their heights and weights. The parental survey included a HFI, which contained a list of 80 food items. For this portion of the survey, parents were asked to indicate whether or not items on the list were present in the home at the time of survey completion.

Research Questions

This study explores four research questions. The questions included: 1) Do Total Fat Score, Total Fiber Score, and Family income predict child z-BMI score, while controlling for parent weight status? 2) If Total Fat and Fiber Scores significantly predict child z-BMI scores, do any of the six Total Group Fat Scores and Total Group Fiber Scores predict child z-BMI scores? 3) Do the Total Vegetable Fiber Score and Total Fruit Fiber Score predict child z-BMI score? 4) Does the availability of fruits, vegetable and milk in participants' homes influence whether the participant consumed the recommended servings of these foods?

Chapter II

Literature Review

Introduction

The obesity rate in the United States has reached an epidemic level (1), with approximately one-third of the adult population classified as obese (Body Mass Index (BMI) ≥ 30). BMI is calculated using an individual's weight in kilograms divided by his or her height in meters, squared (1). The most alarming rise in overweight and obesity rates has been among children and adolescents. Overweight and obesity among children are defined by the Center of Disease Control and Prevention gender- and age-specific growth charts. Overweight is defined as a gender- and age-specific BMI $\geq$ the 85th percentile and $<$ the 95th percentile. Childhood obesity is defined as a gender- and age-specific BMI $\geq$ the 95th percentile.

Prevalence of Obesity and Overweight

In the U.S., child and adolescent rates of overweight and obesity are primarily collected by two national surveys. One of the largest national surveys, the National Health and Nutrition Examination Survey (NHANES), has collected health and nutrition data for U.S. children and adults since the 1960s (9). Each participant is interviewed by a trained professional. Questions include socio-economic, demographic, nutrition, and other health related information. Additionally, participant anthropometrics are measured by trained individuals. The other national survey is the Youth Risk Behavior Surveillance Survey (YRBSS), which consists of self-reported data, including height and weight, from adolescents. It includes information regarding health risk behaviors (unintentional injuries and violence, tobacco use, alcohol and other drug use, sexual behaviors,

unhealthy dietary behaviors, and physical inactivity), overweight and obesity, and asthma (10).

According to Ogden and colleagues, who used NHANES data, in the past two decades the prevalence of obesity among children and adolescents tripled for those aged 2 to 19 years (11). Although obesity levels among school-aged children showed no significant increase from 1999-2006, levels still remain high. Between 2003 and 2006, a large number of 2 to 19 year-olds were found to have high BMIs. In total, 11.9% were $\geq$ the 97th percentile (morbidly obese), 16.9% were $\geq$ the 95th percentile (obese), and 31.7% were $\geq$ the 85th percentile and $<$ the 95th percentile (overweight) for age and gender-specific BMIs. Further, it was observed that adolescents were more likely to be overweight or obese compared to younger children. There were no significant gender differences found among non-Hispanic white and non-Hispanic black school-aged children, except for Mexican-American boys aged 2 to 19 years. Boys were more likely than girls to have a high BMI ($\geq$ the 97th, 95th, or 85th percentile) compared to girls of the same age. Similar gender differences were observed among Hispanic boys and girls, but only at the 95th percentile or above.

There were significant differences in overweight and obesity trends among children and adolescents. According to NHANES, 2003-2006, non-Hispanic black girls and Mexican-American girls were more likely to be overweight or obese compared to their non-Hispanic white counterparts. Similar trends were observed among ethnically diverse boys as well. Mexican American boys were more likely to be overweight or obese compared to both Non-Hispanic white and black boys. However, non-Hispanic

black boys were more likely to be overweight and obese compared to their Non-Hispanic white counterparts. The 2007, YRBS showed similar gender differences and race/ethnicity trends for overweight and obesity (Table 1). Table 1 displays the percentage of male and female students in 9th-12th grade, who were either overweight (>85th percentile and <95th percentile) or obese (>95th percentile) for gender- and age-specific BMI.

Research has shown that there are not only racial and gender differences in the prevalence of overweight and obesity among children, but that these rates are influenced by socio-economic status as well (12-13). Over the past three decades, there was a significant rise in the prevalence of obesity among low-income older children and adolescents (12). Although studies by Alaimo and colleagues and Wang and associates found no association between low-income younger children and weight status regardless of race/ethnicity (12-13), there was a significant association between low-income and weight status in white adolescent boys and girls (ages 10 to 18 years). The opposite relationship existed between black adolescent girls and family income. The study revealed that black adolescent girls from homes with high family income were twice as likely to be overweight than their medium and low-income counterparts. However, Wang and colleagues failed to find a consistent relationship between family income and weight status among Mexican-American adolescents (12). Researchers believe that there are many reasons that contribute to the weight disparities that exist based on gender, race/ethnicity, and income groups (10-11). The predominant findings have shown a decrease in physical activity and increase in energy consumption among

Table 1: Percentage of Students (9th-12th grade), Overweight and Obese, by Age and Sex, 2007 Youth Risk Behavior Survey

	White	Black	Hispanic
Gender: Girls			
Overweight ($\geq 85^{\text{th}}$-$<95^{\text{th}}$ Percentiles)	12.8%	21.4%	17.9%
Obese ($\geq 95^{\text{th}}$ Percentile)	6.8%	17.8%	12.7%
Gender: Boys			
Overweight ($\geq 85^{\text{th}}$-$<95^{\text{th}}$ Percentiles)	15.7%	16.6%	18.3%
Obese ($\geq 95^{\text{th}}$ Percentile)	14.6%	18.9%	20.3%

all groups of children and adolescents (3). These and other factors that may contribute to childhood and adolescent conditions of being overweight and obese will be discussed in further detail in the following sections.

Risk Factors

Dietary Factors

According to the World Health Organization (WHO), global obesity is a growing epidemic. The WHO has identified the causes of obesity as increased consumption of foods that are high in fat and sugar and decreased physical activity due to the increase in sedentary work, convenient transportation, and urbanization (14). Additionally, other research has demonstrated that genetics and the environment play a significant role in the development of obesity among children, adolescents, and adults (14-15).

Generally, high-energy, dense foods tend to be high in fat and low in fiber content (16). The American Academy of Pediatrics recommends a fat intake of 30-35% of kcal for 2 to 3 year-olds, and 25-35% of kcal for 4 to 18 year-olds (17). Many studies have shown that increased fat intake is positively related to higher adiposity in adults as well as children. In a longitudinal study that included 1,432 children ages 5 to 9 years-old, researchers identified dietary patterns associated with childhood fatness. The study's results demonstrated a strong positive relationship between energy-dense, low-fiber, and high-fat foods with higher adiposity in children ($p < 0.0001$). This pattern was especially observed in 7 year-olds and indicated a direct relationship between high-energy intake and the consumption of low-fiber bread, sweets, confectionaries, cakes, crisps, and savory snacks (16). These findings were reaffirmed by Nicklas and

colleagues, who studied 1,562 10-year-old children. Data were collected by 24-hour-dietary-recalls. Results showed that consumption of low quality foods, such as sweets ($p<0.001$) and salty snacks ($p<0.05$), was positively correlated with being overweight among the sample (18).

The WHO states that one of the contributing factors to the obesity epidemic is the low consumption of fiber. Fruits and vegetables are a good source of fiber, as well as vitamins, and minerals (14). According to the 2007 YRBSS, only 21% of students consumed the recommended five servings or more of fruits and vegetables in a period of one week (19). Research suggests that consumption of fruits and vegetables is essential because they are rich in vitamins, minerals, and fiber. In addition, fruits and vegetables contain soluble and insoluble fibers, which may act as a natural hunger suppressant, reducing gastric-emptying and hence reducing “snacking” between meals (20). The WHO states that high consumption of fruits and vegetables has the potential to displace high-fat or energy-dense foods. Hence, high consumption of fruits and vegetables may be a strategy to reduce the conditions of being overweight and obese among children and adolescents.

Several research studies support this WHO recommendation for high consumption of fruits and vegetables. For example, the Bogalusa Heart Study found that African American girls who consumed a diet rich in fruits, fruit juice, and vegetables and who consumed breakfast were less likely to be overweight or obese. On the other hand, European American girls who had a diet composed of seafood, sweets, and sweetened beverages, were more likely to be overweight and obese(18). Similarly, in a

study by Lakkakula and colleagues, who studied 341 low-income African American children, the researchers found that children who did not highly prefer fruits and vegetables were nearly six times more likely to be overweight or obese compared to their counterparts who did highly prefer fruits and vegetables (21). Further, in a study by Langevin and others, which had total of 193 subjects between the ages of 7 to 13 years, 22.0% were overweight and 43.0% were obese. The researchers found 75.0% of the participants failed to meet the recommended fruit, vegetable, grain, and dairy intake. The researchers concluded that a correlation existed between children being overweight and obesity and the failure to consume the recommended fruit, vegetable and other major food groups (22).

Most researchers agree that maintenance of a healthy weight depends upon a sensitive balance between energy consumption and expenditure (15). Some researchers believe that an imbalance in this equation has occurred and can be linked to the increased intake of sugar-sweetened beverages (SSB) (15). Excess consumption of SSB is a concern, as it leads to increased carbohydrate intake. Carbohydrates are the body's primary energy source, but excess intake can lead to excess energy that may be difficult to expend (23). Sugar consumption in the U.S. went up 22% from 1977 (13.1%) to 1996 (16.0%). Presently, a total of 15.8% of dietary calories come from SSB (23-24). Further, the 2007 YRBS data showed that approximately 34% of youth consumed at least one glass of soda or pop per day in the seven days prior to the survey (23-24). These numbers are of concern to many researchers, as the Dietary Guidelines for American suggest that no more than 10% of total daily caloric intake come from added sugars (23).

Many studies have shown the positive association between high SSB consumption and high weight status. For example, the Bogalusa Heart Study found that 10-year-old children who consumed beverages such as soft drinks, fruit flavor drinks, and sweetened tea and coffee were more likely to be overweight ($p < 0.001$) (18). Another study by Gillis and associates found that obese children and adolescents consumed significantly more SSB ($p < 0.002$) compared to their non-obese counterparts and consumption of soda was positively associated with body fat percentage. They recommended that obese children and adolescents limit their intake of SSB (25).

These findings are strongly supported by a controlled study conducted by Ebbeling and associates (26). They randomly assigned 103 adolescents into two groups, an intervention and control group, for 25 weeks. Prior to intervention, each adolescent reported consuming at least 12 fluid ounces of SSB per day. In the intervention group, all SSB were replaced with non-caloric beverages and no changes were made with the control group (26). After a 25-week study duration, results revealed a significant difference in BMI in the intervention group compared to the control group ($-0.63 \pm 0.23 \text{ kg/m}^2$ and $+0.12 \pm 0.26 \text{ kg/m}^2$, respectively; $p = 0.03$) for children in the upper BMI percentile ($p = 0.04$). Further, significant differences in BMI were noticed in participants who had previously consumed greater amounts of SSB (26). These studies suggest that there is a significant relationship between SSB intake and obesity. Therefore, health professionals do recommend that the consumption of SSB be limited.

Activity Factors

High sedentary and low physical activity levels have added to the imbalance between increased caloric intake and expenditure among children, adolescents, and

adults. With the increasing use of technology, such as television, mobile phones, convenient transportation options, video games, and computers, life is increasingly sedentary and physical activity levels among children and adolescents have decreased considerably (27). The Physical Activity Guidelines Advisory Committee recommends that children and adolescents get a total of 60 minutes of moderate to vigorous physical activity a day, each day of the week. However, 2007 YRBS data show that only 35% of students were physically active for at least 60 minutes a day for seven days. In addition, these data show that 36% of students watched three or more hours of television on an average school day and 25% of students played video or computer games or used a computer for non-school related work for more than three hours on an average school day (19). Research has demonstrated that there is a strong association between sedentary behavior and high weight status (28-29).

In a study that used the School Health Action, Planning and Evaluation System (SHAPES) module and collected data from 25,060 high school students, researchers used logistic regression to evaluate the association between BMI and activity levels. Students were classified as high active-low sedentary, high active-high sedentary, low active-low sedentary, and low active-high sedentary. Odds ratios were performed with high active–low sedentary as the reference. This revealed that girls who were low active-high sedentary had were 2.24 times more likely to be overweight than high active-low sedentary girls. Whereas girls who were high active–high sedentary were 1.91 times more likely to be overweight than high active–low sedentary girls (28). On the other hand, results revealed that boys who were low active-high sedentary were 1.5 times more likely than high active–low sedentary boys to be overweight.

In a study by Purslow and others, which examined children (176 boys and 169 girls) between the ages of 8 and 9 years old (29), linear regression was used to examine the relationships between gender, physical activity and weight status. Similar to the Wong study, Purslow found that boys were significantly more moderately and vigorously active than girls ($t = 8.8$, $df = 267$, $p < 0.001$). Boys were more likely to meet the daily recommendation of 60 minutes of physical activity than girls ($t = 7.2$, $df = 299$, $p < 0.001$). In addition, among boys, the duration of physical activity was lower among overweight and obese boys than compared to leaner boys ($\beta = -0.26$, $p = 0.002$) (29). However, the relationship between the duration of physical activity and weight status was not significant among girls. Similarly, there was a significant negative relationship between fat mass and physical activity in boys ($\beta = -0.27$, $p = 0.001$). However, this was not the case in girls (29).

Home Environment

A child's environment is usually controlled by parents or caregivers, who act as gate keepers (30). Historically, most parents have always responded promptly to a child's needs, by providing as much food as possible and as frequently as possible. Parents are often responsible for children's early food experience, which generally leads to lifelong food preferences. The foods that parents provide are usually influenced by culture, availability, prices, and convenience, which in turn shape a child's food environment. Further, parents and caregivers act as role models to children and subsequently, children usually acquire eating behaviors demonstrated by parents or caregivers (30). Several studies found that children were more likely to consume unfamiliar foods if their caregivers consumed them (30-32).

Further, children's food consumption is greatly influenced by parents' feeding styles (33). Parental feeding practices are said to influence children's food choices, quantity of consumption, dietary quality, and BMI. Parents may be concerned that their children are or will become overweight; hence, they may try to restrict or control their children's diets. However, research has shown that parents who restrict their children's food intake may negatively affect food preferences and self-control. On the other hand, parents who use sweet and energy-dense foods as rewards may increase preferences of such foods in their children. Additionally, parents who deny children access to certain types of foods, such that foods are in sight, but out of reach, may cause the children to have poor self-control and to consume food excessively. Parents who pressure their children to eat when they are not hungry may influence children's dietary intake and affect self-control (33).

Varied parenting styles are associated with children's eating behaviors, as well (33). Authoritative parents have high expectations of children's eating behaviors and are highly sensitive to their children's needs. Research has shown that these families tend to have a home food environment with easy access to vegetables and fruits and lower access to "junk foods." On the other hand, authoritarian parents tend to have high expectations but low sensitivity to their children's needs. Research has shown that children of authoritarian parents are five times more likely to be overweight compared to children of authoritative parents. Additionally, a permissive parenting style is demonstrated by low expectations of children's eating behaviors and low sensitivity to their needs. Permissive parenting may lead to overeating and a greater risk for adult obesity (33).

As explained above, parenting styles can provide an environment that can easily accommodate the development of obesity or not (33). Parents are responsible for creating the home food environment, as they are the primary purchasers of foods. Most researchers concur that the greater the availability of foods related to obesity (high-fat and high-sugar foods), the more likely children or adolescents are to consume them (cite). The opposite is observed with greater availability of low-fat, nutrient-dense foods such as fruits and vegetables (7). Foods purchased by parents determine what foods are available in the home. Research has shown that food availability strongly correlates with food intake (4-8).

In a study by Hanson and coworkers, the authors conducted a cross-sectional study with 902 families with adolescents (6). Their objective was to investigate the associations of home food availability, parents' dietary intake and how it influenced their children's vegetable, fruit, and dairy intake. The authors conducted telephone interviews with parents using the Project Eating Among Teens survey. Adolescents completed this survey and the Youth Adolescent Food Frequency Questionnaire at school (6). They found that many of the adolescents and their parent did not meet the recommended fruit, vegetable, and dairy servings per day. Further, parents' reports on home food availability reflected that 90.4% of families had vegetables and fruits available "at least usually." Many parents reported serving both vegetables (87.0%) and dairy (66.6%) at least at meals. The authors found that the availability of vegetables and fruits showed a positive relationship with their intake by girls ($p < 0.01$). However, the relationship between home food availability and intake was not observed in boys. The opposite was observed with the availability of milk, as boys seemed to consume more milk servings at

meals ($p < 0.01$). Further, in girls the consumption of dairy increased when soft drinks were less available ($p = 0.04$). In homes where soft drinks were always present, girls consumed 0.9 servings less of dairy compared to girls in whose homes soft drinks were never present (6).

Similarly, in a study by Spurrier and colleagues, the authors studied 280 preschool children and their families (8). Data regarding the type of home food environment and children's dietary intake were collected by observation, parent interviews, and questionnaires. The researchers found, that the high availability of fruits and vegetables was strongly associated with children's consumption of these types of foods ($p = < 0.001$). A similar pattern was observed with the high availability of sweetened beverages and snack foods. A strong association was observed with the availability of sweetened beverages ($p = 0.004$), and non-core snack foods ($p = 0.01$), and the consumption of these types of foods (8). Also, the study found that parents who restricted their children from consuming sweetened beverages ($p = 0.02$) and high fat and sugar foods ($p = 0.009$) consumed more fruits and vegetables. Therefore, this study found that less availability and less access to high fat and sugar foods and beverages results in higher intakes of fruits and vegetables (8).

In an Australian-based, cross sectional study by Campbell and colleagues, the researchers studied 347 youths, ages 12 to 13, as well as their families and their home food environments (5). Researchers collected data using self-completed surveys, as well as Food Frequency Questionnaires (FFQ). Researchers used multiple linear regression to determine associations between variables. The study found that boys with

authoritarian parents were more likely to consume high energy drinks ($p=0.002$) (5). The report of mothers' dietary intake of both sweet snacks ($p=0.010$) and savory snacks ($p=0.008$) and the availability of unhealthy foods ($p=0.002$) in the home were positively related to boys' dietary intake of these foods. The consumption of high energy drinks by both parents was positively associated with girls' intake of high energy drinks (mothers $p=0.025$ and fathers $p=0.058$) (5). The availability of unhealthy foods was positively related to girls' dietary intake of unhealthy foods ($p<0.001$) (5). Thus, this study clearly showed the association between parental consumption of foods and its association with their children's intake (5). Further, this study reaffirmed that the availability of foods in the home is positively associated with adolescents' food intake.

Measures of Home Food Availability

Most home food availability is measured using a self-reported list of food and beverages, known as a home food inventory (HFI) or home shelf inventory. These inventories are used to evaluate the presence and/or absence of foods within a household. One of the most widely-used HFIs contains a list of 80 foods that is broken down into 12 categories (32). This HFI was originally validated by Crockett and colleagues. In 1992, Crockett and coauthors reported the findings of two studies that used the HFI with 75 subjects. After the subjects completed the HFI, trained interviewers went to the homes and completed the HFI based on the foods available at the time of the interview (32).

The HFI completed by subjects and interviewers were then compared to calculate the specificity and sensitivity of the HFI. Sensitivity was defined as correctly

identifying the actual presence of a food item by the subject and was confirmed by the interviewer. Specificity was defined as the correct reporting of the unavailability of a food item by the subject. In the first study, the researchers found a sensitivity of 0.86 and a specificity of 0.92. In the second study, they found that the HFI had a sensitivity of 0.87 and a specificity of 0.90. Crockett and colleagues further found no differences in self-reporting by gender (32).

In 2002, Miller and associates validated the HFI with subjects who were 65 years or older and who had Type II diabetes (33). They determined the validity of a HFI by calculating specificity and sensitivity of the HFI. These researchers compared participant and interviewer questionnaires, as well as pre- and post-test differences, and used the same specificity and sensitivity definitions as Crockett and researchers. The HFI had a sensitivity of 0.90 and a specificity of 0.97(33). This study reaffirmed that the HFI was valid and was a sound tool to evaluate household food availability. In a similar study, Marsh and coauthors assessed the validity of the self-reported availability of vegetables, fruit, and fruit juices. A total of 48 parents of children in fourth through the sixth grades completed a self-reported inventory that included three types of juices, 13 types of fruit, and 18 types of vegetables (34). Trained interviewers then completed the HFI based on the actual foods present in the homes. Self-reports were compared to interviewers' reports of home food availability. The researchers found great resemblance between the parents' and interviewers' reports (75.9%). They found a sensitivity of 36.8% and a specificity of 39.1% for all fruits, juices, and vegetables. These numbers were significant according to the Cohen Kappa agreement scale ($p <$

0.05). The researchers concluded that HFI for fruits, juices, and vegetables was valid and an accurate tool for assessment of home food availability (34).

In a study by Fulkerson and colleagues, the authors took a different approach to that of the previous researchers (35). They developed a 13-food category HFI, which they validated in order to determine the availability of foods that they believed may contribute to obesity. They tested the HFI using two samples. In the first sample, 6 researchers and 51 adult participants each completed the HFI. Information provided by the participants was compared to the information gathered by the six researchers, to check for accurate reporting. The second sample included parents and their children. Children completed 24-hour-recalls and their parents completed the HFI and a Diet History Questionnaire. The authors derived an obesogenic scale to assess obesogenic home environments (35). The results of the study revealed that this HFI had a specificity of 0.86-0.95 and a sensitivity of 0.69-0.89. Also, they observed that only about half of the 24-hour-recalls had a significant relationship with the HFI scores ($p < 0.05$). However, they found that all of the Diet History Questionnaire results had a significant relationship with HFI scores ($p < 0.05$). Fulkerson and colleagues agreed with the previous authors that the HFI is a valid tool that can be used to assess the home food environment (35).

Summary

Childhood obesity has reached epidemic levels in the U.S. Research has shown that in addition to poor dietary intake and lack of physical activity, the environment may be another major factor that has significantly contributed to the epidemic (1-9).

Environmental factors such as home food availability have been studied extensively and have shown that a high availability of fruits, vegetables, snacks, soda, and dairy is positively correlated with high consumption of these foods, which may potentially influence children's weight status (4-8, 23-25). One HFI (Appendix C), which consists of a list of 80 food items to assess home food availability, has been validated by several studies and may be used to identify accurately the foods that are and are not available in the household. This study used this HFI to assess home food availability and its relationship to children meeting fruit and vegetable and dairy recommendations and their weight status.

Chapter III

Methods and Materials

Introduction

This study was a part of the Healthy Project, a larger study that collected data from 2,800 finalists at the DestiNation Imagination© (DI) Global Finals, an annual event on The University of Tennessee, Knoxville campus. Both the Healthy Project and this subsequent study project were approved by the Institutional Review Board at The University of Tennessee. The Healthy Project's aim was to design and implement a creative afterschool program in the effort to prevent childhood obesity. Participants in grades 3-12 and their parents were asked to provide information on their demographics, activity levels, dietary intake of selected food groups, perceived social status, and weight maintenance and weight loss strategies. Child participants' heights and weights were measured and recorded by trained individuals, whereas parents' heights and weights were self-reported. In 2009, the Healthy Project collected data from 2,397 DI finalists. However, this study will focus on 489 parent and child dyads who completed onsite (children) and online (parents) surveys. This chapter will provide an overview of the methods and materials used to collect and analyze the data.

Research Design & Participants

This study used a cross-sectional, observational research design to examine whether or not a relationship existed between HFA and child weight status. From the subset of 489 parent/child dyads that participated in 2009, data from a total of 489 child participants and their parents were used in this study. In 2009, approximately 6,000 finalists attended that DI Global Finals, from which parental consents were obtained

from 2,991 participants. Parental consent forms were sent out to parents of participants with the DI attendance package. Upon arrival to the University of Tennessee, Knoxville (UTK) campus, parental consents forms were collected at the event registration. During the DI Global Finals data were collected from 2,397 participants (response rate = 80.1%). Some participants, who had not presented at registration with a signed consent form, were allowed to participate if they were with a parent or a legal guardian who signed a parent consent form at one of the data collection sites. Once parental consent was confirmed, the child participant received a four-digit identification code which was placed on his or her badge the signed parent consent form, and the survey which also contained the anthropometric data collection form.

After the completion of onsite data collection from child participants, a letter was sent to their parents/guardians requesting parental participation in an online survey. The letter included the same identification code as their participating child, which parents used to log onto the online survey. The identification code enabled the researchers to match the child participants to the parent participants.

Equipment and Tools

Youth Survey

The youth survey for child participants was formed using relevant questions from the 2007 Youth Risk Surveillance Survey (YRBS) (37). The YRBS, an annually conducted school-based survey, is conducted in collaboration with the Center for Disease Control and Prevention (CDC) by various state, local, educational agencies.

The youth survey for this study asked questions regarding demographic information, activity levels, sedentary behavior, dietary intake of selected food groups, and weight loss methods (Appendix A). The following section will discuss the questions relevant to this study.

Demographic Information Participants' demographic information was collected from the survey. Questions regarding their age, the month they were born in, their grade, gender, years of DI participation, and race and ethnicity, were collected.

Dietary Habits Questions regarding participants' dietary habits were asked as well. Participants were asked to estimate how many times in the past seven days did they eat/drink 100% fruit juice, fruits, vegetables, soda and milk (Appendix A)

Adult Survey

Questions for the adult survey were adapted from two sources: the Behavioral Risk Factor Surveillance Survey (BRFSS) and the Home Shelf/Food Inventory (HFI) (Appendix B). Similar to the YRBS, the BRFSS is a nationwide survey, but it is administered to adults. Through the BRFSS, the CDC collects data on risky behaviors, health precautions, and access to health care for chronic disease conditions. However, this study only included questions from the BRFSS about adult participants' current height, weight, income, physical activity, sedentary behavior, and dietary intake of selected food groups.

Home food availability was assessed using the HFI (Appendix C, a validated list of 80 foods items. Subjects were asked to check a "yes" or "no" box next to each item,

indicating the presence or absence of a food item in the home at the time the survey was completed. A copy of the HFI and permission to use it was obtained from Dr. Susan Crockett. Dr. Crockett and colleagues developed and evaluated HFI in 1992 (33).

Anthropometric Measurements

After child assent was obtained from participants, the Seca S-882 strain gauge digital scales and Seca S-214 Road Rod free-standing stadiometers were used to collect child participants' weights and heights. Prior to data collection, both the scale and stadiometer were placed on a plank of wood to ensure that each station had a hard and even surface. For the purpose of confidentiality the scale and stadiometers were curtained off. Further, the scales were calibrated prior to data collection. Prior to data collection, accuracy of the scales was checked by placing a 10lbs weight on each scale. Prior to obtaining anthropometric measurements, participants were asked to remove any excess clothing such as hats, jackets, shoes, wallets, and watches.

Height and weight measurement were conducted by trained individuals. Weight measurements were taken twice, each to the nearest $\frac{1}{10}$ of a pound. If the measurements differed by more than $\frac{1}{4}$ of a pound, then a third measurement was taken. Averages of the two closest weight measurements were recorded. Similarly, height measurements were taken twice, each to the nearest $\frac{1}{8}$ of an inch. If measurements differed more than a $\frac{1}{4}$ of an inch from each other, a third measurement was completed and averages of the two closest height readings were

recorded. Height and weight measurements were taken after the participant completed the youth survey questions.

Procedure

Child Participants There were four data collection sites, which were strategically placed in high traffic areas of the DI finals. When a child came to the data collection site, the four-digit identification code was written on a survey/data collection form by a trained individual. After verbal assent was obtained, the participant was asked to complete the survey. Tables, chairs, and pencils were provided by the research team. Designated team members were available to answer the participant's questions about the survey questions. After the participants completed the survey, they were asked to move to another area of the data collection site for height and weight measurements. If the participants assented, they were asked to remove extra clothing layers, hats, head pieces, shoes, and items in the pockets. Heights and weights were measured per protocol and then recorded on the last page of the survey, which served as the anthropometric data collection form. Research assistants collected the survey, thanked the children for participating in the study, and offered them complementary low fat milk and a Healthy Project collectable pin.

Adult Participants When parents/guardians signed the parental consent forms, they were asked to provide their mailing address. Within a week after the DI finals, parents and guardians of participants received a letter that thanked them for allowing the child to participate in the study and asked them to complete an online survey. Parents were provided with the same identification codes that were provided to their

children at the finals. The adult surveys were uploaded to mrInterview, an online survey management program (SPSS 17, 2009). Parents entered the website by using their identification codes and answered survey questions. The data were directly entered into a downloadable spreadsheet using the mrInterview program.

Variables

Z-Body Mass Index Scores (z-BMI) BMI z scores were the dependent variable in this study. Prior to calculation of BMI z scores, BMIs were calculated using height and weight of each individual child participant. BMI z scores were calculated using the BMI percentile and a standard normal distribution table. Calculated z scores indicated the deviation of the individual's BMI from the mean BMI of the reference population.

Adult Body Mass Index (BMI) Adult BMI refers to the parent/guardian BMIs, which were self-reported by parents/guardians. Adult BMI was hypothesized as a co-variable in this study. Like child BMI, adult BMI is calculated by dividing weight in kilograms by height in meters squared. A BMI of less than 18.5 is classified as underweight, a BMI 18.5 – 24.9 is healthy weight, a BMI greater than 25.0 but less than 29.9 is considered to be overweight and a BMI greater than 30.0 is considered to be obese.

Food Availability Adult participants were asked to fill out an 80-food item HFI. The HFI is a tool that helps to identify the types of foods available within a household. Adult participants were asked to check the “Yes” box if a food item was present within their household at the time they were taking the survey or check the “No” box if it was not present. The 80-item HFI was then broken into five groups: Dairy, Dressing,

Cereals, Baked Goods, Vegetables and Fruits. This break-down enabled the researchers to look at selected food groups individually.

Food Fat Score Food Fat Score was an independent variable in this study, which enabled researchers to evaluate whether the amount of fat content per serving of each item in a food group correlates with child BMI z scores. Food Fat scores were calculated by inputting each food item list into a nutrition analysis program known as Nutrition Data System for Research (NDSR). NDSR was developed by the Nutrition Coordinating Center at the University of Minnesota. NDSR utilizes the USDA's nutrient database as a reference and is periodically updated with data from new scientific literature.

NDSR displays different forms in which that food is available. For example, bagels can be available in many forms such as whole, white, sesame, and blueberry. In order to calculate "fat score," the researchers took the average of percent calories from fat per serving of each option available and that became that food item's "fat score." If the parent participant selected "yes" (food was present) then the item would be given the "fat score" but if the parent participant selected "no" (food not present) then a score of 0 would be given for that food item. For example, if a participant selected "yes" for regular mayonnaise, which contains 100% of calories per serving came from fat, the food item (mayonnaise) was given a score of 100. If the participant selected "no" for this item, then it was scored as 0.

Total Group Fat Scores Total Group Fat Score was an independent variable in this study and was calculated by adding all of the Food Fat Scores of each food item in

each of the six food groups: Total Dairy Fat Score, Total Dressing Fat Score, Total Cereal Fat Score, Total Baked Goods Scores, Total Vegetables Fat Score, and Total Fruits Fat Score. Total Group Fat Scores were calculated for each participant.

Total Fat Score All fat scores for all 80 food items were summed to calculate a Total Fat Score for each participant. A higher Total Fat Score corresponded to a higher availability of high-fat foods in the household.

Food Fiber Scores This was an independent variable in this study. It enabled researchers to evaluate whether the amount of fiber in grams per serving of each food item on the HFI correlated with child BMI z scores. Like Food Fat Scores, Food Fiber Scores were calculated by inputting each food item into NDSR. In order to calculate “fiber score,” the researchers took the average of grams of fiber per serving of each food option. If the participant selected “yes” (food was present) then the item was given the fiber score, but if the participant selected “no” (food not present), then a score of 0 was given to the food item. For example, if a participant selected “yes” for regular Corn Flakes, the item received a fiber score of 2.22, as the fiber content in a serving of Corn Flakes is 2.22 g. If the participant selected “no,” then the food item was scored as 0.

Total Group Fiber Scores The Total Group Fiber Score was an independent variable and was calculated by adding all the Food Fiber Scores of each food item in the six food groups: Total Dairy Fiber Score, Total Dressing Fiber Score, Total Cereal Fiber Score, Total Baked Goods Fiber Scores, Total Vegetables Fiber Score, and Total Fruits Fiber Score. Total Group Fiber Scores were calculated for each participant.

Total Fiber Scores All fiber scores for all 80 food items were summed to calculate a Total Fiber Score per participant. A higher Total Fiber Score corresponded to a higher availability of high-fiber foods in the household.

Data Analysis

Four research questions were proposed in this study:

Question 1: Do Total Fat Score, Total Fiber Score, and Family income predict child z-BMI score, while controlling for parent weight status?

The researchers predicted that the higher the Total Fat Score, the lower the Total Fiber Score, and the lower the income, the higher the child weight status would be.

Question 2: If Total Fat and Fiber Scores significantly predict child z-BMI scores, do any of the six Total Group Fat Scores and Total Group Fiber Scores predict child z-BMI scores?

The researchers predicted that if Total Fat and Fiber Scores significantly correlated with child z-BMI, then a significant correlation would be observed between the six Total Group Fat Scores and child z-BMI and a significant relationship would be observed between the six Total Fiber Score and child z-BMI.

Question 3: Do the Total Vegetable Fiber Score and Total Fruit Fiber Score predict child z-BMI score?

The researchers predicted that a significant relationship would be observed between Total Vegetable and Fruit Fiber Scores. The higher the Total Vegetable and Fruit Fiber Score the lower the child z-BMI will be.

Question 4: Does the availability of fruits, vegetable and milk in participants' homes influence whether the participant consumed the recommended servings of these foods?

The researchers predicted that the higher the availability of vegetables, fruits, and milk in a household, the more likely the child participant would be to meet the recommended servings of these foods.

In order to answer the research questions proposed by this study, general descriptive and multiple linear regression statistics were conducted. Data analysis was performed using SPSS 17.0 statistical software for Windows. Significance for all statistical analyses was set at $p < 0.05$.

Descriptive Statistics

Demographic characteristics including child participants' age, gender, z-BMI scores, as well as adult participants' age, gender, BMI, and income, were summarized using frequencies and means. In addition, analysis of the demographic variables was conducted using appropriate parametric and non-parametric tests. If significant differences existed, these differences were controlled in the multiple linear regression analysis.

Whether a child participant met the USDA recommended servings of vegetables, fruits and milk were calculated by using the YRBS survey questions. Questions on the

survey asked participants how often during the week prior did they eat a particular type of vegetable, as well as fruits, and fruit juices. Similarly, participants were asked how many glasses of milk they consumed in the past seven days. If a child participant indicated that they ate five or more servings of fruits and vegetables per day, they were classified as meeting the recommended servings of fruits and vegetables. If they consumed less than five servings of fruits and vegetables per day, they were classified as not meeting the recommended servings. Likewise, if child participants reported that they drank three or more glasses of milk per day, they were classified as meeting the recommended servings of milk and if not, they were classified as not meeting the recommendation.

Statistical Analysis

Linear regression models show the relationship between the independent and dependent variable. Regression analysis can be supported by a general formula $y = f(x)$, meaning y is a function of x . To elaborate, y depends on x , therefore x determines the value of y . In other words, x would be the independent variable and y would be the dependent variable. If a linear relationship exists between the x and y variables, an equation determined by plotting x against y will describe the mathematical relationship between the two variables. In this case, our independent variables were Total Fat Scores, Total Group Fat Scores, Total Fiber Score, and Total Group Fiber Scores. Parent BMI was a co-variable and the dependent variable was child z-BMI score. Therefore, a multiple linear regression analysis was performed in order to explore whether linear relationships exist between these variables.

A “t test” enables the determination whether the mean of two samples are statistically different from each other. A fruit and vegetable count were created to measure the number of fruits and vegetables were available within the homes. The t test was used to examine whether a relationship existed between the number of fruits and vegetables and whether the participants met the recommended servings of these foods. Similarly, to examine whether the availability of milk within the household was related to whether participants consumed the recommended servings of milk per day, a milk count was created to count the number of different milks available within the household. However, this was not possible as nearly all participant households had milk available, therefore it could not be tested to see if a difference existed.

Chapter IV

Results

As seen in Table 1, the mean age of the 489 child participants was 12.8 ± 1.7 years. Approximately, 93% of participants were non-Hispanic White while only 7% of them reported to be of other races, which included non-Hispanic Black or African American, American Indian, Alaskan native, native Hawaiian or Pacific Islander, and Asian. There were a total of 258 (52.8 %) female participants and 231 (47.2 %) male participants. The majority of participants attended middle school. As seen Table 2, the majority of the participants were classified as normal weight (78.9%) (BMI percentile $<85^{\text{th}}$ percentile), whereas only 1.8% were classified as underweight and approximately 12.5% and 6.7% of participants were classified as overweight (BMI percentile $\geq 85^{\text{th}}$ percentile and $<95^{\text{th}}$ percentile) or obese (BMI percentile $\geq 95^{\text{th}}$ percentile), respectively.

Table 3 displays the adult participant weight status and annual household income distribution. Approximately 1% of parents were underweight (BMI ≤ 18), 52% were normal weight (BMI ≥ 18 but <25), 29% were overweight (BMI ≥ 25), and 18% were classified as obese (BMI ≥ 30). Further, less than 8% of parents reported a household income of $> \$25,000 - \$50,000$, 35% earned $\$50,001 - \$100,000$, 30% earned $\$100,001 - \$150,000$, and 22% earned $> \$150,000$.

Table 4 represents the number of child participants who consumed the recommended five to six servings of fruits and vegetables per day in the week prior to data collection. This table shows that 26% of the child participants consumed the recommended

Table 1. 2009 Healthy Project Child Participant Demographics for Parent/Child Dyads.

	N	%
Overall	489	100.0
Age ($\bar{x}$, SD)	12.8	1.7
Gender		
Female	258	52.8
Male	231	47.2
Race		
Non-Hispanic White	455	93.0
Other*	34	7.0
School[‡]		
Elementary	29	5.9
Middle	319	65.2
High	140	34.9
Weight Status	$\bar{x}$	SD
Child z-BMI	0.24	0.92

*Includes: non-Hispanic Black or African American, American Indian, Alaskan native, native Hawaiian or Pacific Islander, and Asian.[‡] Elementary includes 4-5th grade; Middle includes 6-8th grade; High includes 9-12th grade.

Table 2. 2009 Healthy Project Child Participant Weight Categories by Gender and School Level for Parent/Child Dyads.

	Underweight		Normal Weight		Overweight		Obese	
	N	%	N	%	N	%	N	%
Total	9	1.8	386	78.9	61	12.5	33	6.7
Gender								
Female	5	1.9	206	79.8	29	11.2	18	7.0
Male	4	1.7	180	77.9	32	13.9	15	6.5
School								
Elementary	1	3.4	26	89.7	1	3.4	1	3.4
Middle	4	1.3	248	77.7	42	13.1	25	7.8
High	4	2.9	112	80.0	17	12.1	7	5.0

Table 3. 2009 Healthy Project Parent Participant Demographics for Parent/Child Dyads.

	N	%
Parent Weight Status		
Underweight	5	1.0
Normal weight	254	51.9
Overweight	140	28.6
Obese	90	18.4
Income		
Less than \$25,000 - \$50,000	35	7.1
\$50,001 – \$100,000	169	34.6
\$100,001 – \$150,000	147	30.1
More than \$150,000	105	21.5
Missing	21	4.3

Table 4. . Percent of 2009 Healthy Project Child Participants (from Parent/Child Dyads) Who Met Recommended Servings of Fruits and Vegetables and Milk in the Week Prior to Global Finals

Met recommended servings of 5 or more servings of fruits and vegetables	N	%
Total	128	26.0
Female	68	26.4
Male	60	26.0
Met recommended 3 or more servings of milk	N	%
Total	83	17.0
Female	35	13.6
Male	48	20.8

servings of fruits and vegetables. A total of 26.4% of female participants consumed 5 or more servings of fruits and vegetables per day in the past 7 days. Whereas, 26% their male counterparts consumed the same.

Similarly, this study looked at child participants who consumed more than three glasses of milk per day for the week prior to the data collection. Approximately 17% of participants met the recommendations. Further, 13.6% of middle and high school female participants consumed more than three glasses of milk per day in the week prior to data collection, but male participants tended to consume more milk than their female counterparts.

Table 5 describes the types of milk that were available in participants' households. From a total of 487 participants, 9% reported having whole milk available, 35% reported having 2% milk available, 36% reported having 1% milk available, and 43% reported having fat-free (skim) milk available in their households. Table 5 indicates that most all of the participants reported having some type of milk available to them. The least number of participants (9%) reported having whole milk available, while the greatest number of participants (43%) reported having skim milk.

Further, Table 5 represents the types of vegetables that are available in participant households as reported by parents. The table is sorted from the least available to the most available vegetable. Table 5 shows that fresh carrots were reported to be in 80% of homes, as were frozen corn and frozen peas. The least available vegetables were brussels sprouts, fresh peas, and cabbage. Also, compared to fresh vegetables, the results showed that frozen vegetables were more readily

Table 5. Percent of 2009 Healthy Project Participant Households (from Parent/Child Dyads) that Have Milk, Vegetables and Fruits Available

	N	%
Total Participant Households	487	100
Milk		
Whole Milk	46	9
2% Milk	169	35
1% Milk	174	36
Skim Milk	208	43
Frozen Vegetables		
Frozen Brussels Sprouts	64	13
Frozen Cauliflower	108	22
Frozen Carrots	126	26
Frozen California Blend	168	34
Frozen Spinach	178	36
Frozen Broccoli	258	53
Frozen Mixed Vegetables	300	61
Frozen Peas	343	70
Frozen Corn	351	72

Fresh Vegetables

Brussels Sprouts	44	9
Peas	98	20
Cabbage	99	20
Cauliflower	128	26
Spinach	190	39
Corn	210	43
Broccoli	293	60
Carrots	419	86

Fruits

Grapefruit	97	20
Pears	124	25
Oranges	253	52
Blueberries	265	54
Strawberries	389	80
Bananas	417	85
Apples	439	90

available in participants' households. Also, Table 5 shows the types of fruits available in participant households. Apples and bananas were available in the largest number of households, while grapefruit and pears were the least available.

Table 6 shows the mean and SD total fat and fiber scores as well as group fat and fiber scores. For Total Fat Score the mean per household was 990 and had a SD of 244. The data showed that the Total Fiber Score mean per household was 58 and the SD was 19.

Through the use of linear regression it was found that parent weight status did seem to have a moderate correlation with child z-BMI ($\alpha=0.00$). However, by using multiple linear regression no significance relationship was found between Total Fat Score, Total Fiber Score, and Family income and child z-BMI while controlling for parent weight status. No significance was found between Total Fat and Fiber scores and child z-BMI. Hence no significance was found between Total Group Fat and Total Group Fiber score (the six groups were: Dairy, Dressing, Cereal, Baked Goods, Vegetables, and Fruits) and child z-BMI score. No significance was found between Total Vegetable and Fruit Fiber scores and child z-BMI scores. Therefore, the value of the Total Vegetable Fruit Fiber score did not influence the participant's weight status. Through t test it was found that there was no significant association between the availability of fruits and vegetables meeting recommendations for these food. A Mann-Whitney test was not run because only 3 households reported not having any type of milk available within the household. Therefore, it was not possible to compare participants who met recommendations with those who did not meet recommendations.

Table 6. 2009 Healthy Project Participant Households (from Parent/Child Dyads)
Total Fat Scores, Total Group Fat Scores, Total Fiber Scores, and Total Group
Fiber Scores

Fat Score	$\bar{x}$	SD
Total Fat Score	990	244
Total Vegetable Fat Score	42	19
Total Fruit Fat Score	17	7
Total Dairy Fat Score	369	120
Fiber Score		
Total Fiber Score	58	19
Total Vegetable Fiber Score	8	4
Total Fruit Fiber Score	8	3

Chapter V

Discussion

Prevalence of Overweight/Obesity

According to NHANES data from 2007-2008, 16% of children ages 6-19 years were overweight and 18.7% were obese (34.7% were overweight/obese). Compared to national rates of overweight and obesity, only a small proportion of the child participants in this study were classified as overweight or obese (19.2%), of which 12.5% were overweight and 6.7% were obese.

Compared to the national statistics of overweight and obesity among females aged 6-19 years, female participants in this study were leaner. In 2009, nationwide 16.8% and 17.3% of females were classified as overweight and obese, respectively, whereas in this study only 11.2% and 7% of females were overweight and obese, respectively (11, 39). Similar to national prevalence trends, in this study, the prevalence of overweight among female participants tended to be lower than male participants in this study. However, the prevalence of male overweight and obesity among participants in this study was lower than the national averages. Nationwide, 15.2% of males, aged 6-19 years, were overweight and 20.1% were obese compared to this study, which showed that only 13.9 % of male participants were overweight and 6.5% were obese.

Dietary Behaviors

In this study, participants' vegetable, fruit, and milk consumption was investigated by a survey using questions taken from the YRBS survey. At this time, the YRBS survey

is only distributed at the high school level. However, there is not another national survey that includes middle school respondents. Thus, for the purpose of discussion, the data in this study, which includes both middle and high school age participants, will be compared to the 2009 high school YRBS data.

According to YRBS 2009, only 22.3% of 9-12th graders consumed five or more fruits and vegetables (100% fruit juices, fruit, green salad, potatoes [excluding French fries, fried potatoes, or potato chips], carrots, or other vegetables) per day during the seven days prior to the survey (39). According to national trends, female adolescents consumed less fruits and vegetables (20.5%) whereas, 23.9% of male adolescents consumed five or more servings of fruits and vegetables per day during the seven days prior to the survey (39). However, in this study a total of 26% of middle and high school participants consumed fruits and vegetables five or more times per day during the seven days prior to the survey, which was slightly higher than the national average. Unlike national trends, both male (26.0%) and female (26.4%) adolescents proportionally consumed approximately the same amount of fruits and vegetables.

This study assessed milk consumption among middle and high school students as well. According to the YRBS 2009 data, a total of 14.5% of 9-12th graders consumed three or more glasses per day of milk during the seven days prior to the survey (39). Overall, results showed that participants in this study consumed more milk than national data. It is important to note that the DI finals were sponsored by the National Dairy Council that provided free milk to participants at the finals, which could have potentially influenced results. However, the results showed that a total of 17.0% of middle and high

school participants consumed three or more glasses of milk per day during the week prior to data collection. Nationwide, male adolescents tended to consume more milk (19.8%) per day compared to their female counterparts (8.7%). A similar trend was observed in this study as well, as male participants tended to consume more milk per day than females did (20.8% and 13.6%, respectively). However, female participants in this study consumed more milk per day than female adolescents nationwide.

Overall, both the national survey data and this study data show that respondents did not consume the recommended servings of fruit, vegetables and milk. However, compared to YRBS 2009 results, the participants in this study consumed more fruits, vegetables and milk on a daily basis in the week prior to data collection.

Home Availability

Several studies have shown that the availability of fruits, vegetables and dairy products in the household significantly predicts the consumption of these products by family members (4-8). However, many of these studies had small sample sizes and failed to discuss the types of foods that were actually available within the households. This study is unique as it had a large sample size and identified the types of food available to the participants in their households that may influence their dietary intake.

In this study, there was a high availability of fresh and frozen vegetables. However, it was observed that in these households frozen vegetables were predominantly available. Except for the availability of fresh carrots and broccoli, three of the five most available vegetables were frozen mixed vegetables, frozen peas, and frozen corn. In a pilot study by Sisk and colleagues, which looked at home food

availability over a 30-day period in nine households, the most common types of fresh vegetable, were lettuce and carrots (41). Also, in this study, the most commonly available frozen vegetables were corn, peas, mixed, and broccoli. Similarly in the study by Sisk, the researchers found that mixed frozen vegetables was one of the most commonly available vegetables. However, unlike the current study one of the least available frozen vegetables was corn. In a study by Morland and Filemena, which studied 50% of stores, and fruit and vegetable markets in two Brooklyn Community Districts, found that frozen vegetables were readily available in all neighborhoods. Fruits and vegetables were more readily available in racially diverse neighborhoods (42). Even though there is no difference nutritionally between fresh and frozen vegetables, it was an interesting observation of this study and Morland's study that frozen vegetables were more available in household and neighborhoods compared to fresh vegetables (42). This availability may be attributed to several reasons, such as convenience, affordability, store availability even though it may not be in season, accessibility, and shelf life (42). The most common type of fresh fruits available were apples and bananas and the least common type of fruit available was grapefruit. These findings show consistently that apples and bananas were the most common types of fresh fruit available.

A large proportion of participant households had milk available in them. The majority of participant households had low-fat milk available (skim and 1% milk), and a lower proportion had 2% and whole milk. In the study by Sisk, the researchers found that approximately half of their participants had whole milk available and the other half had low fat milk available over a 30-day period (41).

Interaction between home food availability and dietary behavior

Dietary behavior can vary dramatically, as it can be influenced by multiple factors such as personal beliefs as well as environmental factors such as the availability and accessibility of particular foods (43). Several studies have found that the availability of these foods in the household significantly influences the intake of these food items (4-8). Despite the findings of these studies, in this study a significant relationship between the availability of fruits, vegetables, and milk, and the reported intake of these foods was not observed, even though participants reported consuming more servings of fruits and vegetables compared to YRBS 2009 data participants (40).

There could multiple reasons that could explain the findings of this study. A strong relationship may not have been observed between home food availability and dietary behaviors because this study did not focus on other factors that may influence children's dietary behaviors such as parental eating behaviors, foods served at family meals, foods consumed away from home, especially at school, and soft drinks available in the home.

Studies by Hanson and colleagues and Arcan and colleagues found that availability of healthier foods in the household did not influence child intake unless parents modeled eating healthier foods and offered and encouraged them at meal times (4, 6). Similarly, a study done with 366 middle schools students found that the consumption of vegetables, fruits, and milk increased when children observed parents consuming these foods (44). Further, according to Videon and Manning, in addition to seeing their parents as role models, children often associate family meals with healthful eating behavior (45). However, due to the increasing number of households where both

parents work, family meals have become less frequent. However, the importance of family meals cannot be underestimated. The study by Videon and Manning revealed that adolescents who ate meals with a parent present more than three times a week were at a lower risk of poor consumption of fruits, vegetables and dairy (45). The current study did not look at parental dietary behavior and foods served at family meals, which could explain why a correlation between home availability and intake was found to be weak.

Due to time constraints families are finding it difficult to consume home-prepared meals together, fast foods provide an easy and affordable alternative (46). However, studies have shown that fast food tends to be energy dense, higher in fat, sugar content and lower in nutrients (46). In a study by Boutelle and colleagues, researchers found that children whose parents reported eating fast food more than three times per week more likely to report the availability of soda, pop and chips within the home (46). The presence of soda within the household has been suggested by Arcan and colleagues to be strongly be correlated with its intake, which is inversely related to the intake of milk (6). On the other hand, the study by Boutelle revealed that families who did not report the purchase of fast food were more likely to have fruit, vegetables, and dairy present within their household and were more likely to report these foods being served at family meals (46). As mentioned earlier, adolescents were more likely to report a higher consumption of fruits, vegetables and dairy when present at family meals. The current study did not look at foods available or consumed by the participants outside the home, which could also explain the weak correlation between foods within the home and the dietary intake of these foods and child weight status.

Schools are another location where children obtain and consume meals away from home. Schools are the primary place where children spend the majority of their time and on average consume at least one meal at school (47). Approximately, 31 million children participate in the National School Lunch Program each day, and despite being obligated to adhere to the Dietary Guidelines for Americans, a recent study revealed that nearly half the children who consume school lunches also consume too much energy and do not consume enough micronutrients (30, 47). Also, schools provide students access to competitive foods such as sodas and other beverages and snacks in vending machines and school stores (30). In one noteworthy study, the results showed that consumption of soda was indirectly proportional to the intake of milk (6). Hence, the availability of different types of foods in the school environment can strongly influence children's dietary behaviors, And so, in this study, a significant relationship between the home availability of fruits, vegetables, and milk and dietary behaviors was not observed.

Overall, as described by numerous studies (4-36), a child's diet can be influenced by multiple factors. It seems that in this study, that availability of foods in the household does not predict dietary intake. However, dietary intake can be strongly influenced by parent modeling, availability of foods at family meals, and meals consumed away from home in the form of fast food or school meals. Therefore, future research could try incorporating key areas that have been demonstrated by others to strongly influence children's diet.

Interaction home food availability and weight status

Studies have shown that a high home availability of high-fat, low-fiber foods (whole milk, potato chips, candy) was correlated with higher weight status among children. Similarly, a high availability of low-fat, high-fiber foods (fruits, vegetables, legumes) was associated with lower weight status children (5, 7, 48-49). The findings of the current study with DI participants were not consistent with the findings of previous studies. A significant relationship between the home availability and weight status was not observed. As discussed earlier, participants' food intake may be influenced by parents' dietary behaviors, family meals, and foods consumed away from home, all of which can potentially affect weight status. In addition to these factors, a child's home physical activity environment can influence weight status. A previous study conducted with DI participants in 2008 revealed that these participants tended to be moderately to vigorously active on a daily basis, which was also associated with participants' weight status (50). High levels of physical activity can negate the calories consumed, and thus not influence weight status. The current study did not look at physical activity levels in relationship to weight status and home food availability. However, this may have been a covariate that influenced the findings of this study.

Limitations, strengths and future research

In this study, there were a number of limitations. Primarily, this study was cross-sectional, in that it represents a snap shot in time, and may not have represented what is typical of participants' dietary behaviors and home food environments. The survey questions, which were derived from the YRBS survey, required participants to report the quantity of fruits, vegetables and milk consumed in the week prior to DI finals and

travelling, which may have led to participants reporting food that may not be typically consumed. Further, the overall response rate of 39.9% reflects that some DI participants chose not to participate in this study (50). This may have resulted in researchers not acquiring information from parents and guardians who could be potentially overweight and who did not wish for their children to participate. Further, there were a number of children who received parental consent, but chose not to participate at the data collection site. Again, this may have caused researchers not to collect information from children who were comparatively overweight and had unhealthier behaviors compared to their healthier counterparts (50).

Another limitation of this study was that home food availability was self-reported by parents and guardians, without direct objective measures, meaning that there was no method of evaluating the accuracy of the reported item. Therefore, misreporting of foods could have been possible, so that food items were reported present might not have been actually present, and so that foods that were present were not reported as present within the household. Further, information on the types and quantities of foods that are typically consumed by children away from home was not asked. Of course, this too could have been a significant contributing factor to participants' food intake and weight status.

There were several strengths in this study, including a large sample size for which heights and weights were measured and recorded by trained individuals. This study was unique, as it compared data collected from parent and child dyads, parent weights were compared to their child's measured weight. Further, this study is the first

of its kind that describes the types of foods that were available in the households of 489 U.S. middle and high school children. For the purposes of future research, researchers would recommend including measures for parental dietary behaviors, family meals, soda availability at home, participants' physical activity level, participants' sedentary behavior, as well as parents' physical activity level.

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Appendices

Appendix A

5th Grade & Under 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="4" style="text-align: center; padding: 5px;">Weight (in lbs)</th> </tr> <tr> <td style="width: 25%; height: 20px;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> </tr> <tr> <td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr> <td style="text-align: center;">1</td><td style="text-align: center;">1</td><td style="text-align: center;">1</td><td style="text-align: center;">1</td></tr> <tr> <td style="text-align: center;">2</td><td style="text-align: center;">2</td><td style="text-align: center;">2</td><td style="text-align: center;">2</td></tr> <tr> <td style="text-align: center;">3</td><td style="text-align: center;">3</td><td style="text-align: center;">3</td><td style="text-align: center;">3</td></tr> <tr> <td style="text-align: center;">4</td><td style="text-align: center;">4</td><td style="text-align: center;">4</td><td style="text-align: center;">4</td></tr> <tr> <td style="text-align: center;">5</td><td style="text-align: center;">5</td><td style="text-align: center;">5</td><td style="text-align: center;">5</td></tr> <tr> <td style="text-align: center;">6</td><td style="text-align: center;">6</td><td style="text-align: center;">6</td><td style="text-align: center;">6</td></tr> <tr> <td style="text-align: center;">7</td><td style="text-align: center;">7</td><td style="text-align: center;">7</td><td style="text-align: center;">7</td></tr> <tr> <td style="text-align: center;">8</td><td style="text-align: center;">8</td><td style="text-align: center;">8</td><td style="text-align: center;">8</td></tr> <tr> <td style="text-align: center;">9</td><td style="text-align: center;">9</td><td style="text-align: center;">9</td><td style="text-align: center;">9</td></tr> </table>	Weight (in lbs)								0	0	0	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5	5	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="4" style="text-align: center; padding: 5px;">Height (in inches)</th> </tr> <tr> <td style="width: 25%; height: 20px;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> </tr> <tr> <td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td><td style="text-align: center;">0</td></tr> <tr> <td style="text-align: center;">1</td><td style="text-align: center;">1</td><td style="text-align: center;">1</td><td style="text-align: center;">1/8</td></tr> <tr> <td style="text-align: center;">2</td><td style="text-align: center;">2</td><td style="text-align: center;">2</td><td style="text-align: center;">1/4</td></tr> <tr> <td style="text-align: center;">3</td><td style="text-align: center;">3</td><td style="text-align: center;">3</td><td style="text-align: center;">3/8</td></tr> <tr> <td style="text-align: center;">4</td><td style="text-align: center;">4</td><td style="text-align: center;">4</td><td style="text-align: center;">1/2</td></tr> <tr> <td style="text-align: center;">5</td><td style="text-align: center;">5</td><td style="text-align: center;">5</td><td style="text-align: center;">5/8</td></tr> <tr> <td style="text-align: center;">6</td><td style="text-align: center;">6</td><td style="text-align: center;">6</td><td style="text-align: center;">3/4</td></tr> <tr> <td style="text-align: center;">7</td><td style="text-align: center;">7</td><td style="text-align: center;">7</td><td style="text-align: center;">7/8</td></tr> <tr> <td style="text-align: center;">8</td><td style="text-align: center;">8</td><td style="text-align: center;">8</td><td></td></tr> <tr> <td style="text-align: center;">9</td><td style="text-align: center;">9</td><td style="text-align: center;">9</td><td></td></tr> </table>	Height (in inches)								0	0	0	0	1	1	1	1/8	2	2	2	1/4	3	3	3	3/8	4	4	4	1/2	5	5	5	5/8	6	6	6	3/4	7	7	7	7/8	8	8	8		9	9	9	
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1. What grade will you be going into next year?

- ☐ 3rd
- ☐ 4th
- ☐ 5th

2. In what month were you born?

- ☐ January
- ☐ February
- ☐ March
- ☐ April
- ☐ May
- ☐ June
- ☐ July
- ☐ August
- ☐ September
- ☐ October
- ☐ November
- ☐ December

3. In what year were you born?

- ☐ 1998
- ☐ 1999
- ☐ 2000

4. What is your gender?

- ☐ Girl
- ☐ Boy

5. Are you Hispanic or Latino?

- ☐ Yes
- ☐ No

6. What is your race? (Select one or more responses.)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian/Other Pacific Islander
- ☐ White

7. Including this year, how many years have you participated in DI®?

- ☐ 1 year (My first year)
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years
- ☐ 5 or more years

6th Grade Survey

Instructions

This survey is about health behavior. The information you give will be used to develop better health education for young people like yourself.

DO NOT write your name on this survey. The answers you give will be kept private. No one will know what you write. Answer the questions based on what you really do.

Completing the survey is voluntary. If you don't want to answer a question, just leave it blank. The questions that ask about you specifically will only be used to describe the types of young people completing this survey. The information will not be used to find out your name.

Make sure to read every question. Fill in the circles completely. When you are finished, follow the instructions of the person giving you the

Thank you very much for your help.

DIRECTIONS

- Use a #2 pencil only.
- Make dark marks.
- Fill in a response like this:
- If you change your answer, erase your old answer completely.



Research Team Use Only			
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4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

1. How old are you?

- ☐ 9 years old or younger
- ☐ 10 years old
- ☐ 11 years old
- ☐ 12 years old
- ☐ 13 years old

2. In what month were you born?

- ☐ January
- ☐ February
- ☐ March
- ☐ April
- ☐ May
- ☐ June
- ☐ July
- ☐ August
- ☐ September
- ☐ October
- ☐ November
- ☐ December

3. In what year were you born?

- ☐ 1996
- ☐ 1997
- ☐ 1998
- ☐ 1999
- ☐ 2000
- ☐ 2001

4. What is your sex?

- ☐ Female
- ☐ Male

5. What grade will you be going into next year?
- ☐ 6th grade
6. Including this year, how many years have you participated in Destination ImagiNation®?
- ☐ 1 year (My first year)
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years
- ☐ 5 or more years
7. Are you Hispanic or Latino?
- ☐ Yes
- ☐ No
8. What is your race? **(Select one or more responses.)**
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White

The next 7 questions ask about a different subject.

9. How do **you** describe your weight?
- ☐ Very underweight
- ☐ Slightly underweight
- ☐ About the right weight

- ☐ Slightly overweight
- ☐ Very overweight

10. Which of the following are you trying to do about your weight?

- ☐ **Lose** weight
- ☐ **Gain** weight
- ☐ **Stay** the same weight
- ☐ I am **not trying to do anything** about my weight

11. During the past 30 days, did you **exercise** to lose weight or to keep from gaining weight?

- ☐ Yes
- ☐ No

12. During the past 30 days, did you **eat less food, fewer calories, or foods low in fat** to lose weight or to keep from gaining weight?

- ☐ Yes
- ☐ No

13. During the past 30 days, did you **go without eating for 24 hours or more** (also called fasting) to lose weight or to keep from gaining weight?

- ☐ Yes
- ☐ No

14. During the past 30 days, did you **take any diet pills, powders, or liquids** without a doctor's advice to lose weight or to keep from gaining weight? (Do **not** include meal replacement products such as Slim Fast.)
- ☐ Yes
- ☐ No
15. During the past 30 days, did you **vomit or take laxatives** to lose weight or to keep from gaining weight?
- ☐ Yes
- ☐ No

The next 5 questions ask about your physical activity.

16. During the past 7 days, on how many days were you physically active for a total of **at least 60 minutes per day**? (Add up all the time you spend in any kind of physical activity that increases your heart rate and makes you breathe hard some of the time.)
- ☐ 0 days
- ☐ 1 day
- ☐ 2 days
- ☐ 3 days
- ☐ 4 days
- ☐ 5 days
- ☐ 6 days
- ☐ 7 days
17. On an average school day, how many hours do you watch TV?
- ☐ I do not watch TV on an average school day
- ☐ Less than 1 hour per day

- ☐ 1 hour per day
- ☐ 2 hours per day
- ☐ 3 hours per day
- ☐ 4 hours per day
- ☐ 5 or more hours per day

18. On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Include activities such as Nintendo, Game Boy, PlayStation, Xbox, computer games, and the Internet.)

- ☐ I do not play video or computer games or use a computer for something that is not school work
- ☐ Less than 1 hour per day
- ☐ 1 hour per day
- ☐ 2 hours per day
- ☐ 3 hours per day
- ☐ 4 hours per day
- ☐ 5 or more hours per day

19. In an average week when you are in school, on how many days do you go to physical education (PE) classes?

- ☐ 0 days
- ☐ 1 day
- ☐ 2 days
- ☐ 3 days
- ☐ 4 days
- ☐ 5 days

20. During the past 12 months, on how many sports teams did you play? (Include any teams run by your school or community groups.)

- ☐ 0 teams
- ☐ 1 team
- ☐ 2 teams
- ☐ 3 or more teams

The next 8 questions ask about food you ate or drank during the past 7 days. Think about all the meals and snacks you had from the time you got up until you went to bed. Be sure to include food you ate at home, at school, at restaurants, or anywhere else.

21. During the past 7 days, how many times did you drink **100% fruit juices** such as orange juice, apple juice, or grape juice? (Do **not** count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks.)

- ☐ I did not drink 100% fruit juice during the past 7 days
- ☐ 1 to 3 times during the past 7 days
- ☐ 4 to 6 times during the past 7 days
- ☐ 1 time per day
- ☐ 2 times per day
- ☐ 3 times per day
- ☐ 4 or more times per day

22. During the past 7 days, how many times did you eat **fruit**? (Do **not** count fruit juice.)

- ☐ I did not eat fruit during the past 7 days
- ☐ 1 to 3 times during the past 7 days
- ☐ 4 to 6 times during the past 7 days
- ☐ 1 time per day
- ☐ 2 times per day
- ☐ 3 times per day
- ☐ 4 or more times per day

23. During the past 7 days, how many times did you eat **green salad**?

- ☐ I did not eat green salad during the past 7 days
- ☐ 1 to 3 times during the past 7 days
- ☐ 4 to 6 times during the past 7 days
- ☐ 1 time per day
- ☐ 2 times per day
- ☐ 3 times per day
- ☐ 4 or more times per day

24. During the past 7 days, how many times did you eat **potatoes**? (Do **not** count French fries, fried potatoes, or potato chips.)

- ☐ I did not eat potatoes during the past 7 days
- ☐ 1 to 3 times during the past 7 days
- ☐ 4 to 6 times during the past 7 days
- ☐ 1 time per day
- ☐ 2 times per day
- ☐ 3 times per day
- ☐ 4 or more times per day

25. During the past 7 days, how many times did you eat **carrots**?

- ☐ I did not eat carrots during the past 7 days
- ☐ 1 to 3 times during the past 7 days
- ☐ 4 to 6 times during the past 7 days
- ☐ 1 time per day
- ☐ 2 times per day
- ☐ 3 times per day

☐ 4 or more times per day

26. During the past 7 days, how many times did you eat **other vegetables**? (Do **not** count green salad, potatoes, or carrots.)

☐ I did not eat other vegetables during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

27. During the past 7 days, how many times did you drink a can, bottle, or glass of soda or pop, such as Coke, Pepsi, or Sprite? (Do **not** include diet soda or diet pop.)

☐ I did not drink soda or pop during the past 7 days

☐ 1 to 3 times during the past 7 days

☐ 4 to 6 times during the past 7 days

☐ 1 time per day

☐ 2 times per day

☐ 3 times per day

☐ 4 or more times per day

28. During the past 7 days, how many **glasses of milk** did you drink? (Include the milk you drank in a glass or cup, from a carton, or with cereal. Count the half pint of milk served at school as equal to one glass.)

- ☐ I did not drink milk during the past 7 days
☐ 1 to 3 glasses during the past 7 days
☐ 4 to 6 glasses during the past 7 days
☐ 1 glass per day
☐ 2 glasses per day
☐ 3 glasses per day
☐ 4 or more glasses per day

The End!

For Research Team Use Only

Weight (in lbs)			
			.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Height (in inches)		
0	0	0
1	1	1/8
2	2	1/4
3	3	3/8
4	4	1/2
5	5	5/8
6	6	3/4
7	7	7/8
8	8	
9	9	

Appendix A

7th – 12th Grade Survey

Instructions

This survey is about health behavior. The information you give will be used to develop better health education for young people like yourself.

DO NOT write your name on this survey. The answers you give will be kept private. No one will know what you write. Answer the questions based on what you really do.

Completing the survey is voluntary. If you don't want to answer a question, just leave it blank. The questions that ask about you specifically will only be used to describe the types of young people completing this survey. The information will not be used to find out your name. Make sure to read every question. Fill in the circles

completely. When you are finished, follow the instructions of the person giving you the survey.

Thank you very much for your help.



DIRECTIONS	
• Use a #2 pencil only.	
• Make dark marks.	
• Fill in a response like this:	☒

Research Team Use Only			
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

1. How old are you?

- ☐ 11 years old or younger
- ☐ 12 years old
- ☐ 13 years old
- ☐ 14 years old
- ☐ 15 years old
- ☐ 16 years old
- ☐ 17 years old
- ☐ 18 years old
- ☐ 19 years old or older

2. In what month were you born?

- ☐ January
- ☐ February
- ☐ March
- ☐ April
- ☐ May
- ☐ June
- ☐ July
- ☐ August
- ☐ September
- ☐ October
- ☐ November
- ☐ December

3. In what year were you born?

☐ 1990

☐ 1991

☐ 1992

☐ 1993

☐ 1994

☐ 1995

☐ 1996

☐ 1997

☐ 1998

☐ 1999

4. What is your sex?

☐ Female

☐ Male

5. What grade will you be going into next year?

☐ 7th grade

☐ 8th grade

☐ 9th grade

☐ 10th grade

☐ 11th grade

☐ 12th grade

6. Including this year, how many years have you participated in Destination ImagiNation®?

☐ 1 year (My first year)

☐ 2 years

☐ 3 years

☐ 4 years

☐ 5 or more years

7. Are you Hispanic or Latino?

☐ Yes

☐ No

8. What is your race? **(Select one or more responses.)**

☐ American Indian or Alaska Native

☐ Asian

☐ Black or African American

☐ Native Hawaiian or Other Pacific Islander

☐ White

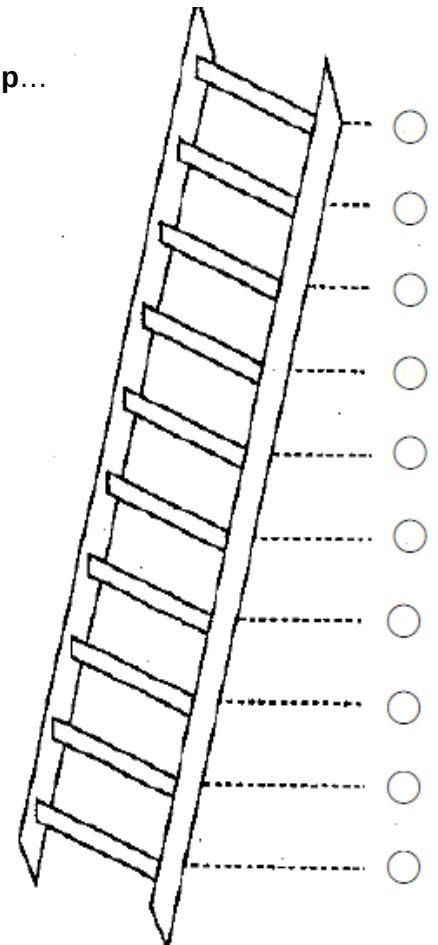
9. Imagine that this ladder pictures how **American society is set up...**

At the top of the ladder are the people who are the best off – they have the most money, the highest amount of schooling, and the jobs that bring the most respect.

At the bottom are people who are the worst off – they have the least money, little or no education, no job or jobs that no one wants or respects.

Now think about your family. Please tell us where you think your family would be on this ladder. **Fill in the circle that best represents where your family would be on this ladder.**

10. Now assume that the ladder is a way of **picturing your school.**

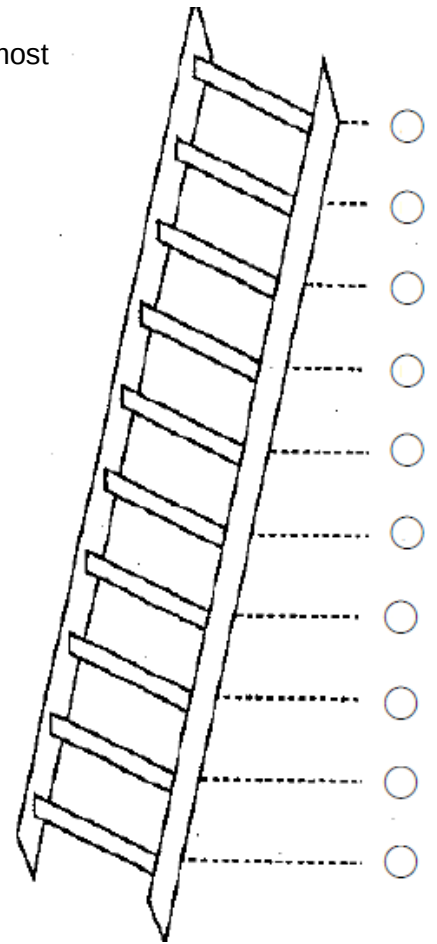


At the top of the ladder are the people in your school with the most respect, the highest grades, and the highest standing.

At the bottom, are the people who no one respects, no one wants to hang around with, and have the worst grades.

Where would you place yourself on this ladder?

Fill in the circle that best represents where you would be on this ladder.



The next 7 questions ask about a different subject.

11. How do **you** describe your weight?

- ☐ Very underweight
- ☐ Slightly underweight
- ☐ About the right weight
- ☐ Slightly overweight
- ☐ Very overweight

12. Which of the following are you trying to do about your weight?

- ☐ **Lose** weight
- ☐ **Gain** weight
- ☐ **Stay** the same weigh
- ☐ I am **not trying to do anything** about my weight

13. During the past 30 days, did you **exercise** to lose weight or to keep from gaining weight?

- ☐ Yes
- ☐ No

14. During the past 30 days, did you **eat less food, fewer calories, or foods low in fat** to lose weight or to keep from gaining weight?

- ☐ Yes
- ☐ No

15. During the past 30 days, did you **go without eating for 24 hours or more** (also called fasting) to lose weight or to keep from gaining weight?

- ☐ Yes
- ☐ No

16. During the past 30 days, did you **take any diet pills, powders, or liquids** without a doctor's advice to lose weight or to keep from gaining weight? (Do **not** include meal replacement products such as Slim Fast.)
- ☐ Yes
- ☐ No
17. During the past 30 days, did you **vomit or take laxatives** to lose weight or to keep from gaining weight?
- ☐ Yes
- ☐ No

The next 5 questions ask about your physical activity.

18. During the past 7 days, on how many days were you physically active for a total of **at least 60 minutes per day**? (Add up all the time you spend in any kind of physical activity that increases your heart rate and makes you breathe hard some of the time.)
- ☐ 0 days
- ☐ 1 day
- ☐ 2 days
- ☐ 3 days
- ☐ 4 days
- ☐ 5 days
- ☐ 6 days
- ☐ 7 days
19. On an average school day, how many hours do you watch TV?
- ☐ I do not watch TV on an average school day
- ☐ Less than 1 hour per day
- ☐ 1 hour per day
- ☐ 2 hours per day
- ☐ 3 hours per day
- ☐ 4 hours per day
- ☐ 5 or more hours per day

20. On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Include activities such as Nintendo, Game Boy, PlayStation, Xbox, computer games, and the Internet.)

- ☐ I do not play video or computer games or use a computer for something that is not school work
- ☐ Less than 1 hour per day
- ☐ 1 hour per day
- ☐ 2 hours per day
- ☐ 3 hours per day
- ☐ 4 hours per day
- ☐ 5 or more hours per day

21. In an average week when you are in school, on how many days do you go to physical education (PE) classes?

- ☐ 0 days
- ☐ 1 day
- ☐ 2 days
- ☐ 3 days
- ☐ 4 days
- ☐ 5 days

22. During the past 12 months, on how many sports teams did you play? (Include any teams run by your school or community groups.)

- ☐ 0 teams
- ☐ 1 team
- ☐ 2 teams
- ☐ 3 or more teams

The next 8 questions ask about food you ate or drank during the past 7 days. Think about all the meals and snacks you had from the time you got up until you went to bed. Be sure to include food you ate at home, at school, at restaurants, or anywhere else.

23. During the past 7 days, how many times did you drink **100% fruit juices** such as orange juice, apple juice, or grape juice? (Do **not** count punch, Kool-Aid, sports drinks, or other fruit-flavored drinks.)

- ☐ I did not drink 100% fruit juice during the past 7 days
- ☐ 1 to 3 times during the past 7 days
- ☐ 4 to 6 times during the past 7 days
- ☐ 1 time per day
- ☐ 2 times per day
- ☐ 3 times per day
- ☐ 4 or more times per day

24. During the past 7 days, how many times did you eat **fruit**? (Do **not** count fruit juice.)

- ☐ I did not eat fruit during the past 7 days
- ☐ 1 to 3 times during the past 7 days
- ☐ 4 to 6 times during the past 7 days
- ☐ 1 time per day
- ☐ 2 times per day
- ☐ 3 times per day
- ☐ 4 or more times per day

25. During the past 7 days, how many times did you eat **green salad**?

- ☐ I did not eat green salad during the past 7 days
- ☐ 1 to 3 times during the past 7 days
- ☐ 4 to 6 times during the past 7 days
- ☐ 1 time per day
- ☐ 2 times per day
- ☐ 3 times per day
- ☐ 4 or more times per day

26. During the past 7 days, how many times did you eat **potatoes**? (Do **not** count French fries, fried potatoes, or potato chips.)
- ☐ I did not eat potatoes during the past 7 days
 - ☐ 1 to 3 times during the past 7 days
 - ☐ 4 to 6 times during the past 7 days
 - ☐ 1 time per day
 - ☐ 2 times per day
 - ☐ 3 times per day
 - ☐ 4 or more times per day
27. During the past 7 days, how many times did you eat **carrots**?
- ☐ I did not eat carrots during the past 7 days
 - ☐ 1 to 3 times during the past 7 days
 - ☐ 4 to 6 times during the past 7 days
 - ☐ 1 time per day 2 times per day
 - ☐ 3 times per day 4 or more times per day
28. During the past 7 days, how many times did you eat **other vegetables**? (Do **not** count green salad, potatoes, or carrots.)
- ☐ I did not eat other vegetables during the past 7 days
 - ☐ 1 to 3 times during the past 7 days
 - ☐ 4 to 6 times during the past 7 days
 - ☐ 1 time per day
 - ☐ 2 times per day
 - ☐ 3 times per day
 - ☐ 4 or more times per day

29. During the past 7 days, how many times did you drink a can, bottle, or glass of soda or pop, such as Coke, Pepsi, or Sprite? (Do **not** include diet soda or diet pop.)
- ☐ I did not drink soda or pop during the past 7 days
 - ☐ 1 to 3 times during the past 7 days
 - ☐ 4 to 6 times during the past 7 days
 - ☐ 1 time per day 2 times per day
 - ☐ 3 times per day
 - ☐ 4 or more times per day
30. During the past 7 days, how many **glasses of milk** did you drink? (Include the milk you drank in a glass or cup, from a carton, or with cereal. Count the half pint of milk served at school as equal to one glass.)
- ☐ I did not drink milk during the past 7 days
 - ☐ 1 to 3 glasses during the past 7 days
 - ☐ 4 to 6 glasses during the past 7 days
 - ☐ 1 glass per day
 - ☐ 2 glasses per day
 - ☐ 3 glasses per day
 - ☐ 4 or more glasses per day

The End!

For Research Team Use Only

Weight (in lbs)			
			.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Height (in inches)			
0	0	0	0
1	1	1	1/8
2	2	2	1/4
3	3	3	3/8
4	4	4	1/2
5	5	5	5/8
6	6	6	3/4
7	7	7	7/8
8	8	8	
9	9	9	

Appendix B

Parent Survey 2009

Thank you for taking time to complete this survey.

Your time is appreciated!

Fruits and Vegetables

These next questions are about the foods you usually eat or drink. How often you eat or drink each one, for example, three times a day, twice a week, and so forth. Include all foods ***you*** eat, both at home and away from home.

How often do you drink fruit juices such as orange, grapefruit, or tomato?

___ Per day OR ___ Per week

Not counting juice, how often do you eat fruit?

___ Per day OR ___ Per week

How often do you eat green salad?

___ Per day OR ___ Per week

How often do you eat potatoes not including French fries, fried potatoes, or potato chips?

___ Per day OR ___ Per week

How often do you eat carrots?

___ Per day OR ___ Per week

Not counting carrots, potatoes, or salad, how many servings of vegetables do you usually eat? (Example: A serving of vegetables at both lunch and dinner would be two servings.)

___ Per day OR ___ Per week

Shelf Inventory

Please use this check list to tell us which foods are present in your home right now. Be sure to look in all places where you store food. Please check "Yes" box when you find a food present now. Check "No" when the food is not present now. Do not count frozen or canned food unless they are specified.

Milk/Dairy

Yes No

- | | | |
|--------------------------|--------------------------|--|
| ☐ | ☐ | Whole Milk |
| ☐ | ☐ | Low Fat Milk (2%) |
| ☐ | ☐ | Low Fat Milk (1%) or Buttermilk |
| ☐ | ☐ | Skim Milk |
| ☐ | ☐ | Low Fat Yogurt |
| ☐ | ☐ | No Fat Yogurt |
| ☐ | ☐ | Sour cream and Sour Cream Dips |
| ☐ | ☐ | Light, Lowfat, and Lean Sour Cream and Light Sour Cream Dips |
| ☐ | ☐ | Cream and Half and Half |

Cheese

Yes No

- | | | |
|--------------------------|--------------------------|---|
| ☐ | ☐ | Regular Cottage Cheese |
| ☐ | ☐ | Low Fat (1% - 2%) or Dry Curd Cottage Cheese |
| ☐ | ☐ | Cream Cheese |
| ☐ | ☐ | Light Cream Cheese |
| ☐ | ☐ | Valveeta, Cheese Food and spreads, Colby, Cheddar, American, Swiss, |

Monterey Jack cheese

- | | | |
|--------------------------|--------------------------|---|
| ☐ | ☐ | Blue, Brick, Limburger, Muenster, Provolone, Gouda, Brie, Romano, Parmesan, |
| ☐ | ☐ | Mozzarella cheese (made with skim milk) |
| ☐ | ☐ | String Cheese |
| ☐ | ☐ | Farmer Cheese |
| ☐ | ☐ | Diet Cheese (Such as Weight Watchers) |

Salad Dressing

Yes No

- | | | |
|--------------------------|--------------------------|---|
| ☐ | ☐ | Regular Salad Dressing |
| ☐ | ☐ | Reduced Calorie, Low Fat, No Fat, or Light Dressing |
| ☐ | ☐ | Regular Mayonnaise |
| ☐ | ☐ | Weight Watchers, Low Fat, or Light Mayonnaise |

Cereals

Yes No

- | | | |
|--------------------------|--------------------------|--|
| ☐ | ☐ | 100% Bran Cereals (Such as 100% Bran, all Bran, Fiber One, Quaker Oat Bran, Bran Buds) |
| ☐ | ☐ | All other bran cereals (such as Raisin Bran, Bran Flakes, Nutrific, Bran Chez, Fruit and Fiber, Muselix Bran, Fruitful Bran) |
| ☐ | ☐ | Oatmeal (Including Instant Oatmeal and Quick Oatmeal) |
| ☐ | ☐ | Shredded Wheat Types (Such as Shredded Wheat, Fruit Wheats, Strawberry Squares, Frosted Miniwheats, Quaker Oat Squares) |
| ☐ | ☐ | Cheerios |
| ☐ | ☐ | Rice Krispies |

☐ ☐ Corn, Oat or Wheat Flake Types (such as corn flakes and wheaties)

☐ ☐ Others (please specify)_____

Breads, Pastas, Rice – do not count frozen foods

Yes No

- | | | |
|--------------------------|--------------------------|---|
| ☐ | ☐ | Whole Wheat or Whole Grain Bread or Rolls (First ingredient should be whole wheat or whole grain flour) |
| ☐ | ☐ | Other Brown Bread or Rolls |
| ☐ | ☐ | White Bread or Rolls |
| ☐ | ☐ | Brown or Wild Rice |
| ☐ | ☐ | White Rice |
| ☐ | ☐ | Pasta (such as macaroni and spaghetti) |
| ☐ | ☐ | Whole Wheat Pasta (such as macaroni and spaghetti) |

Baked Goods

Yes No

- | | | |
|--------------------------|--------------------------|-------------------------|
| ☐ | ☐ | Pastry |
| ☐ | ☐ | Donuts |
| ☐ | ☐ | Other Cakes and Cookies |

Fresh Vegetables

Yes No

- | | | |
|--------------------------|--------------------------|------------------|
| ☐ | ☐ | Peas |
| ☐ | ☐ | Potatoes |
| ☐ | ☐ | Corn |
| ☐ | ☐ | Carrots |
| ☐ | ☐ | Brussels Sprouts |
| ☐ | ☐ | Spinach |

- | | | |
|--------------------------|--------------------------|-------------|
| ☐ | ☐ | Broccoli |
| ☐ | ☐ | Cabbage |
| ☐ | ☐ | Cauliflower |

Frozen Vegetables

Yes No

- | | | |
|--------------------------|--------------------------|--|
| ☐ | ☐ | Peas |
| ☐ | ☐ | Corn |
| ☐ | ☐ | Carrots |
| ☐ | ☐ | Brussels Sprouts |
| ☐ | ☐ | Spinach |
| ☐ | ☐ | Broccoli |
| ☐ | ☐ | Cauliflower |
| ☐ | ☐ | Mixed Vegetables |
| ☐ | ☐ | Broccoli and Cauliflower Mix, California Blend |

Fresh Fruits

Yes No

- | | | |
|--------------------------|--------------------------|--------------------------------|
| ☐ | ☐ | Apples |
| ☐ | ☐ | Pears |
| ☐ | ☐ | Oranges |
| ☐ | ☐ | Bananas |
| ☐ | ☐ | Strawberries (fresh or frozen) |

☐ ☐ Blueberries (fresh or frozen)

☐ ☐ Grapefruit

Fresh or Frozen Meat & Sausage

Yes No

☐ ☐ Extra Lean Ground Beef

☐ ☐ Lean Ground Beef

☐ ☐ Regular Ground Beef

☐ ☐ Sausage (such as smoked, links, Polish, Liver, Salami, Pepperoni, Bratwurst, Breakfast)

☐ ☐ Bacon

☐ ☐ Balogna

☐ ☐ Frankfurters

Crackers and Chips

Yes No

☐ ☐ Rye and Wheat Crispbread

☐ ☐ Triscuits

☐ ☐ Other Crackers

☐ ☐ Snack Foods (such as Potato, Corn, or Tortilla Chips: Corn puffs and curls)

Legumes

Yes No

- ☐ ☐ Dried Peas, Beans, or Lentils
- ☐ ☐ Canned Beans (such as butter, garbanzo, kidney, navy, northern, pinto, red or baked beans)
- ☐ ☐ Dried beans and Chili with beans

Please answer the following questions by placing a check in the appropriate blank

Do you usually do the grocery shopping?

- ☐ Yes ☐ No

When did you or someone in the household last shop for groceries?
(Check One)

- ☐ Today
- ☐ Yesterday
- ☐ 2 days ago
- ☐ 3 days ago
- ☐ 4 days ago
- ☐ 5 days ago
- ☐ 6 days ago
- ☐ 1 week ago
- ☐ More than one
week ago

How often do you eat away from home? (Check One)

- ☐ Never to 2 times a week
- ☐ 3 to 5 times a week

- ☐ 6 to 8 times a week
- ☐ 9 to 11 times a week
- ☐ 12 or more times a week

Physical Activity

These next questions ask about your physical activity.

When you are at work or if you stay at home, which of the following best describes what you do? (If you have multiple jobs, include all jobs)

Would you say you are —

- ☐ Mostly sitting or standing
- ☐ Mostly walking
- ☐ Mostly involved in heavy labor or physically demanding work

We are interested in two types of physical activity - vigorous and moderate. Vigorous activities cause large increases in breathing or heart rate while moderate activities cause small increases in breathing or heart rate. Think about any physical activity that you get at work, at home taking care of the household, and in your leisure time.

Now, thinking about the moderate activities you do in a usual week, do you do moderate activities for at least 10 minutes at a time, such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breathing or heart rate?

- ☐ Yes
- ☐ No

If yes skip to Vigorous PA Question

How many days per week do you do these moderate activities for at least 10 minutes at a time?

- ☐ Do not do any moderate physical activity for at least 10 minutes at a time

- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☐ 4 Days
- ☐ 5 Days
- ☐ 6 Days
- ☐ 7 Days

On days when you do moderate activities for at least 10 minutes at a time, how much total time in minutes per day do you spend doing these activities?

_____ Minutes/Day

Now, thinking about the vigorous activities you do in a usual week, do you do vigorous activities for at least 10 minutes at a time, such as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate?

- ☐ Yes
- ☐ No

If yes skip to MacArthur Scale

How many days per week do you do these vigorous activities for at least 10 minutes at a time?

- ☐ Do not do any vigorous physical activity for at least 10 minutes at a time
- ☐ 1 Day
- ☐ 2 Days
- ☐ 3 Days
- ☐ 4 Days
- ☐ 5 Days
- ☐ 6 Days
- ☐ 7 Days

On days when you do vigorous activities for at least 10 minutes at a time, how much total time in minutes per day do you spend doing these activities?

_____ Minutes/Day

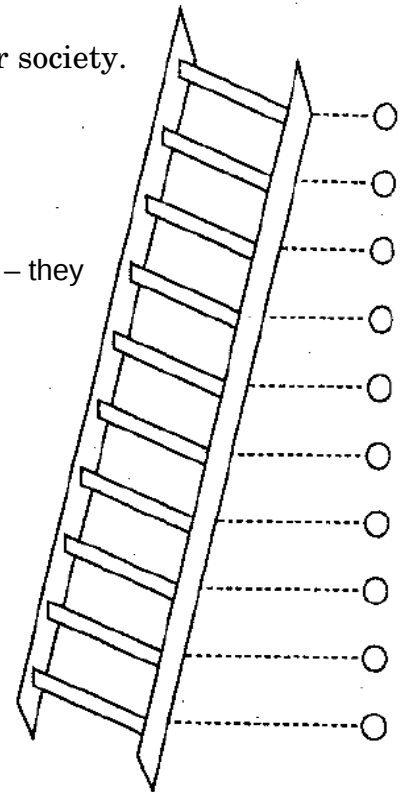
These next questions refer to a different subject.

Think of this ladder as representing where people stand in our society.

At the top of the ladder are the people who are the best off,
those who have the most money, most education, and the best jobs.

At the bottom are people who are the worst off – they
have the least money, little or no education, no job or
jobs that no one wants or respects.

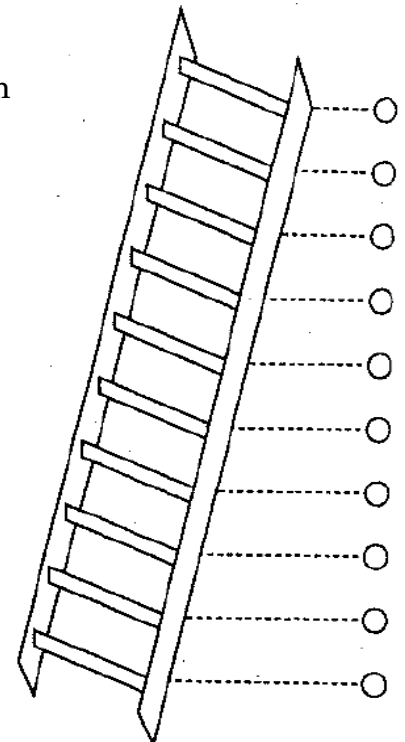
Please tell us where you think you stand on the ladder.



People define community in different ways; please define it in whatever way is most meaningful to you.

At the **top** of the ladder are the people who have the highest
Standing in their community.

At the **bottom** are the people who have the lowest
Standing in their community.



Where would you place yourself on this ladder?

How do you describe your weight?

- ☐ Very underweight
- ☐ Slightly underweight
- ☐ About the right weight
- ☐ Slightly overweight
- ☐ Very over weight

During the past year, how has your weight changed?

- ☐ Stayed the same
- ☐ Decreased a lot
- ☐ Decreased a little
- ☐ Increased a little
- ☐ Increased a lot

In the past month, which were you trying to do about your weight?

- ☐ Lose weight
- ☐ Gain weight
- ☐ Stay the same weight
- ☐ I am not trying to do anything about my weight

If you selected the last option skip to Demographics

During the past month, did you diet or exercise to lose weight or to keep from gaining weight?

- ☐ Diet only
- ☐ Exercise only
- ☐ Diet and exercise
- ☐ Neither

Demographics

What is your relationship to the Destination ImagiNation® participant?

- ☐ Mother
- ☐ Father
- ☐ Grandmother
- ☐ Grandfather
- ☐ Female Guardian
- ☐ Male Guardian
- Other (specify) _____

What is your age?

____ Years

Are you Hispanic or Latino?

- ☐ Yes
- ☐ No

Which one or more of the following would you say is your race? **(Check all that apply)**

- ☐ White
- ☐ Black or African American
- ☐ Asian
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ American Indian or Alaska Native
- ☐ Other

Are you...?

- ☐ Married
- ☐ Divorced
- ☐ Widowed
- ☐ Separated
- ☐ Never married
- ☐ A member of an unmarried couple

What is the highest grade or year of school you completed?

- ☐ Grade 8 or less
- ☐ Grades 9 through 11 (Some high school)
- ☐ Grades 12 or GED (High school graduate)
- ☐ College 1 year to 3 years (Some college or technical school)
- ☐ College 4 years or more (College graduate)

Is your annual household income from all sources—

- ☐ Less than \$25,000
- ☐ \$25,000 - \$50,000
- ☐ \$50,001 - \$75,000
- ☐ \$75,001 - \$100,000
- ☐ More than \$100,000

About how much do you weigh (*in pounds*) without shoes?

----- Pounds

About how tall are you without shoes?

_____ Feet / _____ Inches

May we contact you once more time? We would like to get a little more dietary information from your Destination ImagiNation® participant. Further participation will qualify you for additional incentive opportunities.

☐ Yes

☐ No

Would you prefer to be contacted by mail or email?

Please enter your email address.

Thank you so much for your cooperation!

**Please click the NEXT button
to submit your response and complete the survey.**

Appendix C

ID LABEL

PART I SHELF INVENTORY

Please use this checklist to tell us which foods are present in your home right now. Be sure to look in all places where you store food. Place a check in the "Yes" box when you find a food present now. Check the "No" box if a food is not present now. Do not count frozen or canned foods unless they are specified.

MILK/DAIRY

- | | Yes | No | |
|----|--------------------------|--------------------------|---|
| 30 | ☐ | ☐ | (1) Whole Milk |
| | ☐ | ☐ | (2) Low Fat Milk (2%) |
| | ☐ | ☐ | (3) Low Fat Milk (1%) & Buttermilk |
| | ☐ | ☐ | (4) Skim Milk |
| | ☐ | ☐ | (5) Low Fat Yogurt |
| | ☐ | ☐ | (6) No Fat Yogurt |
| | ☐ | ☐ | (7) Sour Cream & Sour Cream Dips |
| | ☐ | ☐ | (8) Light, Lowfat & Lean Sour Cream & Light Sour Cream Dips |
| | ☐ | ☐ | (9) Cream or Half and Half |

CHEESE — Do not count frozen cheese.

- | | Yes | No | |
|----|--------------------------|--------------------------|--|
| 30 | ☐ | ☐ | (10) Regular Cottage Cheese |
| | ☐ | ☐ | (11) Low Fat (1%-2%) or Dry Curd Cottage Cheese |
| | ☐ | ☐ | (12) Cream Cheese |
| | ☐ | ☐ | (13) Light Cream Cheese |
| | ☐ | ☐ | (14) Velveeta, Cheese food and spreads, Colby, Cheddar, American, Swiss, or Monterey Jack Cheese |
| 44 | ☐ | ☐ | (15) Blue, Brick, Limburger, Muenster, Provalone, Gouda, Brie, Romano, Parmesan |
| | ☐ | ☐ | (16) Mozzarella Cheese (made with skim milk) |
| | ☐ | ☐ | (17) String Cheese |
| | ☐ | ☐ | (18) Farmer Cheese |
| | ☐ | ☐ | (19) Diet Cheese (Such as Lite-N-Lively, Lite-Line, Weight Watchers, Formaggi) |

SALAD DRESSING

- | | Yes | No | |
|----|--------------------------|--------------------------|--|
| 40 | ☐ | ☐ | (20) Regular Salad Dressing (Including Miracle Whip type dressing) |
| | ☐ | ☐ | (21) Reduced Calorie, Low Fat, No Fat, or Light Dressing |
| | ☐ | ☐ | (22) Regular Mayonnaise |
| | ☐ | ☐ | (23) Weight Watchers, Low Fat, or Light Mayonnaise |

CEREAL

Yes No

- 53 ☐ ☐ (24) 100 % Bran Cereals (Such as 100 % Bran, All Bran, Fiber One, Quaker Oat Bran, Bran Buds)
- ☐ ☐ (25) All Other Bran Cereals (Such as Raisin Bran, Bran Flakes, Nutrific, Bran Chex, Fruit and Fiber, Mueslix Bran, Fruitful Bran)
- ☐ ☐ (26) Oatmeal (Including Instant Oatmeal and Quick Oatmeal)
- ☐ ☐ (27) Shredded Wheat Types (Such as Shredded Wheat, Fruit Wheats, Strawberry Squares, Frosted Miniwheats, Quaker Oat Squares)
- ☐ ☐ (28) Cheerios
- ☐ ☐ (29) Rice Krispies
- ☐ ☐ (30) Corn, Oat or Wheat Flake Types (Such as Cornflakes and Wheaties)
- ☐ ☐ (31) Other cereals, please specify _____
- _____
- _____

BREADS, PASTA, RICE — Do not count frozen items.

Yes No

- 61 ☐ ☐ (32) Whole Wheat or Whole Grain Bread or Rolls (first ingredient must be whole wheat or whole grain flour)
- ☐ ☐ (33) Other Brown Bread or Rolls
- ☐ ☐ (34) White Breads or Rolls
- ☐ ☐ (35) Brown or Wild Rice
- ☐ ☐ (36) White Rice
- ☐ ☐ (37) Pasta (Such as Macaroni or Spaghetti)
- ☐ ☐ (38) Whole Wheat pasta (Such as Macaroni or Spaghetti)

BAKED GOODS — Do not count frozen items.

Yes No

- 68 ☐ ☐ (39) Pastry (Such as Coffee Cake & Sweet Rolls)
- ☐ ☐ (40) Donuts
- ☐ ☐ (41) Other cakes or cookies

FRESH VEGETABLES

Yes No

- 71 ☐ ☐ (42) Peas
- ☐ ☐ (43) Potatoes
- ☐ ☐ (44) Corn
- ☐ ☐ (45) Carrots
- ☐ ☐ (46) Brussels Sprouts
- ☐ ☐ (47) Spinach
- ☐ ☐ (48) Broccoli
- ☐ ☐ (49) Cabbage
- ☐ ☐ (50) Cauliflower

FROZEN VEGETABLES**Yes No**

- 80 1 ☐ 2 ☐ (51) Peas
1 ☐ 2 ☐ (52) Corn
1 ☐ 2 ☐ (53) Carrots
1 ☐ 2 ☐ (54) Brussels Sprouts
1 ☐ 2 ☐ (55) Spinach
1 ☐ 2 ☐ (56) Broccoli
1 ☐ 2 ☐ (57) Cauliflower
1 ☐ 2 ☐ (58) Mixed vegetables
1 ☐ 2 ☐ (59) Broccoli and Cauliflower Mix or California Blend

FRESH FRUIT**Yes No**

- 80 1 ☐ 2 ☐ (60) Apples
1 ☐ 2 ☐ (61) Pears
1 ☐ 2 ☐ (62) Oranges
1 ☐ 2 ☐ (63) Bananas
1 ☐ 2 ☐ (64) Strawberries (fresh or frozen)
1 ☐ 2 ☐ (65) Blueberries (fresh or frozen)
1 ☐ 2 ☐ (66) Grapefruit

FRESH or FROZEN MEAT & SAUSAGE**Yes No**

- 96 1 ☐ 2 ☐ (67) Extra Lean Ground Beef
1 ☐ 2 ☐ (68) Lean Ground Beef
1 ☐ 2 ☐ (69) Regular Ground Beef
1 ☐ 2 ☐ (70) Sausage (Such as Smoked, Links, Polish, Liver, Salami, Pepperoni, Bratwurst, Breakfast)
1 ☐ 2 ☐ (71) Bacon
1 ☐ 2 ☐ (72) Bologna
1 ☐ 2 ☐ (73) Frankfurters

CRACKERS & CHIPS**Yes No**

- 103 1 ☐ 2 ☐ (74) Rye or Wheat Crispbread
1 ☐ 2 ☐ (75) Triscuits
1 ☐ 2 ☐ (76) Other Crackers
1 ☐ 2 ☐ (77) Snack foods (Such as Potato, Corn, or Tortilla Chips; Corn Puffs & Curls)

LEGUMES**Yes No**

- 107 1 ☐ 2 ☐ (78) Dried peas, beans or lentils
1 ☐ 2 ☐ (79) Canned beans (Such as butter, garbanzo, kidney, navy, northern, pinto, red or baked beans)
1 ☐ 2 ☐ (80) Refried beans and Chili with Beans

Please answer the following questions by placing a check in the appropriate blank.

- (81) Do you usually do the grocery shopping?
110 1 ☐ YES 2 ☐ NO
- (82) Are you male or female ?
111 1 ☐ Male
2 ☐ Female
- (83) How old are you? (Check one)
1 ☐ 25 to 34
2 ☐ 35 to 44
112 3 ☐ 45 to 54
4 ☐ 55 to 64
5 ☐ 65 to 69
- (84) When did you or someone in the household last shop for groceries?
(Check one)
01 ☐ Today
02 ☐ Yesterday
113 03 ☐ 2 days ago
04 ☐ 3 days ago
05 ☐ 4 days ago
06 ☐ 5 days ago
07 ☐ 6 days ago
08 ☐ 1 week ago
09 ☐ More than one week ago
- (85) How often do you eat away from home? (Check one)
1 ☐ Never to 2 times per week
2 ☐ 3 to 5 times per week
115 3 ☐ 6 to 8 times per week
4 ☐ 9 to 11 times per week
5 ☐ 12 or more times per week

Vita

Manasi Barot was born in Navsari, India but spent most of her childhood and adolescence in Gaborone, Botswana. Manasi graduated from Maru A Pula International High School in 2003. In December 2003 she made her journey to the USA to start her bachelor's degree program at The University of Tennessee. In May of 2008, Manasi graduated with a Bachelor of Science in Nutrition. In August of 2008 she was accepted as a graduate student into the Public Health Nutrition Graduate Program at The University of Tennessee, where she had the privilege to work as a Graduate Research Assistant on the Destination Imagination® Healthy Project. In 2009, she married her childhood friend Poorak Mody. Manasi is now settled in Waukesha, WI.