

Investigation of the Association between Adolescents' Attitudes and Food Preferences  
with Their Eating Behaviors: Inspiration from the FLASHE Study

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Thesis submitted in partial fulfillment of  
the requirements for the degree of  
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ABSTRACT

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## **Abstract**

Background: Nutrition plays an integral role in the development and growth of adolescent populations. Nutrition education programs promote healthy dietary behavior changes by increasing the nutritional knowledge of adolescents as well as positively influencing their attitudes and food preferences. Building on the theoretical framework of the Theory of Planned Behavior, we aim to investigate the association between adolescents' eating behaviors with their attitudes and food preferences.

Methods: We used the Family Life, Activity, Sun, Health and Eating (FLASHE) dataset for our analysis. 1657 adolescents were included in the dataset, and therefore in our analysis. We assessed age, sex, weight and ethnicity as our demographic covariates. Exposures (attitudes and food preferences) were classified as Disagree/Dislike, Neutral or Agree/Like with the summed responses from the dataset. Similarly, outcomes (frequency level of healthy or unhealthy eating outcomes) were categorized as "Seldom", "Sometimes" and "Often" with summed responses from the dataset. Our statistical analysis approach consisted of chi-squared tests to assess association of demographic covariates and outcomes, multiple correspondence analysis with our exposures (attitudes and food preferences) and separate ordinal logistic regression models investigating the association between eating behavior outcomes with attitudes and food preferences. Results: We found that five attitudes/preferences are positively

associated with adolescents' healthy eating behaviors, which are self-efficacy regarding eating fruits and vegetables on a daily basis (adjusted odds ratio [aOR]=1.56, 95%CI=1.05-2.31), positive preferences towards water (aOR =2.45, 95%CI=1.60-3.73), fruit (aOR=2.01, 95%CI=1.18-3.40) and vegetables (aOR=2.63, 95%CI=1.82-3.79) as well as positive attitudes towards having a healthy diet (aOR=2.18, 95%CI=1.57-3.04). As for unhealthy eating behaviors, we found that positive preferences towards sugary sweetened beverages and soda have the highest estimate with increasing the consumption of unhealthy food products, with adjusted odds ratio of 2.52 (95%CI 1.79-3.55) and 1.93 (95%CI 1.36-2.73). Two other variables have the opposite effect, which are self-efficacy in limiting junk food consumption (aOR=0.71, 95%CI=0.49-1.00) and positive attitudes in having a healthy diet (aOR=0.67, 95%0.47-0.94). Conclusions: We found that adolescents' preferences and attitudes are strong predictors for their eating behaviors. Positive attitudes in eating a healthy diet could influence their eating behaviors by increasing consumption of healthy food products and reducing the consumption of unhealthy food products at the same time. The results of our study may have implications with education, policy and interventions. Education, policies and intervention programs should aim to empower the young generation to foster positive attitudes and motivation to eat healthily.

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# 1. Introduction

According to the World Health Organization (WHO), nutrition is a critical part of health and development. Optimal nutrition is not only related to maternal and child health, stronger immune systems, safer pregnancy and childbirth, lower risks of non-communicable diseases, but also makes a difference in promoting the productivity of individuals, thus creating opportunities for breaking the cycle of poverty and hunger [1]. Nutrition has become an increasingly important topic over the past decades as it has lifetime impacts for one's health and well-being. Adolescence is a critical period of time during an individuals' lifetime with rapid physiological, mental and behavioral changes. Globally, adolescents account for approximately a quarter of the global population. [2] The World Health Organization (WHO) defines adolescence as ages between 10 and 19 [3]. It is evident that adequate and balanced nutrition plays an indispensable role in the growth and development of adolescents [4,5,6]. Not only does optimal nutrition promote the full growth potential of adolescents, but healthy dietary practices and eating habits could be fostered during this period with proper nutrition education. [7]. As stronger senses of autonomy and independence are remarkable characteristics of the cognitive changes in adolescents, adolescents tend to make more decisions on their own [8]. Therefore, positive and healthy eating behaviors developed in adolescence could be maintained to adulthood. Failure of achieving adequate and balanced nutrition may have serious detrimental consequences, including undernutrition, which raises the risks

of various infectious diseases as well as overweight and obesity issues, which is associated with various non-communicable diseases and elevates the risk of adult obesity and related chronic conditions [5,9,10]. In conclusion, good nutrition and healthy dietary patterns during adolescence has a profound impact on one's future life.

While acknowledging the importance of nutrition in adolescence, it is crucial to understand the current trends and challenges with adolescent nutrition. Malnutrition is one of the most significant challenges within adolescent nutrition, which could be further classified into undernutrition (various nutrient deficiencies, manifested as stunting and wasting), and overnutrition (excessive intake of nutrients, manifested by overweight and obesity) [5,10,11]. While undernutrition health issues are still major burdens of health in low and middle income countries, overweight and obese issues among adolescents are increasingly severe health concerns contemporarily. [11,12]. The past few decades witnessed dramatic increases of adolescents suffering from overweight and obese health issues, with approximately one in every five young individuals being overweight or obese [4,13]. Data shown from WHO indicated that the worldwide prevalence of obesity among children and adolescents aged 5-19 years old nearly quadrupled between 1975 and 2016 (4% to 18%), with over 340 million children and adolescents aged 5-19 were overweight and obese in 2016 [14]. From a short-term perspective, overweight and obese adolescents experience breathing difficulties, elevated risks of fractures, hypertension, early markers of various CVDs, insulin

resistance and psychological effects [15]. A systematic review study demonstrated that obese children and adolescents are five times more likely to remain overweight and obese in adulthood compared to those who were not obese [16]. In addition, multiple evidence indicates that overweight and obesity health issues among adolescents are associated with higher risks in diabetes, various cardiovascular conditions and cancer among adulthood [16,17,18]. The fundamental cause of overweight and obese issues among adolescents is excessive consumption of calories than expended, marked by increased intake of energy-dense foods that are rich in fats and sugars as well as physical inactivity. Moreover, there is substantial interest in eating disorders and poor dietary habits issues among the young generation. Current research indicates that a growing number of adolescents, especially females are suffering from eating disorders such as binge eating, anorexia nervosa etc. [19,20]. Eating disorders, along with poor eating habits could lead to not only impoverished nutritional status, but also several mental health issues, highlighted with lower self-esteem and higher body dissatisfaction [20,21,22].

Thus, positive and healthy eating patterns, along with behaviors are integral for the comprehensive health and development of adolescents. The dietary habits of adolescents are influenced by various factors, which could be broadly classified into three categories: Macro-system factors (including food availability, food production, distribution system etc.), environmental factors (family and peer influence, social and

cultural norms etc.) and personal factors (attitudes, beliefs, food preferences, self-efficacy etc.) [23,24]. For instance, studies concluded that food parenting practices are strong predictors of adolescent dietary behaviors [25,26]. Nevertheless, the impact of various factors may vary due to different characteristics of the adolescent, such as age, gender and so on [27]. While the majority of research has emphasized the influence of environmental factors on adolescents' eating behaviors, we are interested in understanding how one's perception and attitude explain their behavior. It is widely acknowledged that personal factors have a significant impact on one's decision making and eating behaviors. As the Theory of Planned Behavior (TPB) suggested, behavioral intentions are influenced by the attitude about the likelihood that the behavior will have the expected outcome [28]. The purpose of this research is to investigate the association between adolescents' personal factors, which includes attitudes and food preferences with their actual eating behavior. Various studies have been conducted to investigate how well the TPB predicts healthy eating behaviors among the young generation. It was found that perceived behavioral control, attitudes towards healthy eating behavior and subjective norms predicted 45% of the variance in behavioral intention [29]. Although several studies have found that adolescents' eating behaviors could be explained by TPB, limited research has focused on the actual influence of how their attitudes and food preferences on adolescents' eating behaviors. In conclusion, perceived behavioral control

and adolescents' own attitudes towards healthy eating had a positive impact on behavioral intention to eat healthily.

We hypothesized that adolescents' attitudes and food preferences are strongly associated with their eating behaviors. Our hypothesis was generated based on the Knowledge, Attitudes and Practice (KAP) model as well as the Theory of Planned Behavior. Both theories suggest that knowledge could promote changes in attitudes and eventually promote behavioral changes. We are also interested in the different effects of distinct factors or variables, along with the association for different subgroups of the adolescent population. We believe that our study could provide several implications by obtaining a deeper understanding of how personal attitudes and food preferences affect the adolescents' eating behaviors. The results of this study could support nutrition education programs and interventions targeting the young generation to promote healthy dietary behavioral changes.

## **2. Methods**

### **2.1 Study Sample and Dataset**

The sample used in this analysis comes from the Family Life, Activity, Sun, Health and Eating (FLASHE) Study that was conducted in 2014 [30]. There are still several studies using the FLASHE dataset at present and we believe the data is highly relevant to the current perspective [31-33]. FLASHE was established by the National Cancer Institute in partnership with Weststar aiming to examine psychosocial, generational and environmental correlates of cancer-related behaviors. Dyads, consisting of one parent and one adolescent per family were recruited through Ipsos' Consumer Panel and were matched on key characteristics to ensure the sample was representative of the broader US population. Eligible parents were over the age of 18, along with the legal guardian of the participating adolescent and live with that adolescent at least 50% of the time. Eligible adolescents had to be between the ages of 12 to 17.5. After consent was obtained from the dyads, the participants were asked to self-report questions regarding their lifestyle behaviors (dietary behaviors, physical activities, etc.). The study in the current report did not require Institutional Review Board Approval because it was determined not to meet the definition of human subject research. No ethics review was required as this analysis is a secondary data analysis of publicly available de-identified data. Further details of the recruitment process and procedures are attached in the Appendix A.



Among the 5027 recruited dyads, 1945 dyads provided consent for the study and 1745 parents along with 1657 adolescents completed the demographic and diet surveys. Since the purpose of the current analysis focuses on the adolescent population itself, the final sample size used in the current report is 1657 participants.

## **2.2 Measures**

### **2.2.1 Demographic Variables**

The adolescents recruited in the FLASHIE were asked to report their age (12-17 years old), sex (male or female), ethnicity (Hispanic, Non-Hispanic White, Non-Hispanic Black) as well as weight (kg) and height (m). Adolescents' Body Mass Index (BMI) was calculated based on their reported weight and height. The BMI percentile was assessed to determine whether the adolescent was normal weight or overweight. Overweight was defined as the BMI percentile of the adolescent between 85th and 95th with their corresponding age and sex (compared with the CDC reference growth chart [34]) while obesity was defined as the BMI percentile equal or greater than the 95th percentile with their corresponding age and sex [34].

### **2.2.2 Eating Behaviors**

As the primary outcomes of this analysis, eating behaviors were further classified as healthy eating behaviors and unhealthy eating behaviors. Seven items were used to

assess the healthy eating behaviors while 13 items were used to assess the unhealthy eating behaviors (Please see Appendix B for further details regarding the items used for assessment). The items measure the frequency of consumption of different food products during the past 7 days and were based on a modified version of the Dietary Screener Questionnaire used in the 2009-2010 National Health and Nutrition Examination Survey (NHANES) and National Youth Physical Activity and Nutrition Survey. Moreover, all 20 items were structured in the same format. For example, when assessing the consumption of fruits, the question was as follows:

“During the past 7 days, how many times did you eat... FRUIT like apples, bananas, melon, etc.? COUNT fresh, frozen, canned, and dried fruit. DON'T COUNT fruit juices...”

Responses were categorized as:

- “none”,
- “1-3 times per week”,
- “4-6 times per week”,
- “1 time per day”,
- “2 times per day”, and,
- “3 or more times per day”.

With complexity of the six-level responses, we further classified the responses into a three-level ordinal scale, which is “Seldom” (combining the first two responses

together), “Sometimes” (combining the responses of “4-6 times per week” and “1 times per day” together and “Often” (combining the responses of “2 times per day” and “3 or more times per day” together). The combination and collapsing of responses simplified the data, which reduced the complexity to identify patterns and relationships among the different levels of responses. The grouping of healthy eating behaviors included fruits, fruits and vegetables, dairy and whole grain while unhealthy eating behaviors were assessed based on items related with added sugars and saturated and trans fat, such as candy, chocolate, frozen dessert, soda etc. Further details regarding the items measured are attached in the Appendix B.

### **2.2.3 Attitudes and Food Preferences**

The main exposure variables, adolescents’ attitude and food preferences were measured by 8 items in total. The items are listed as follows (with some small edits to wording to facilitate writing these in a numbered list):

1. I feel confident in my ability to eat fruits and vegetables every day.
2. I feel confident in my ability to limit the amount of junk food and sugary drinks I eat and drink.
3. Please select how much you Dislike or Like: Sugary sweetened drinks like Capri Sun, Sunny D, Arizona Tea, etc.

4. Please select how much you Dislike or Like: Regular soda or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc.
5. Please select how much you Dislike or Like: Any water that is not sweetened like tap water, filtered water, bottled water or sparkling water
6. Please select how much you Dislike or Like: Fruit like apples, bananas, melon, etc. Count fresh, frozen, canned or dried fruit
7. Please select how much you Dislike or Like: A green salad, or other non-fried vegetables like carrots, broccoli, green beans, corn, etc.
8. How much do you disagree or agree with the [following] statement? I eat a healthy diet.

The first two items were used to assess the self-efficacy of the adolescents in either consuming fruits and vegetables or limiting the consumption of unhealthy foods. Items 3-7 were used to assess the preference levels of 5 different food products. The last item was used to measure the attitude of adolescents in eating a healthy diet. The response options for each of these items were five levels, ranging from “Strongly Disagree/Dislike” to “Strongly Agree/Like”. Similar with our outcome variables, for analytic purposes, we summed the responses as three ordinal levels: “Disagree/Dislike”, “Neutral” and “Agree/Like”. Further details regarding our measures are attached in Appendix B.

## **2.3 Statistical Analysis**

Two sets of associational analyses were used to assess the potential for confounding of the relationship between the primary exposures (attitudes and preferences) and key outcomes (healthy and unhealthy eating behaviors) by demographic variables. Specifically, the chi-squared test of independence was used to assess the association between each potential confounding variable (i.e. demographic covariates; age, sex, weight, ethnicity) and each outcome. Similarly, we assessed the associations between the demographic covariates with the exposure variables regarding food preferences and attitudes. We then conducted a multiple correspondence analysis (MCA) with the exposure variables regarding attitudes and food preferences. The purpose of our MCA is to investigate similarity and proximity of the variables and avoid potential issues of collinearity when including all exposure variables in the same regression model. MCA also helps us understand the different directions and strengths of association and effect among the different ordinal levels of the exposure variables. Separate ordinal logistic regression models were performed to investigate the association of adolescents' eating behaviors with their attitudes and preferences. We have included uni-variable models with a single explanatory (i.e. exposure) variable, full models (with all 8 exposure variables) and adjusted models (full models adjusted with the demographic covariates including age, sex, weight and ethnicity). Odd ratio from

the full model and adjusted odds ratio (from the adjusted model), along with 95% confidence intervals were reported as the estimate of association. All the statistical analyses were performed using R Studio (R version 4.2.2). We used packages *tidyverse*, *MASS*, *factoextra*, *tableone*, *biostat3*, *brant* in our analysis [35-40]. The significance level for all analyses was 0.05 (two-sided).

## **3. Results**

### **3.1 Analytic Sample Descriptives**

Among the 1657 adolescents within the FLASH dataset, a reasonably even distribution across the ages between 12 and 17 years old was observed, with approximately 200 to 300 adolescents in each age group. Similarly, females and males were evenly distributed, with 810 males and 823 females respectively. As the quota sampling method recruited adolescents based on demographic characteristics to obtain a nationally representative sample, this ensures the representative of youth of this age nationally, which ensures the generalizability of findings. Overweight and obese adolescents accounted for 26.9% of the sample size in total, with 245 (14.8%) overweight and 201 (12.1%) respectively. Additionally, Non-Hispanic white adolescents had the highest percentage of adolescents among all adolescents, with 1037 adolescents accounting for 64% of the total population. The summary statistics could be found in Table 1.

Similar patterns of data distribution were found in both the outcome and exposure variables (Table 2 and Table 3). The majority of adolescents were categorized with frequency levels as “Sometimes” with both healthy eating behaviors and unhealthy eating behaviors as outcomes, which were 1275 and 1321 respectively. There were fewer adolescents in the “Often” categories of both outcomes. Only 140 and 53 adolescents

reported eating healthy foods or unhealthy foods more than once per day in the dataset. Among the eight variables regarded with attitudes and food preferences, while similar counts of responses were observed in “Disagree/Dislike” and “Neutral” attitudes, “Agree/Like” has the majority of responses, ranging from 876 to 1441 counts.

**Table 1: Summary descriptive statistics with demographic covariates.**

| <b>Demographic characteristic</b> | <b>Levels</b>      | <b>N (%)</b> |
|-----------------------------------|--------------------|--------------|
| Age - years                       | 12                 | 219 (13.4%)  |
|                                   | 13                 | 326 (19.9%)  |
|                                   | 14                 | 276 (16.9%)  |
|                                   | 15                 | 288 (17.6%)  |
|                                   | 16                 | 326 (19.9%)  |
|                                   | 17                 | 202 (12.3%)  |
| Sex                               | Male               | 810 (49.6%)  |
|                                   | Female             | 823 (50.4%)  |
| Weight *                          | Normal             | 1211 (73.1%) |
|                                   | Overweight         | 245 (14.8%)  |
|                                   | Obese              | 201 (12.1%)  |
| Ethnicity                         | Hispanic           | 160 (9.9%)   |
|                                   | Non-Hispanic Black | 272 (16.8%)  |
|                                   | Non-Hispanic White | 1037 (64.0%) |
|                                   | Other              | 152 (9.4%)   |

Reported as counts (percentages).

\*Overweight and obese were defined as BMI percentile based on each adolescents’ corresponding age and sex with CDC growth chart [34]. Overweight was defined as 85<sup>th</sup> to 95<sup>th</sup> percentile according to their age and sex while obesity was defined as 95<sup>th</sup> percentile or more [34].



**Table 2: Summary of distribution of outcome variables.**

| <b>Outcomes</b> | <b>Healthy eating behaviors<br/>N(%)</b> | <b>Unhealthy eating<br/>behaviors N(%)</b> |
|-----------------|--|--|
| Seldom          | 242 (14.4%)                              | 283 (17.1%)                                |
| Sometimes       | 1275 (76.9%)                             | 1321 (79.7%)                               |
| Often           | 140 (8.4%)                               | 53 (3.20%)                                 |

**Table 3: Summary of distribution of exposures variables.**

| <b>Exposures</b>   | <b>Disagree/Dislike<br/>N(%)</b> | <b>Neutral<br/>N(%)</b> | <b>Agree/Like<br/>N(%)</b> |
|--|----------------------------------|-------------------------|----------------------------|
| I feel confident in my ability to eat fruits and vegetables every day.                             | 217 (13.1%)                      | 155<br>(9.4%)           | 1285<br>(77.5%)            |
| I feel confident in my ability to limit the amount of junk food and sugary drinks I eat and drink. | 360 (21.7%)                      | 252<br>(15.2%)          | 1045<br>(63.1%)            |
| Preferences of..   |                                  |                         |                            |
| .. Sugar sweetened drinks like Capri Sun, Sunny D, Arizona Tea, etc.                               | 239 (14.4%)                      | 144<br>(8.7%)           | 1274<br>(76.9%)            |
| .. Regular soda or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc.                                  | 231 (13.9%)                      | 175<br>(10.6%)          | 1251<br>(75.5%)            |

|   |             |                |                 |
|---|-------------|----------------|-----------------|
| .. Any water that is not sweetened like tap, filtered, bottled or sparkling water.      | 135 (8.1%)  | 197<br>(11.9%) | 1325<br>(80.0%) |
| .. Fruit like apples, bananas, melon, etc. Count fresh, frozen, canned or dried fruits. | 88 (5.3%)   | 128<br>(7.7%)  | 1441<br>(87.0%) |
| ... A green salad, or other non-fried vegetables like carrots, broccoli, etc.           | 252 (15.2%) | 242<br>(14.6%) | 1163<br>(70.2%) |
| I eat a healthy diet.   | 413 (24.9%) | 368<br>(22.2%) | 876 (52.9%)     |

### **3.2 Assessment of confounding with Chi-Squared Tests**

The majority of adolescents tend to respond their frequency level as “Sometimes” to both the healthy and unhealthy diets, with 1275 and 1321 among the 1657 adolescents respectively. “Often” tends to be a less likely response from the adolescents, especially for the unhealthy eating behaviors, with only 53 adolescents reported often eating unhealthy foods. When looking at the associations between the covariates with the different eating behaviors, our Chi-squared test indicated there is systematic difference between different ethnical groups with respect to both healthy eating behaviors and unhealthy eating behaviors ( $p=0.025$  and  $p=0.007$ ). For healthy eating behaviors, significant differences were observed from different weight groups ( $p=0.023$ ). By comparing the “often” and “seldom” groups of adolescents with respect to

healthy eating behaviors, a higher percentage was observed in the adolescents who often eat healthy foods (77.1%) compared to adolescents who seldomly eat healthy foods (64.5%) among the adolescents who were classified as normal weight. Among the 242 adolescents who reported seldomly eating healthy foods, 19% were overweight and 16.5% were obese. 12.9% and 10% of the 140 adolescents who reported eating healthy foods more than once per day were overweight and obese suggesting that overweight and obese adolescents tend to have less frequent consumption of healthy foods. Within the 53 adolescents who eat unhealthy foods more than once per day and the 283 adolescents who seldomly eat unhealthy foods, a higher percentage of non-Hispanic black youths were found in the former group, with 35.3% compared to 13.4% in the latter group, which indicates that non-Hispanic black youths are more likely to consume unhealthy foods regularly compared to other ethnical groups. We further incorporated Chi-squared tests of the demographic covariates with the exposure variables. We found that sex, weight and ethnicity could cause systematic differences between the distribution of responses for the different levels of the exposure variables. This indicates that sex and weight are potential confounders between adolescents eating behaviors with their attitudes and food preferences. The assessment of covariates with the exposure variables are attached in Appendix C. No significant differences were observed based on age and sex. The summary and distributions are illustrated in Table 4 and Table 5.

**Table 4: Chi-Squared Test of covariates and healthy eating behaviors as outcome.**

|            | <b>levels</b> | <b>Seldom</b> | <b>Sometimes</b> | <b>Often</b> | <b>P-value</b> |
|------------|---------------|---------------|------------------|--------------|----------------|
| n          |               | 242           | 1275             | 140          |                |
| Age (%)    | 12 years old  | 33(13.8)      | 167 (13.3)       | 19 (13.6)    | 0.365          |
|            | 13 years old  | 44 (18.3)     | 257 (20.4)       | 25 (17.9)    |                |
|            | 14 years old  | 32 (13.3)     | 217 (17.3)       | 27 (19.3)    |                |
|            | 15 years old  | 50 (20.8)     | 208 (16.5)       | 30 (21.4)    |                |
|            | 16 years old  | 43 (17.9)     | 257 (20.4)       | 26 (18.6)    |                |
|            | 17 years old  | 38 (13.5)     | 151 (12.0)       | 13 (9.3)     |                |
| Sex (%)    | male          | 120 (50.2)    | 620 (49.4)       | 70 (50)      | 0.972          |
|            | female        | 119 (49.8)    | 634 (50.6)       | 70 (50)      |                |
| Weight (%) | normal        | 156 (64.5)    | 947 (74.3)       | 108 (77.1)   | 0.023          |

|               |                    |            |            |           |       |
|---------------|--------------------|------------|------------|-----------|-------|
|               | overweight         | 46 (19.0)  | 181 (14.2) | 18 (12.9) |       |
|               | obese              | 40 (16.5)  | 147 (11.5) | 14 (10.0) |       |
| Ethnicity (%) | Hispanic           | 23 (9.8)   | 120 (9.6)  | 17 (12.2) | 0.025 |
|               | non-Hispanic Black | 56 (23.8)  | 189 (15.2) | 27 (19.4) |       |
|               | non-Hispanic White | 141 (60.0) | 814 (65.3) | 82 (59.0) |       |
|               | Other              | 15 (6.4)   | 124 (9.9)  | 13 (9.4)  |       |

**Table 5: Chi-Squared test with demographic covariates and unhealthy eating behaviors as outcome.**

|         | levels       | Seldom    | Sometimes  | Often    | P-value |
|---------|--------------|-----------|------------|----------|---------|
| n       |              | 283       | 1321       | 53       |         |
| Age (%) | 12 years old | 36 (12.9) | 175 (13.4) | 8 (15.7) | 0.436   |

|            |              |            |            |           |       |
|------------|--------------|------------|------------|-----------|-------|
|            | 13 years old | 46 (16.5)  | 271 (20.7) | 9 (17.6)  |       |
|            | 14 years old | 42 (15.1)  | 225 (17.2) | 9 (17.6)  |       |
|            | 15 years old | 62 (22.3)  | 215 (16.4) | 11 (21.6) |       |
|            | 16 years old | 53 (19.1)  | 266 (20.3) | 7 (13.7)  |       |
|            | 17 years old | 39 (14.0)  | 156 (11.9) | 7 (13.7)  |       |
| Sex (%)    | Male         | 128 (46.0) | 653 (50.1) | 29 (56.9) | 0.272 |
|            | Female       | 150 (54.0) | 651 (49.9) | 22 (43.1) |       |
| Weight (%) | Normal       | 220 (77.7) | 956 (72.4) | 35 (66.0) | 0.211 |

|                  |                    |            |            |           |       |
|------------------|--------------------|------------|------------|-----------|-------|
|                  | Overweight         | 35 (12.4)  | 202 (15.3) | 8 (15.1)  |       |
|                  | Obese              | 28 (9.9)   | 163 (12.3) | 10 (18.9) |       |
| Ethnicity<br>(%) | Hispanic           | 33 (11.9)  | 121 (9.4)  | 6 (11.8)  | 0.007 |
|                  | non-Hispanic Black | 37 (13.4)  | 217 (16.8) | 18 (35.3) |       |
|                  | non-Hispanic White | 179 (64.6) | 836 (64.7) | 22 (43.1) |       |
|                  | Other              | 28 (10.1)  | 119 (9.2)  | 5 (9.8)   |       |

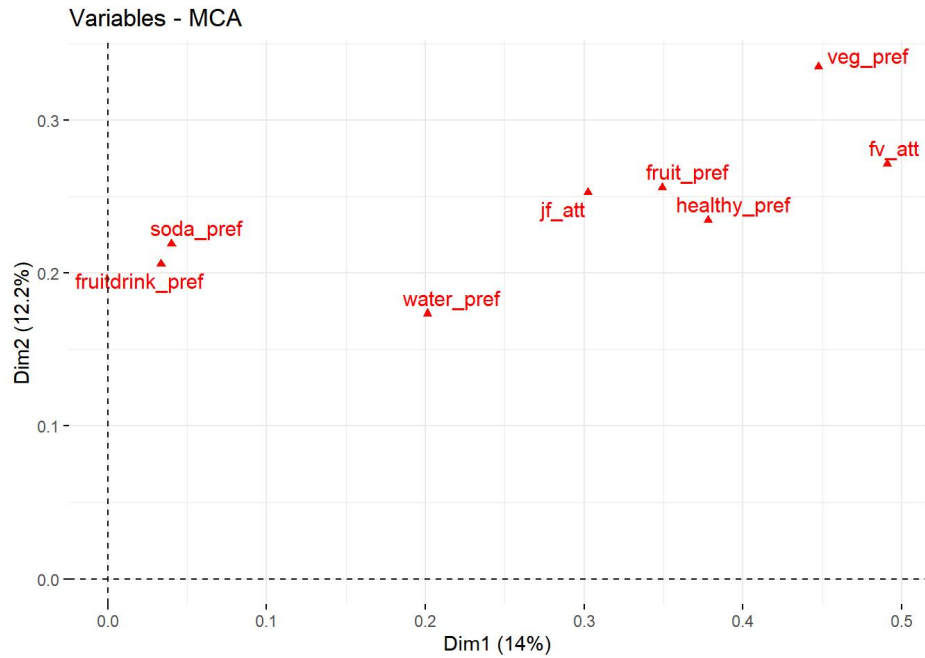
### ***3.3 Multiple Correspondence Analysis of Attitudes and Food Preferences (Independent Variables)***

Dimension 1 and Dimension 2 represent the principal components that explain the most variability in the data. Twenty six percent of the variability within these

variables could be explained by Dimensions 1 and 2 combined. While both dimensions have similar percentages, this indicates each dimension captures similar proportions of the variation in the data. The variables assessing preferences towards soda (soda\_pref) and sugary drinks (fruitdrink\_pref) are located on the same position on the plot, which indicates similarity and strong connection between these variables. These two variables are strongly related with Dimension 1 but has limited relationship with Dimension 2 as they are located on the upper-left position of the MCA plot. The remaining six variables are located on the right side of the plot, which indicates a strong relation with Dimension 1 compared to the two variables assessing preferences towards soda and sugary drinks. Among these six variables, preferences towards vegetables (veg\_pref) and self-efficacy in eating fruits and vegetables (fv\_att) are strongly related with both Dimension 1 and Dimension 2 as they are located on the upper right side of the MCA plot. This indicates that these two variables have strong and complex relationships with the other variables in the dataset. (Figure 1). For the different levels of variables regarding attitudes and food preferences, similar patterns were observed for the different levels of the adolescents' attitudes and preferences levels. Possible associations were demonstrated when the adolescents reported "Neutral" as the 8 variables fall within the same quadrant and appear to show proximity. Similarly, when the adolescents reported "Dislike" towards the healthy food items (water, fruit, vegetables) and have "Negative" attitudes towards self-efficacy (jf\_att\_disagree, fv\_att\_disagree)

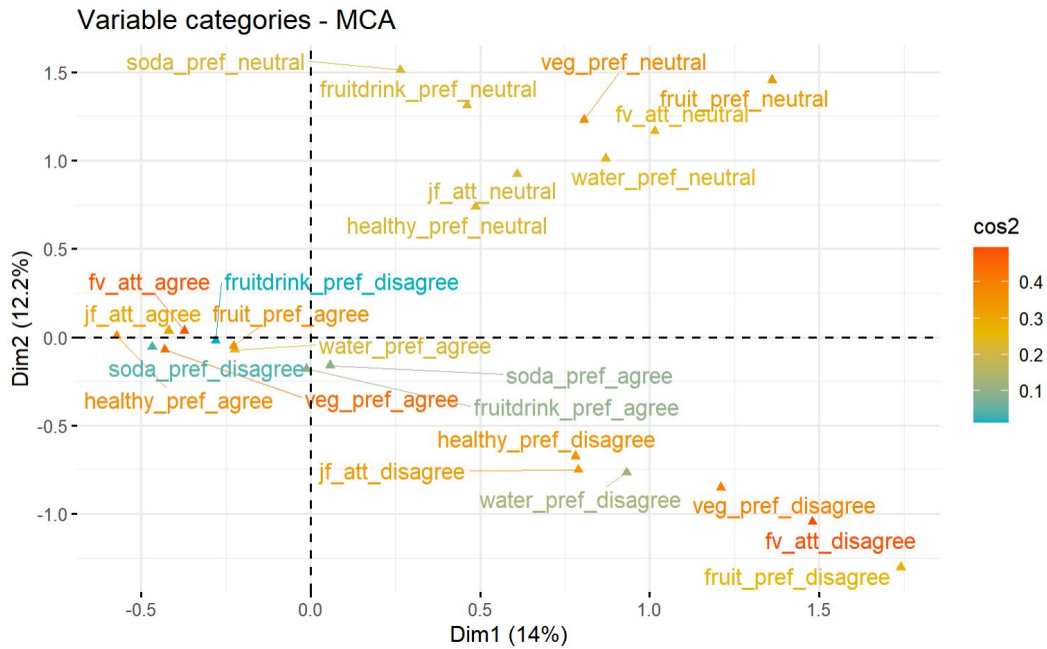


and healthy diets (healthy\_pref\_disagree), as well as having preferences towards soda (soda\_pref\_agree) and sugary sweetened beverages (fruitdrink\_pref\_agree), associations were observed as they follow the same pattern. Among those levels of variables, similarity and proximity were illustrated between positive preferences towards soda and sugary sweetened beverages (SSBs). Negative attitudes towards consuming fruits and vegetables (fv\_att\_disagree), along with preferences of vegetables as “Dislike” (veg\_pref\_disagree) have the highest cos2 values, which indicates that the two variables have the strongest representation of Dimension 1. On the left side of Figure 2, we could find six variables that showed positive attitudes and preferences towards healthy food items (fv\_att\_agree, jf\_att\_agree, water\_pref\_agree, veg\_pref\_agree, fruit\_pref\_agree, healthy\_pref\_agree) and the remaining two variables are preferences of soda and sugary drinks marked as “Dislike” (soda\_pref\_disagree, fruitdrink\_pref\_disagree). Similarly, to the lower right side of the MCA plot, positive attitudes towards consuming fruits and vegetables (fv\_att\_agree), as well as preferences towards vegetables (veg\_pref\_agree) have the highest cos2 value, which suggests stronger contribution. As these eight variables are in similar positions with short distances, similarities and proximity among these 8 variables could be illustrated. Lastly, as the individual variables with different levels are located within different quadrants in the MCA plot, different or even opposite patterns of relationship with other variables are likely to occur. (Figure 2).



**Figure 1: Multiple correspondence analysis of variables regarding attitudes and food preferences on individual levels.**

\*Soda\_pref, water\_pref, veg\_pref, fruit\_pref and fruitdrink\_pref refers to the variable assessing adolescents' attitudes towards soda, water, vegetables, fruits and sugary sweetened drinks. Fv\_att and jf\_attitude refers to the variables assessing adolescents' self-efficacy in eating fruits and vegetables and limiting the consumption of junk food. Healthy\_pref refers to the variable assessing adolescents' attitude on eating a healthy diet. The variables were coded as in the original dataset.



\*

**Figure 2: Multiple correspondence analysis of attitudes and food preferences variables on the ordinal level.**

\*The variables are denoted as the original dataset.

\*\* Soda\_pref, water\_pref, veg\_pref, fruit\_pref and fruitdrink\_pref refers to the variable assessing adolescents' attitudes towards soda, water, vegetables, fruits and sugary sweetened drinks. Fv\_att and jf\_attitude refers to the variables assessing adolescents' self-efficacy in eating fruits and vegetables and limiting the consumption of junk food. Healthy\_pref refers to the variable assessing adolescents' attitude on eating a healthy diet. The variables were coded as in the original dataset.

\*\*\*Cos2 refers to the quality of representation of a variable on a given dimension. It represents the squared correlation between the variable and the dimension.

### **3.4 Ordinal Logistic Regression Estimates for the Association between healthy eating behaviors with attitudes and food preferences**

Five variables were observed to have significant association between attitudes and food preferences with healthy eating behaviors from the full model (model with all eight exposure variables) and adjusted model (full model adjusted with demographic covariates). The five variables are self-efficacy regarding eating fruits and vegetables on a daily basis (aOR=1.56, 95%CI: 1.05-2.31), positive preferences towards water (aOR=2.45, 95%CI=1.60-3.73), towards fruit (aOR=2.01, 95%CI=1.18-3.40) and towards vegetables (2.63, 95%CI=1.82-3.79) as well as positive attitudes towards having a healthy diet (aOR=2.18, 95%CI=1.57-3.04) respectively. The positive odds ratio indicates a positive association between adolescents' positive attitudes and healthy eating behaviors. For instance, when the adolescents reported that they "agree" with their ability to eat fruits and vegetables on a daily basis (i.e. self-efficacy), the odds of eating healthy foods more frequently ("often" versus "sometimes" or "sometimes" versus "seldom") increased 56% compared to those who disagree, while holding the other variables and covariates constant. The remaining four variables tend to have stronger estimates, as the adjusted odds ratio were all greater than two. The odds ratios increased when the adolescents reported attitudes as "Agree" or "Like" compared to attitudes as "Neutral" within the exposure variables. Additionally, limited association was found when adolescents reported "Neutral" attitudes. The two variables that showed significant association

when they reported neutral attitudes were preferences towards eating vegetables and attitudes towards eating a healthy diet. Therefore, the variables showed are a stronger association with healthy eating behaviors when the adolescents have positive and stronger attitudes. (See attached Table 6)

**Table 6: Ordinal logistic regression of adolescents' attitudes and food preferences with healthy eating behaviors as outcomes.**

| Variables\Models   |         | Univariable Model*(OR; 95%CI, p-value) | Full Model*(OR; 95%CI, p-value) | Adjusted Model*(OR; 95%CI, p-value) |
|--|---------|--|---------------------------------|-------------------------------------|
| <i>I feel confident in my ability to eat fruits and vegetables every day</i>                             |         |  |                                 |                                     |
|  | Neutral | 1.26; 0.81-1.96<br>(p=0.3)             | 0.78; 0.48-1.28<br>(p=0.33)     | 0.77; 0.46-1.28<br>(p=0.31)         |
|  | Agree   | 3.99; 2.89-5.50<br>(p=0.00)            | 1.60; 1.09-2.33<br>(p=0.02)     | 1.56; 1.05-2.31<br>(p=0.03)         |
| <i>I feel confident in my ability to limit the amount of junk food and sugary drinks I eat and drink</i> |         |  |                                 |                                     |
|  | Neutral | 1.23;<br>0.85-1.77<br>(p=0.28)         | 0.94;<br>0.63-1.40<br>(p=0.77)  | 0.95;<br>0.63-1.42<br>(p=0.79)      |
|  | Like    | 2.35;<br>1.77-3.11<br>(p=0.00)         | 1.21;<br>0.89-1.66<br>(p=0.22)  | 1.19;<br>0.86-1.64<br>(p=0.30)      |
| <i>Preferences of Sugar sweetened drinks like Capri Sun, Sunny D, Arizona Tea, etc.</i>                  |         |  |                                 |                                     |

|  |         |   |   |   |
|--|---------|---|---|---|
|  | Neutral | 0.90;<br>0.56-1.45<br>( <i>p</i> =0.67) | 1.08;<br>0.66-1.77<br>( <i>p</i> =0.76) | 1.01;<br>0.61-1.68<br>( <i>p</i> =0.97) |
|  | Like    | 0.80;<br>0.57-1.12<br><i>p</i> =(0.20)  | 0.91;<br>0.63-1.30<br>( <i>p</i> =0.59) | 0.87;<br>0.60-1.26<br>( <i>p</i> =0.46) |
| <i>Preferences of Regular soda or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc</i>                                    |         |   |   |   |
|  | Neutral | 0.89;<br>0.55-1.46<br>( <i>p</i> =0.65) | 1.02;<br>0.60-1.71<br>( <i>p</i> =0.95) | 1.08;<br>0.63-1.83<br>( <i>p</i> =0.79) |
|  | Like    | 0.64;<br>0.46-0.89<br>( <i>p</i> =0.01) | 0.80;<br>0.56-1.13<br>( <i>p</i> =0.20) | 0.81;<br>0.56-1.16<br>( <i>p</i> =0.26) |
| <i>Preferences of Any water that is not sweetened like tap water, filtered water, bottled water or sparkling water</i> |         |   |   |   |
|  | Neutral | 1.51;<br>0.94-2.42<br>( <i>p</i> =0.09) | 1.29;<br>0.78-2.15<br>( <i>p</i> =0.32) | 1.48;<br>0.88-2.50<br>( <i>p</i> =0.14) |
|  | Like    | 3.24;<br>2.20-4.75<br>( <i>p</i> =0.00) | 2.09;<br>1.38-3.14<br>( <i>p</i> =0.00) | 2.45;<br>1.60-3.73<br>( <i>p</i> =0.00) |
| <i>Preference of Fruit like apples, bananas, melon, etc. Count fresh, frozen, canned or dried fruits</i>               |         |   |   |   |
|  | Neutral | 1.84;<br>1.04-3.25<br>( <i>p</i> =0.04) | 1.40;<br>0.75-2.62<br>( <i>p</i> =0.29) | 1.47;<br>0.77-2.80<br>( <i>p</i> =0.24) |
|  | Agree   | 4.20;<br>2.67-6.55<br>( <i>p</i> =0.00) | 1.76;<br>1.05-2.92<br>( <i>p</i> =0.03) | 2.01;<br>1.18-3.40<br>( <i>p</i> =0.01) |

|  |         |   |   |   |
|--|---------|---|---|---|
| <i>Preference of A green salad, or other non-fried vegetables like carrots, broccoli, green beans, corn, etc</i> |         |   |   |   |
|  | Neutral | 1.89;<br>1.28-2.78<br>( <i>p</i> =0.00) | 1.48;<br>0.96-2.27<br>( <i>p</i> =0.07) | 1.58;<br>1.01-2.46<br>( <i>p</i> =0.04) |
|  | Like    | 4.43;<br>3.25-6.04<br>( <i>p</i> =0.00) | 2.33;<br>1.64-3.32<br>( <i>p</i> =0.00) | 2.63;<br>1.82-3.79<br>( <i>p</i> =0.00) |
| <i>I eat a healthy diet.</i>   |         |   |   |   |
|  | Neutral | 1.78;<br>1.29-2.46<br>( <i>p</i> =0.00) | 1.63;<br>1.14-2.31<br>( <i>p</i> =0.01) | 1.61;<br>1.13-2.32<br>( <i>p</i> =0.01) |
|  | Agree   | 3.86;<br>2.90-5.16<br>( <i>p</i> =0.00) | 2.31;<br>1.69-3.21<br>( <i>p</i> =0.00) | 2.18;<br>1.57-3.04<br>( <i>p</i> =0.00) |

\*The table indicates odds ratio, 95% confidence intervals as well as p-values in each cell. The reference group was the adolescents who were categorized as “Seldom” in healthy eating behaviors.

\*\*Further details regarding the counts and distribution of responses within the exposures and outcomes are provided in the Appendix sections.

### ***3.5 Ordinal Logistic Regression Estimates for the Association between unhealthy eating behaviors with attitudes and food preferences***

We found four variables that appeared significant with unhealthy eating behaviors based on the results of our ordinal logistic regression models. Two variables were positively associated with unhealthy eating behaviors, which were food

preferences towards sugary sweetened drinks and soda. When the adolescents reported that they like sugary sweetened drinks and soda, the adjusted odds ratio of the two variables are 2.52 (95%CI=1.79-3.55) and 1.93 (95%CI=1.36-2.73) respectively. The large positive odds ratios shows that the odds of eating unhealthy foods more frequently increases dramatically when the adolescents like sugary drinks and soda, which indicates that adolescents tend to consume unhealthy foods more frequently when they have preferences toward it. Self-efficacy in limiting the amount of junk food consumption (aOR=0.71, 95%CI=0.49-1.00), along with positive attitudes in having a healthy diet are negatively associated with having an unhealthy eating behavior (aOR=0.67, 95%CI=0.47-0.94). The odds of consuming unhealthy foods more frequently reduced by approximately 30% given the condition that adolescents agree in their ability in limiting junk food consumption or adolescents agree that they have a healthy diet. No association was found between unhealthy eating behaviors among the adolescents with positive preferences towards water, fruit and vegetables.

Limited evidence was found between unhealthy eating behaviors and “neutral” attitudes or preferences among the exposure variables. Only neutral preferences towards sugary sweetened drinks showed a positive significant association with unhealthy eating behaviors. (aOR=1.71, 95%=1.05-2.80).

**Table 7: Ordinal logistic regression models of adolescents’ attitudes and food preferences with unhealthy eating behaviors as outcomes.**



| <b>Variables\Models</b>  |         | <b>Univariate Model (OR; 95%CI, p-value)</b> | <b>Full Model (OR; 95%CI, p-value)</b> | <b>Adjusted Model (OR; 95%CI, p-value)</b> |
|--|---------|--|--|--|
| <i>I feel confident in my ability to eat fruits and vegetables every day</i>                             |         |  |  |  |
|  | Neutral | 0.66;<br>0.39-1.12<br>(p=0.12)               | 0.77;<br>0.43-1.38<br>(p=0.38)         | 0.80;<br>0.46-1.45<br>(p=0.47)             |
|  | Agree   | 0.67;<br>0.45-0.97<br>(p=0.04)               | 1.02;<br>0.65-1.59<br>(p=0.92)         | 1.03;<br>0.65-1.61<br>(p=0.92)             |
| <i>I feel confident in my ability to limit the amount of junk food and sugary drinks I eat and drink</i> |         |  |  |  |
|  | Neutral | 0.64;<br>0.42-0.98<br>(p=0.04)               | 0.77;<br>0.49-1.22<br>(p=0.27)         | 0.81;<br>0.51-1.28<br>(p=0.36)             |
|  | Like    | 0.48;<br>0.35-0.66<br>(p=0.00)               | 0.64;<br>0.45-0.92<br>(p=0.02)         | 0.71;<br>0.49-1.00<br>(p=0.05)             |
| <i>Preferences of Sugar sweetened drinks like Capri Sun, Sunny D, Arizona Tea, etc</i>                   |         |  |  |  |
|  | Neutral | 1.93;<br>1.24-3.02<br>(p=0.00)               | 1.77;<br>1.10-2.86<br>(p=0.02)         | 1.71;<br>1.05-2.80<br>(p=0.03)             |
|  | Like    | 3.41;<br>2.50-4.65<br>(p=0.00)               | 2.55;<br>1.81-3.56<br>(p=0.00)         | 2.52;<br>1.79-3.55<br>(p=0.00)             |
| <i>Preferences of Regular soda or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc.</i>                     |         |  |  |  |

|  |         |   |   |   |
|--|---------|---|---|---|
|  | Neutral | 1.08;<br>0.69-1.70<br>( <i>p</i> =0.73) | 0.90;<br>0.56-1.47<br>( <i>p</i> =0.68) | 0.80;<br>0.49-1.32<br>( <i>p</i> =0.38) |
|  | Like    | 2.93;<br>2.14-3.99<br>( <i>p</i> =0.00) | 2.00;<br>1.42-2.80<br>( <i>p</i> =0.00) | 1.93;<br>1.36-2.73<br>( <i>p</i> =0.00) |
| <i>Preferences of Any water that is not sweetened like tap water, filtered water, bottled water or sparkling water</i> |         |   |   |   |
|  | Neutral | 0.83;<br>0.47-1.44<br>( <i>p</i> =0.51) | 0.93;<br>0.52-1.67<br>( <i>p</i> =0.81) | 1.04;<br>0.57-1.88<br>( <i>p</i> =0.90) |
|  | Like    | 0.78;<br>0.49-1.21<br>( <i>p</i> =0.28) | 0.91;<br>0.56-1.45<br>( <i>p</i> =0.69) | 0.97;<br>0.59-1.56<br>( <i>p</i> =0.91) |
| <i>Preference of Fruit like apples, bananas, melon, etc. Count fresh, frozen, canned or dried fruits</i>               |         |   |   |   |
|  | Neutral | 0.61;<br>0.31-1.20<br>( <i>p</i> =0.16) | 0.74;<br>0.35-1.52<br>( <i>p</i> =0.42) | 0.81;<br>0.38-1.71<br>( <i>p</i> =0.58) |
|  | Agree   | 0.74;<br>0.42-1.27<br>( <i>p</i> =0.28) | 0.84;<br>0.45-1.53<br>( <i>p</i> =0.58) | 0.92;<br>0.48-1.71<br>( <i>p</i> =0.79) |
| <i>Preference of A green salad, or other non-fried vegetables like carrots, broccoli, green beans, corn, etc</i>       |         |   |   |   |
|  | Neutral | 0.89;<br>0.57-1.40<br>( <i>p</i> =0.63) | 1.17;<br>0.72-1.91<br>( <i>p</i> =0.53) | 1.10;<br>0.67-1.84<br>( <i>p</i> =0.69) |

|                              |         |   |   |   |
|------------------------------|---------|---|---|---|
|                              | Like    | 0.79;<br>0.56-1.11<br>( <i>p</i> =0.18) | 1.04;<br>0.70-1.54<br>( <i>p</i> =0.85) | 0.97;<br>0.64-1.46<br>( <i>p</i> =0.90) |
| <i>I eat a healthy diet.</i> |         |   |   |   |
|                              | Neutral | 0.83;<br>0.57-1.20<br>( <i>p</i> =0.32) | 0.98;<br>0.66-1.47<br>( <i>p</i> =0.94) | 0.93;<br>0.62-1.40<br>( <i>p</i> =0.74) |
|                              | Agree   | 0.52;<br>0.38-0.70<br>( <i>p</i> =0.00) | 0.66;<br>0.46-0.93<br>( <i>p</i> =0.02) | 0.67;<br>0.47-0.94<br>( <i>p</i> =0.02) |

\*The table indicates odds ratio, 95% confidence intervals as well as p-values in each cell. The reference group was the adolescents who were categorized as “Seldom” in unhealthy eating behaviors.

\*\*Further details regarding the counts and distribution of responses within the exposures and outcomes are provided in the Appendix sections.

## 4. Discussion

In this study, we aimed to investigate the association of adolescents' attitudes and food preferences with their eating behaviors, from both a healthy and unhealthy perspective. We found that self-efficacy in consuming fruits and vegetables on a daily basis, food preferences towards water, fruits and vegetables as well as positive attitudes towards having a healthy diet are positively associated with having healthy eating behaviors among adolescents. As for unhealthy eating behaviors, food preferences of sugar sweetened beverages as well as soda have shown positive associations. On the contrary, self-efficacy in limiting the consumption of junk food as well as positive attitudes of healthy diets have opposite effects of having unhealthy eating behaviors.

With 1275 and 1321 adolescents among the total 1657 categorized as "often" consuming healthy food products and unhealthy food products, it is surprising to note that very few adolescents either consume healthy foods or unhealthy foods more than once per day. Only 53 adolescents were found to consume unhealthy food products more than once per day, which is lower than our expectation. For healthy eating behaviors, our Chi-Squared test indicated that overweight and obese adolescent, along with Non-Hispanic Black adolescents are less likely to consume healthy foods on a regular basis. Non-Hispanic Black adolescents are also more likely to consume unhealthy foods compared to other ethnic groups. This might be due to socioeconomic factors as Non-Hispanic Black youths are more likely to come from low-income areas,

which limits their access to healthy foods and proper nutrition education resources. Results from our ordinal logistic regression and multiple correspondence analysis implied that adolescents have a tendency to eat more healthy food products when they have positive preferences towards healthy food items. In contrast, adolescents are more likely to consume unhealthy food items when they have strong preferences for them. In addition, our results emphasized that self-efficacy, along with attitudes towards having a healthy diet are important factors in promoting healthy eating behaviors and reducing unhealthy eating behaviors at the same time. Interestingly, except for the variable assessing adolescents' attitude on eating a healthy diet, the variables that had significant impact on the healthy eating behaviors might not have a significant impact on unhealthy eating behaviors. This suggests that different attitudes and food preferences might have distinct influence on adolescents' eating behaviors. A certain positive attitude might promote healthy eating among adolescents but might have limited impact on limiting the consumption of unhealthy food products. Lastly, there was no association found with either healthy eating behaviors or unhealthy eating behaviors when the adolescents' reported "Neutral" attitudes towards attitudes and food preferences. The results of our study are consistent with several previous findings. Previous studies have concluded that adolescents' SSB consumption is highly correlated with their attitudes regarding SSB/junk food intake [32,33] as well as the positive role of how self-efficacy and food preferences result in more frequent consumption of fruits and vegetables

[40,41]. Food preferences are strong predictors of the adolescents' eating behaviors. Self-efficacy and positive attitudes are meaningful for both promoting healthy eating habits and reducing unhealthy eating behaviors. Nevertheless, in another study involving high school students, positive attitudes along with subjective norms were found to be associated with higher intention to change with respect to healthy dietary habits. The study found that more positive self-efficacy expectations were associated with higher intention of increasing fruit intake [41,42]. The findings are consistent with the Theory of Planned Behavior, with multiple evidence supporting the fact that perceived behavioral control and adolescents' own attitudes towards healthy eating had a positive impact on behavioral intentions to eat healthily.

#### ***4.1 Study Strengths and Limitations***

This analysis had several strengths to mention. Firstly, this paper has considered the association of different factors on both healthy eating behaviors and unhealthy eating behaviors, which provided a more comprehensive understanding of how the adolescents' how cognitive and personal factors are associated with their food intake. Additionally, we conducted both ordinal logistic regression analysis and multiple correspondence analysis to fully comprehend the variables regarding self-efficacy, food preferences and attitudes. Lastly, we have controlled for potential covariates to avoid potential bias or confounding.

However, we acknowledge the fact there are still some major limitations of this analysis. One of the major limitations is that the data was collected from a cross-sectional perspective. Both our exposure (attitudes and food preferences) and outcomes (healthy and unhealthy eating behaviors) were simultaneously assessed, thus there is limited evidence of the temporal relationship between the exposure and outcome. The FLASHE survey was highly self-reported, which introduced several self-report biases. For example, recall bias may occur within the 7 day dietary survey as well as social desirability bias. This may threaten the internal validity of our study results. Additionally, we have summed the responses of the independent and dependent variables into three ordinal levels, which may potentially result in misclassification bias. We have collapsed and summed our responses with consultancy in relevant literature and previous research with the same dataset. Additional sensitivity analyses would be needed to assess how the cut-offs for collapsing responses impact the results of the models. Finally, as we intended to perform ordinal logistic regression analysis, the results of our analysis highly relied on the assumption of proportional odds, which is the constant effect of an independent variable for each increase in the level of the response. We performed a Brant test for the logistic regression models to test the assumption of proportional odds. The results of our Brant test satisfied the proportional odds assumption. However, due to potential multicollinearity among our exposure variables, the Brant test results might not be sufficiently evident. (See attached Appendix

for further details regarding Brant tests) Despite these limitations, our analysis provides an important contribution to the literature.

## ***4.2 Implication for Policy and Intervention***

As we found that adolescents' eating behaviors are strongly associated by their attitudes and food preferences, this has several implications for education, policy and intervention development. Adolescents' attitudes have direct and strong associations on their intentions and behaviors to eat healthily. Efforts to enhance these attitudes should be made indeed. Proper nutrition education is essential for adolescents to develop healthy and positive attitudes [43,44]. Education campaigns should emphasize promoting the attitudes, confidence and motivations of youths to eat healthily. More hands-on experience should be provided to them to attain more control of their diet and experience a wider variety of foods [45]. In addition to promoting nutrition education, policies should focus more on creating a healthy food environment for the young generation. Efforts should be made to limit the accessibility and availability of unhealthy foods to adolescents. For instance, there should be restrictions on the advertising and marketing of unhealthy foods. As the adolescents are less exposed to the unhealthy food products, there are less likely to formulate food preferences towards the unhealthy food items. [47, 48]]A healthy food environment ensures that adolescents have access to healthy foods and has opportunities to enjoy the foods they like, which may help to



formulate healthy dietary practices. Nutrition education programs should aim to empower the positive attitudes, motivations of adolescents to develop healthy eating behaviors. [34-46] There could be more focus on the various factors that influence adolescents' attitudes and preferences when designing the intervention programs. For instance, several innovative interventions and piloted trials have shown that the children or adolescents participating in the study have fostered positive attitudes and improved self-efficacy, which eventually corresponded to more frequent consumption of greens and other healthy food items [49, 50]. Communication and interventions should empower the young generation to have the knowledge, ability and motivation to eat healthily. Given the fact that adolescence is not only a transitional period of lifetime, but also the foundation of one's adulthood and future life, our study has significant public health impact in various ways

### ***4.3 Implication for Future Research***

This is the first study to our knowledge that assess cognitive and personal factors to both healthy and unhealthy eating behaviors. There are indeed several directions for future research and studies. Firstly, longitudinal observational studies could be conducted to further investigate the between adolescents' eating behaviors, attitudes and food preferences over time. This is crucial to determine the temporal relationship or investigate whether the relationship is bidirectional. Interventions that promote

adolescents' self-efficacy and attitudes should be tested for both efficacy and effectiveness. Distinct study methods could be conducted. Cluster randomized controlled trials and single group pre and post studies are most used in this field of interest, these study designs are highly recommended to be conducted in the nutrition interventions targeting adolescents. Finally, future research could be conducted in the neuroscientific field. Future studies could systematically investigate the neural mechanisms underlying the relationship between eating behaviors, attitudes and food preferences.

## 5. Conclusion

Prior to conducting this research, we conducted an innovative park-based nutrition education program for adolescents in Miami in partnership with Miami Dade Recreation and Open Space Department. We designed and developed the curriculum and intervention program while the Miami government evaluated the feasibility and efficacy of the intervention program with pre and post measurements. Our program lasted for four weeks, over 60 adolescents participated in our weekly presentations and after-hour activities. The adolescents reported positive feedback and demonstrated positive changes in their attitudes and dietary behaviors after the program. We developed our research purpose of systematically investigating the associations of eating behaviors with attitudes and food preferences based on the results we found in this intervention program.

By assessing both the healthy eating behaviors and unhealthy eating behaviors of the adolescents, we concluded that their attitudes and food preferences have strong associations with their eating behaviors. Food preferences are strong predictors of what the adolescents choose to eat. Additionally, self-efficacy and attitudes could influence both healthy and unhealthy eating behaviors. With the support of literature and theories, our study has a significant impact on providing guidelines for education and nutrition intervention programs aiming to promote healthy eating behaviors among the young generation.

## **Appendix A**

Appendix A (attached file) shows the conceptual model, study highlights, enrollment and design details provided by the National Institute of Cancer. Resource available in :

**FLASHE: Family Life, Activity, Sun, Health, and Eating Study ([cancer.gov](https://www.cancer.gov))**

# FLASHE

Family Life, Activity, Sun, Health, and Eating Study

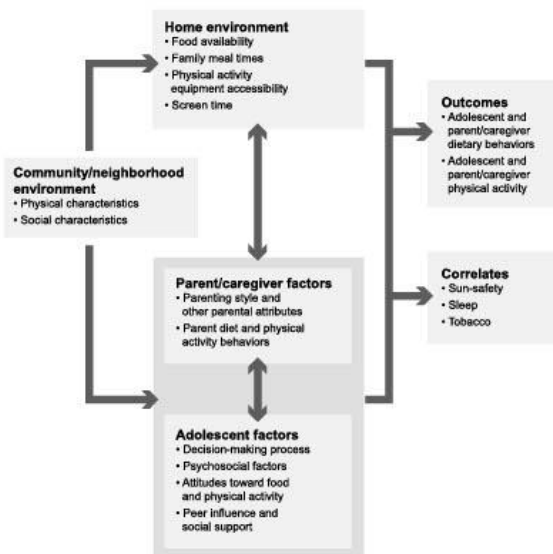
## About FLASHE

The Family Life, Activity, Sun, Health, and Eating (FLASHE) study is a National Cancer Institute survey that examines psychosocial, generational (parent-teen), and environmental correlates of cancer-related behaviors. Behavioral measures focus on diet and physical activity as they relate to cancer risk.

Other behaviors assessed include sun-safety, sleep, and tobacco use. The sample was drawn from a Consumer Opinion Panel representative of the U.S. general population on sex, education, income, age, household size, and region. A subsample of adolescents received motion-sensing devices to objectively measure their physical activity.

## FLASHE Conceptual Model

This model is guided by ecological and behavioral psychosocial frameworks and theories.



## Study Highlights

- Researchers collected data from dyads of caregivers and their adolescent children (ages 12–17) between April –October 2014.
- The FLASHE study included two surveys for each respondent: one on diet-related behaviors and one on physical activity-related behaviors.
- A module attached to the first survey included questions on general parenting style and demographics.
- In a random subsample of dyads, adolescents also wore an accelerometer for seven days and completed an activity log.

[cancercontrol.cancer.gov/flashe](http://cancercontrol.cancer.gov/flashe)

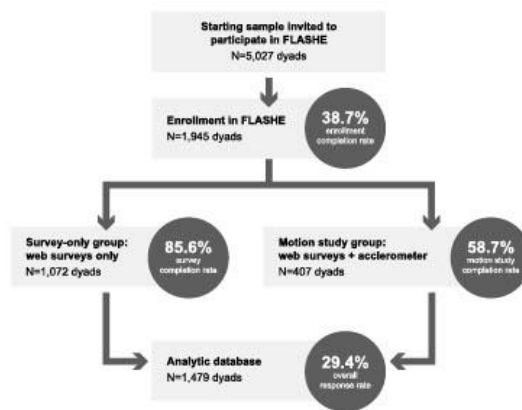
## Example Constructs in FLASHE

The FLASHE study assessed multiple constructs relevant to dietary and physical activity behaviors, including the following examples:

- Community/Neighborhood Environment: Neighborhood accessibility; social capital; traffic
- Home Environment: Home availability of foods and physical activity equipment; context of family meals
- Adolescent Factors: Barriers; motivations; perceptions of advertising and media
- Parent/Caregiver Factors: Parenting practices; parenting style; parent-reported behavioral correlates
- Other Health Behaviors: Sun-safety and tanning; sleep time and quality; tobacco use

## FLASHE Enrollment and Design

This figure shows the number of dyads who enrolled in FLASHE and completed study procedures.



- Parent-adolescent dyads were randomly assigned to one of two study arms. A total of 1,479 dyads completed all of the study procedures to which they were assigned.
- Of dyads in the survey-only group, 1,072 completed all surveys: parent-diet, parent-physical activity, adolescent-diet, and adolescent-physical activity.
- An additional 407 dyads assigned to the motion study group completed all surveys and returned the accelerometer.
- Individual FLASHE data sets (parent only or adolescent only) have higher sample sizes.

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## Connect with FLASHE

Please go to the FLASHE webpage at: [cancercontrol.cancer.gov/flashe](http://cancercontrol.cancer.gov/flashe) to access data sets, surveys, analysis resources, and other information.



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More further details regarding the study methods, data collection and management,  
please see attached website: **Family Life, Activity, Sun, Health, and Eating (FLASHE)**  
**Study Methodology Report (cancer.gov)**

## **Appendix B**

This Appendix provides the original data questionnaire regarding adolescents' eating behaviors (Adolescent Diet Survey Instrument).

We generated our exposure variables (attitudes and food preferences) from Section 1 and Section 6 from the questionnaire. More specifically, we used items 1a, 5a, 46a, 46b, 46c, 46d, 46e and 47.

We generated our outcome variables from Section 2 of the questionnaire. More specifically, we used items 11, 15, 16, 17, 18, 21, 22 for healthy eating behavior outcomes. For unhealthy eating behavior outcomes, we used the items 10, 12, 19, 23, 25, 26, 27, 28, 31, 32, 33, 34 and 35. Items that are controversial in determining the categories of healthy or unhealthy foods were excluded to avoid potential bias.

The original questionnaire could also be accessed through the website below:

FLASHE Annotated Teen Diet Survey ([cancer.gov](http://cancer.gov))



## LASHE – Annotated Teen Diet Survey

### Notes about this instrument:

This annotated instrument is designed to provide question content, variable names, labels and response values. It does NOT represent the actual survey completed by respondents because skip patterns and other programming for web-based administration are not presented. For a full list of variables included in each dataset, as well as missing data codes, please reference the codebook. Screen shots of the surveys as administered are available upon request at: email [nciflashe@mail.nih.gov](mailto:nciflashe@mail.nih.gov)

The variable information in all capitals is the VARIABLE NAME. Following the variable name is the VARIABLE LABEL.

Survey instrument is indicated by the starting letters of the variable name:

- T = Teen Demographic survey
- TD = Teen Diet survey
- TP = Teen Physical Activity Survey
- P = Parent Demographic Survey
- PD = Parent Diet Survey
- PP = Parent Physical Activity Survey

Some variables were constructed to facilitate data analyses. These variables are indicated by variable names beginning with "X." Some of these X variables can be found in this instrument and others can be found in the codebook.

Federal Laws govern the protection of individual respondents participating in federally-sponsored studies and surveys. In order to ensure that FLASHE was in compliance with these regulations, a risk assessment study was conducted. Data that was determined to pose too great a risk of exposure for personal identifiable information to respondents were modified to ensure confidentiality. The types of changes made included:

- Recoding some responses to combine response categories due to small cell sizes. Variable names that include "RC" have been recoded.
- Removing some data from the public use dataset. These data are indicated with the statement "*Information not available on the public use dataset*".

### Section 1: Your Attitudes & Opinions

This first set of questions asks you about your views on certain types of foods.

Please select how much you disagree or agree with each of the statements listed below.

|   | Strongly disagree          | Somewhat disagree          | Neither disagree nor agree | Somewhat agree             | Strongly agree             |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. I feel confident in my ability to eat fruits and vegetables every day<br>TDEFFV: TD_EfficacyFV | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. My friends eat fruits and vegetables most days of the week<br>TDNORMFV: TD_NormFV              | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

2. There are lots of reasons why people might eat fruits and vegetables every day. Please select how much you disagree or agree with how true each of these reasons is for YOU.

| I would eat fruits and vegetables every day because...  | <b>Strongly disagree</b>   | <b>Somewhat disagree</b>   | <b>Neither disagree nor agree</b> | <b>Somewhat agree</b>      | <b>Strongly agree</b>      |
|---|----------------------------|----------------------------|-----------------------------------|----------------------------|----------------------------|
| a. I would feel bad about myself if I didn't<br>TDMFVBAD: TD_MotivationFV_FeelBadMyself   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. I have thought about it and decided that I want to eat fruits and vegetables every day<br>TDMFVWANT: TD_MotivationFV_WantToEat | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. Others would be upset with me if I didn't<br>TDMFVUPST: TD_MotivationFV_OthersUpset  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| d. It's an important thing for me to do<br>TDMFVIMPT: TD_MotivationFV_ImportantToDo   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

3. About how many servings of fruits and vegetables does the government recommend that teenagers should eat each day?

TDKNFV: TD\_KnowFV  
\_\_\_\_\_ servings each day

- I'm not really sure.  
TDKNFVNS: TD\_KnowFV\_NotSure  
0 Not checked  
1 Checked

4. There are lots of reasons why people might not eat fruits and vegetables as much as they'd like to. Please select how much you disagree or agree with how true each of these reasons is for YOU.

| I don't eat fruits and vegetables as much as I like to because...   | <b>Strongly disagree</b>   | <b>Somewhat disagree</b>   | <b>Neither disagree nor agree</b> | <b>Somewhat agree</b>      | <b>Strongly agree</b>      |
|---|----------------------------|----------------------------|-----------------------------------|----------------------------|----------------------------|
| a. They often spoil before I get a chance to eat them<br>TDBFVSPL: TD_BarrierFV_SpoilBeforeEat                                | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. They aren't filling enough<br>TDBFVNTFL: TD_BarrierFV_NotFillingEnough   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. The restaurants I go to don't serve fruits and vegetables<br>TDBFVREST: TD_BarrierFV_RestaurantNotServe                    | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| d. I just don't think of fruits and vegetables when I'm looking for something to eat<br>TDBFVDTHINK: TD_BarrierFV_DontThinkOf | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| e. They are not packed in my lunch<br>TDBFVNLUNCH: TD_BarrierFV_NotPackedLunch  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

This next set of questions asks about your views on junk food and sugary drinks. Junk foods are foods that are high in calories and usually have added sugars and fat and include candy, cookies, potato chips, French fries, etc. Sugary drinks include regular soda, sports drinks, fruit drinks, sweetened teas and other drinks with added sugar.

5. Please select how much you disagree or agree with each of the statements listed below.

|  | <b>Strongly disagree</b>   | <b>Somewhat disagree</b>   | <b>Neither disagree nor agree</b> | <b>Somewhat agree</b>      | <b>Strongly agree</b>      |
|--|----------------------------|----------------------------|-----------------------------------|----------------------------|----------------------------|
| a. I feel confident in my ability to limit the amount of junk food and sugary drinks I eat and drink<br>TDEFFFB: TD_EfficacyFB | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. My friends eat junk food or drink sugary drinks on most days of the week<br>TDNORMFB: TD_NormFB                             | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

6. There are lots of reasons why people might limit the amount of junk food and sugary drinks they have. Please select how much you disagree or agree with how true each of these reasons is for YOU.

| I would try to limit how much junk food and sugary drinks I have because...   | <b>Strongly disagree</b>   | <b>Somewhat disagree</b>   | <b>Neither disagree nor agree</b> | <b>Somewhat agree</b>      | <b>Strongly agree</b>      |
|---|----------------------------|----------------------------|-----------------------------------|----------------------------|----------------------------|
| a. I would feel bad about myself if I didn't<br>TDMFBBAD: TD_MotivationFB_FeelBadMyself   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. I have thought about it and decided that I want to limit junk food and sugary drinks<br>TDMFBWANT: TD_MotivationFB_WantToLimit | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. Others would be upset with me if I didn't<br>TDMFBUPST: TD_MotivationFB_OthersUpset  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| d. It's an important thing for me to do<br>TDMFBIMPT: TD_MotivationFB_ImportantToDo   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

7. There are lots of reasons why you might start eating or continue eating when you aren't hungry. How often do YOU start or continue to eat when YOU'RE not hungry because...

|   | <b>Never</b>               | <b>Rarely</b>              | <b>Sometimes</b>           | <b>Often</b>               | <b>Always</b>              |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. You feel sad and depressed?<br>TDENHSAD: TD_EatNoHunger_Sad      | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. You feel anxious or nervous?<br>TDENHANX: TD_EatNoHunger_Anxious | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

8. These next questions are about how you regulate and manage your emotions. Please select how much you disagree or agree with each of the statements listed below.

|   | <b>Strongly disagree</b>   | <b>Somewhat disagree</b>   | <b>Neither disagree nor agree</b> | <b>Somewhat agree</b>      | <b>Strongly agree</b>      |
|---|----------------------------|----------------------------|-----------------------------------|----------------------------|----------------------------|
| a. I keep my emotions to myself<br>TDEMKPSELF: TD_EmotionReg_KeepToMyself   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. When I am feeling POSITIVE emotions, I am careful not to express them<br>TDEMPOSNE: TD_EmotionReg_PositiveNotExpress | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. I control my emotions by NOT EXPRESSING THEM<br>TDEMCNTNE: TD_EmotionReg_ControlNotExpress                           | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| d. When I am feeling NEGATIVE emotions, I make sure not to express them<br>TDEMNEGNE: TD_EmotionReg_NegativeNotExpress  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

9. Please think about messages you see or hear on television, magazines, radio, internet or billboards about foods and drinks. Please mark how much you disagree or agree with each of the statements listed below.

| When I see advertisements for foods or drinks...  | <b>Strongly disagree</b>   | <b>Somewhat disagree</b>   | <b>Neither disagree nor agree</b> | <b>Somewhat agree</b>      | <b>Strongly agree</b>      |
|---|----------------------------|----------------------------|-----------------------------------|----------------------------|----------------------------|
| a. I want to try the advertised foods or drinks.<br>TDADTRY: TD_Ads_WantToTry                 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. I think the advertised foods or drinks will taste good.<br>TDADTASTE: TD_Ads_WillTasteGood | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. I trust the messages advertised.<br>TDADTRUST: TD_Ads_TrustMessages                        | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

**Section 2: What You Eat and Drink**

These questions ask about what you DRANK DURING THE PAST 7 DAYS. Think about everything you drank from the time you got up until you went to bed. Be sure to count what you drank at home, school, restaurants or anywhere else. Also think about drinks you had in a can, bottle or glass.

10. DURING THE PAST 7 DAYS, how many times did you drink SWEETENED FRUIT DRINKS and teas like Capri Sun, Sunny D, Arizona Tea, etc.? DON'T COUNT 100% pure fruit juice or artificially sweetened or diet drinks.

TDBFRUTDRK: TD\_Bev\_FruitDrink

1 I did not drink sweetened fruit drinks during the past 7 days

2 1 – 3 times in the past 7 days

3 4 – 6 times in the past 7 days

4 1 time per day

5 2 times per day

6 3 or more times per day

11. DURING THE PAST 7 DAYS, how many times did you drink 100% PURE FRUIT JUICE like orange, apple, grape, etc.? DON'T COUNT fruit-flavored drinks with added sugar like Capri Sun, etc.

TDBFRUTJC: TD\_Bev\_FruitJuice

1 I did not drink 100% pure fruit juice during the past 7 days

2 1 – 3 times in the past 7 days

3 4 – 6 times in the past 7 days

4 1 time per day

5 2 times per day

6 3 or more times per day

12. DURING THE PAST 7 DAYS, how many times did you drink regular SODA or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc.? DON'T COUNT diet or zero calorie sodas.  
 TDBSODA: TD\_Bev\_Soda
- 1 I did not drink soda during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
13. DURING THE PAST 7 DAYS, how many times did you drink ENERGY DRINKS like Rockstar, Red Bull, etc.? These drinks usually have caffeine.  
 TDBENERGY: TD\_Bev\_EnergyDrink
- 1 I did not drink energy drinks during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
14. DURING THE PAST 7 DAYS, how many times did you drink SPORTS DRINKS like Gatorade, Powerade, etc.? DON'T COUNT low-calorie sports drinks like G2, Powerade Zero, etc.  
 TDBSPORT: TD\_Bev\_SportDrink
- 1 I did not drink sports drinks during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
15. DURING THE PAST 7 DAYS, how many times did you drink any WATER that is not sweetened like tap water, filtered water, bottled water or sparkling water?  
 TDBWATER: TD\_Bev\_Water
- 1 I did not drink water during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
16. DURING THE PAST 7 DAYS, how many times did you drink MILK or have it on your cereal? COUNT milk you drank at school. COUNT other types of milk, like soy, rice, almond, etc. DON'T COUNT flavored or sweetened milk OR small amounts of milk added to coffee or tea.  
 TDBMILK: TD\_Bev\_Milk
- 1 I did not drink milk during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day

These questions ask about the food you ATE DURING THE PAST 7 DAYS. Think about all the meals and snacks you ate from the time you got up until you went to bed. Be sure to count foods that you ate at home, school, restaurants or anywhere else.

17. DURING THE PAST 7 DAYS, how many times did you eat fruit like apples, bananas, melon, etc.? COUNT fresh, frozen, canned and dried fruit. DON'T COUNT fruit juices.

TDFFRUIT: TD\_Food\_Fruit

- 1 I did not eat fruit during the past 7 days
- 2 1 – 3 times in the past 7 days
- 3 4 – 6 times in the past 7 days
- 4 1 time per day
- 5 2 times per day
- 6 3 or more times per day

18. DURING THE PAST 7 DAYS, how many times did you eat a GREEN SALAD, with or without other vegetables?

TDFSALAD: TD\_Food\_Salad

- 1 I did not eat green salad during the past 7 days
- 2 1 – 3 times in the past 7 days
- 3 4 – 6 times in the past 7 days
- 4 1 time per day
- 5 2 times per day
- 6 3 or more times per day

19. DURING THE PAST 7 DAYS, how many times did you eat FRIED POTATOS like French fries, tater tots, hash brown potatoes, etc.?

TDFPOTFRD: TD\_Food\_PotatoesFried

- 1 I did not eat fried potatoes during the past 7 days
- 2 1 – 3 times in the past 7 days
- 3 4 – 6 times in the past 7 days
- 4 1 time per day
- 5 2 times per day
- 6 3 or more times per day

20. DURING THE PAST 7 DAYS, how many times did you eat any OTHER KIND OF POTATOS that aren't fried like baked, boiled, mashed or potatoes used in soups and stews?

TDFPOTOTH: TD\_Food\_PotatoesOther

- 1 I did not eat non-fried potatoes during the past 7 days
- 2 1 – 3 times in the past 7 days
- 3 4 – 6 times in the past 7 days
- 4 1 time per day
- 5 2 times per day
- 6 3 or more times per day

21. DURING THE PAST 7 DAYS, how many times did you eat other NON-FRIED VEGETABLES like carrots, broccoli, collards, green beans, corn, etc.? DON'T COUNT green salad or potatoes.

TDFVEG: TD\_Food\_Vegetables

- 1 I did not eat non-fried vegetables during the past 7 days
- 2 1 – 3 times in the past 7 days
- 3 4 – 6 times in the past 7 days
- 4 1 time per day
- 5 2 times per day
- 6 3 or more times per day

22. DURING THE PAST 7 DAYS, how many times did you eat refried beans, baked beans, pinto beans, black beans or other COOKED BEANS? DON'T COUNT green beans or string beans.  
 TDFBEANS: TD\_Food\_Beans
- 1 I did not eat cooked beans during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
23. DURING THE PAST 7 DAYS, how many times did you eat PIZZA like frozen, fast food or homemade pizza?  
 TDFPIZZA: TD\_Food\_Pizza
- 1 I did not eat pizza during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
24. DURING THE PAST 7 DAYS, how many times did you eat tacos, burritos, nachos or other dishes like these?  
 TDFTACOS: TD\_Food\_Tacos
- 1 I did not eat these dishes during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
25. DURING THE PAST 7 DAYS, how many times did you eat foods that you HEAT AND SERVE or make from a box like fried mozzarella sticks, Hot Pockets, macaroni and cheese, etc.? COUNT foods that are made at home or purchased out.  
 TDFHTSERV: TD\_Food\_HeatServe
- 1 I did not eat foods that you heat and serve during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
26. DURING THE PAST 7 DAYS, how many times did you eat PROCESSED MEAT like bologna or other kinds of lunch meat, hot dogs, bacon, etc.?  
 TDFPROCMT: TD\_Food\_ProcessedMeat
- 1 I did not eat processed meat during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
27. DURING THE PAST 7 DAYS, how many times did you eat HAMBURGERS OR CHEESEBURGERS? COUNT fast food burgers like Big Macs, Whoppers, etc.  
 TDFBURGERS: TD\_Food\_Burgers
- 1 I did not eat hamburgers or cheeseburgers during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day

28. DURING THE PAST 7 DAYS, how many times did you eat FRIED CHICKEN like chicken nuggets, breaded chicken strips or breaded chicken patties? COUNT only chicken that has been fried.  
 TDFFRCHCKN: TD\_Food\_FriedChicken
- 1 I did not eat fried chicken during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
29. DURING THE PAST 7 DAYS, how many times did you eat WHOLE GRAIN BREAD like toast, rolls or sandwich bread? COUNT whole wheat, rye, oatmeal and pumpernickel bread. DON'T COUNT white bread.  
 TDFWHGRBRD: TD\_Food\_WholeGrainBread
- 1 I did not eat whole grain bread during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
30. DURING THE PAST 7 DAYS, how many times did you eat brown rice, whole grain/whole wheat pasta, or other COOKED WHOLE GRAINS? COUNT bulgur, cracked wheat and millet. DON'T COUNT white rice or regular pasta.  
 TDFWHGRCKD: TD\_Food\_WholeGrainCooked
- 1 I did not eat cooked whole grains during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
31. DURING THE PAST 7 DAYS, how many times did you eat any type of CANDY OR CHOCOLATE? COUNT candy bars, lollipops/suckers, sour candies, etc. DON'T COUNT sugar-free candy.  
 TDFCANDY: TD\_Food\_Candy
- 1 I did not eat candy or chocolate during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
32. DURING THE PAST 7 DAYS, how many times did you eat cookies, cakes, cupcakes, doughnuts, brownies, pop-tarts, etc.? COUNT homemade and packaged treats like Little Debbie, Hostess Twinkies, etc.  
 TDFCAKE: TD\_Food\_Cake
- 1 I did not eat any of these during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day
33. DURING THE PAST 7 DAYS, how many times did you eat ice cream or other FROZEN DESSERTS like frozen yogurt, ice cream bars, etc.? DON'T COUNT sugar-free kinds.  
 TDFDESSERT: TD\_Food\_Desserts
- 1 I did not eat frozen desserts during the past 7 days
  - 2 1 – 3 times in the past 7 days
  - 3 4 – 6 times in the past 7 days
  - 4 1 time per day
  - 5 2 times per day
  - 6 3 or more times per day



34. DURING THE PAST 7 DAYS, how many times did you eat regular POTATO CHIPS, corn chips or cheese puffs like Lays, Doritos, Cheetos, etc.? DON'T COUNT baked varieties and don't count pretzels.

TDFCHIPS: TD\_Food\_Chips

- 1 I did not eat chips during the past 7 days  
 2 1 – 3 times in the past 7 days  
 3 4 – 6 times in the past 7 days  
 4 1 time per day  
 5 2 times per day  
 6 3 or more times per day

35. DURING THE PAST 7 DAYS, how many times did you eat SUGARY CEREALS like Cap'n Crunch, Froot Loops, Frosted Flakes, etc.? DON'T COUNT non-sugarcoated kinds like Shredded Wheat or regular Cheerios.

TDFCERSUGR: TD\_Food\_CerealSugar

- 1 I did not eat sugary cereals during the past 7 days  
 2 1 – 3 times in the past 7 days  
 3 4 – 6 times in the past 7 days  
 4 1 time per day  
 5 2 times per day  
 6 3 or more times per day

36. DURING THE PAST 7 DAYS, how many times did you eat NON-SUGARY CEREALS like regular Cheerios, Chex, Corn Flakes, etc.? DON'T COUNT sugary cereals like Froot Loops or Frosted Flakes.

TDFCERNUG: TD\_Food\_CerealNoSugar

- 1 I did not eat non-sugarcoated cereals during the past 7 days  
 2 1 – 3 times in the past 7 days  
 3 4 – 6 times in the past 7 days  
 4 1 time per day  
 5 2 times per day  
 6 3 or more times per day

### Section 3: Food Away From Home

37. Are there vending machines at your school?

TDSCHLVNDG: TD\_SchoolVending

- 1 Yes  
 2 No

IF NO, RESPONDENT SKIPPED TO QUESTION 39

38. Do they sell sodas, salty snacks and/or candy?

TDSCHLSODA: TD\_SchoolVending\_Sodas

- 1 Yes  
 2 No

39. Does your school have working water fountains or dispensers?

TDSCHLH2O: TD\_SchoolWater

- 1 No, none work  
 2 Yes, only a few  
 3 Yes, widely available  
 4 There are no water fountains or dispensers

40. Think about the local area around your school, within a 10-15 minute walk in any direction. Do you have any of the following in walking distance from your school? Please select all that apply.

- |  | Yes                        | No                         |
|--|----------------------------|----------------------------|
| a. Convenience/corner store/small grocery store/bodega<br>TDANCONV: TD_AvailNbhd_ConvenienceStore                            | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 |
| b. Supermarket/mid-size grocery store<br>TDANSUPRMKT: TD_AvailNbhd_Supermarket   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 |
| c. Fruit/vegetable market/Farmer's market/ co-op/Community Supported Agriculture (CSA)<br>TDANMKTCSA: TD_AvailNbhd_MarketCSA | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 |
| d. Fast food restaurant<br>TDANFASTFD: TD_AvailNbhd_FastFoodRest   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 |
| e. Non-fast food restaurant<br>TDANNFASTFD: TD_AvailNbhd_NonFastFood   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 |

41. How often do you go to each of the following that's in walking distance from your school?

- |  | Never                      | Rarely                     | Sometimes                  | Often                      | Always                     |
|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. Convenience/corner store/small grocery store/bodega<br>TDFSCONV: TD_FoodShop_ConvenienceStore                               | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. Supermarket/mid-size grocery store<br>TDFSSUPRMKT: TD_FoodShop_Supermarket  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. Fruit/vegetable market/Farmer's market/<br>co-op/Community Supported Agriculture (CSA)<br>TDFSMKTCSA: TD_FoodShop_MarketCSA | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| d. Fast food restaurant<br>TDFSFASFD: TD_FoodShop_FastFoodRest   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| e. Non-fast food restaurant<br>TDFSNFASTFD: TD_FoodShop_NonFastFood  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

Think about all the meals and snacks you ate and drank AWAY FROM HOME in the past 7 days, from the time you got up until you went to bed. COUNT breakfast, lunch, dinner and snacks.

42. During the past 7 days, ON HOW MANY DAYS did you eat at least one meal or snack AWAY FROM HOME at...

- |   | On 0<br>days               | On 1<br>day                | On 2<br>days               | On 3<br>days               | On 4<br>days               | On 5<br>days               | On 6<br>days               | On 7<br>days               |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. A fast food restaurant like McDonald's, Taco Bell or KFC?<br>TDMFASTFD: TD_MealsAway_FastFoodRest  | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |
| b. A full service pizza restaurant like Pizza Hut, Godfather's or CiCi's Pizza?<br>TDMAPIZZA: TD_MealsAway_PizzaRest                          | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |
| c. A convenience store like 7-Eleven or Express Mart?<br>TDMACONV: TD_MealsAway_ConvenienceStore  | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |
| d. A full service restaurant like Red Lobster, TGI-Fridays, Chili's or an independent restaurant?<br>TDMAFSREST: TD_MealsAway_FullServiceRest | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |

**Section 4: Food in Your Home**

The next few questions ask about food in your home. For this survey, home means the place where you and your parent(s) have lived together for most of the time in the PAST 12 MONTHS.

Again, "PARENT" means the adult who takes care of you. It could be your birth mother or father or your adopted mother or father. It could also be your guardian, an adult relative or an adult who isn't related to you.

43. Please think about the evening meals eaten AT YOUR HOME in the past 7 days. On how many of the past 7 days was the evening meal...

|  | <b>On 0<br/>days</b>       | <b>On 1<br/>day</b>        | <b>On 2<br/>days</b>       | <b>On 3<br/>days</b>       | <b>On 4<br/>days</b>       | <b>On 5<br/>days</b>       | <b>On 6<br/>days</b>       | <b>On 7<br/>days</b>       |
|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. Purchased from a fast food restaurant and eaten AT HOME?<br>TDMHFASTFD: TD_MealsHome_FastFood   | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |
| b. Delivered to your HOME like pizza or Chinese food?<br>TDMHDELIVR: TD_MealsHome_Delivered  | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |
| c. Made from a HEAT AND SERVE or box meal like Spaghetti-O's, a microwave meal or frozen pizza, and eaten AT HOME?<br>TDMHHTSERV: TD_MealsHome_HeatServe | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |
| d. Cooked from scratch or a recipe and eaten AT HOME?<br>TDMHCOOK: TD_MealsHome_Cooked   | <input type="checkbox"/> 0 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 | <input type="checkbox"/> 7 |

44. How often are the following foods and drinks available in your home?

|  | <b>Never</b>               | <b>Rarely</b>              | <b>Sometimes</b>           | <b>Often</b>               | <b>Always</b>              |
|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. Fruits or vegetables<br>TDAFV: TD_Avail_FV  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. Sweets like candy, cookies, cake, ice cream, etc.<br>TDAWWEET: TD_Avail_Sweets  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. Sugary drinks like regular soda, sports drinks, fruit drinks, sweetened teas and other drinks with added sugar<br>TDAWGRDRK: TD_Avail_SugarDrinks | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| d. Regular potato chips, corn chips or cheese puffs like Lays, Doritos, Cheetos, etc.<br>TDACHIPS: TD_Avail_Chips                                    | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

**Section 5: Family Meals**

For these next questions, think about meal times with your family.

45. Please select how much you disagree or agree with each of the statements listed below.

| In my family...   | Strongly disagree          | Somewhat disagree          | Neither disagree nor agree | Somewhat agree             | Strongly agree             |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. It is important that we eat at least one meal a day together<br>TDFMTOGTHR: TD_FamilyMeals_EatTogether | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. We often watch TV while eating dinner<br>TDFMTV: TD_FamilyMeals_WatchTV                                | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. I often eat alone<br>TDFMEATALON: TD_FamilyMeals_EatAlone  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

**Section 6: Your Preferences**

The questions in this section ask about your food and drink preferences.

46. Please select one box for how much you DISLIKE or LIKE each of the drinks and foods listed below.

|  | Strongly dislike           | Somewhat dislike           | Neither dislike nor like   | Somewhat like              | Strongly like              | Never tried it             |
|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. Sugar sweetened drinks like Capri Sun, Sunny D, Arizona Tea, etc<br>TDPFRUTDRK: TD_Pref_FruitDrink                          | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 |
| b. Regular soda or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc.<br>TDPSTODA: TD_Pref_Soda                                    | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 |
| c. Any water that is not sweetened like tap water, filtered water, bottled water or sparkling water<br>TDPWATER: TD_Pref_Water | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 |
| d. Fruit like apples, bananas, melon, etc. Count fresh, frozen, canned or dried fruit<br>TDPFRUIT: TD_Pref_Fruit               | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 |
| e. A green salad, or other non-fried vegetables like carrots, broccoli, green beans, corn, etc<br>TDPVEG: TD_Pref_Vegetables   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 |

How much do you disagree or agree with the statement listed below?

47. I eat a healthy diet.  
TDHLTHDIET: TD\_HealthyDiet
- 1 Strongly disagree
  - 2 Somewhat disagree
  - 3 Neither disagree nor agree
  - 4 Somewhat agree
  - 5 Strongly agree

**Section 8: Your Parents**

Again, "PARENT" means the adult who takes care of you. It could be your birth mother or father or your adopted mother or father. It could also be your guardian, and adult relative or an adult who isn't related to you.

48. How much do you disagree or agree with each of the statements listed below regarding WHAT YOUR PARENT(S) SAY AND DO when it comes to eating fruits and vegetables?

|  | <b>Strongly disagree</b>   | <b>Somewhat disagree</b>   | <b>Neither disagree nor agree</b> | <b>Somewhat agree</b>      | <b>Strongly agree</b>      |
|--|----------------------------|----------------------------|-----------------------------------|----------------------------|----------------------------|
| a. My parent(s) buy fruits and vegetables for me<br>TDPFVBUY: TD_ParentingFV_Buy   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. My parent(s) try to eat fruits and vegetables when I'm around<br>TDPFVTRYEAT: TD_ParentingFV_TryToEat                             | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. My parent(s) encourage me to try different kinds of fruits and vegetables<br>TDPFVTRYVAR: TD_ParentingFV_TryVariety               | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| d. My parent(s) and I decide together how many fruits and vegetables I have to eat<br>TDPFVDECIDE: TD_ParentingFV_DecideTogether     | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| e. My parent(s) have to make sure that I eat enough fruits and vegetables<br>TDPFVENOUGH: TD_ParentingFV_EatEnough                   | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| f. My parent(s) make me eat fruits and vegetables<br>TDPFVMKEAT: TD_ParentingFV_MakeEat  | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| g. It's okay for my parent(s) to make rules about how many fruits and vegetables I can have<br>TDPFVMKRULE: TD_ParentingFV_MakeRules | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3        | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

These questions ask about junk food and sugary drinks that you may eat or drink. Remember that JUNK FOODS are foods that are high in calories and usually have added sugars and fat and include candy, cookies, potato chips, French fries, etc. SUGARY DRINKS include regular soda, sports drinks, fruit drinks, sweetened teas and other drinks with added sugar.

49. How much do you disagree or agree with each of the statements listed below regarding WHAT YOUR PARENT(S) SAY AND DO when it comes to eating junk food or drinking sugary drinks?

|  | Strongly disagree          | Somewhat disagree          | Neither disagree nor agree | Somewhat agree             | Strongly agree             |
|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| a. If I've had a bad day, my parent(s) let me have junk food or sugary drinks to make me feel better<br>TDPFBBADDAY: TD_ParentingFB_BadDay         | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| b. My parent(s) don't buy a lot of junk food or sugary drinks for me<br>TDPFBNOTBUY: TD_ParentingFB_NotBuyAlot                                     | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| c. My parent(s) try to avoid eating junk food or drinking sugary drinks when I'm around<br>TDPFBVOID: TD_ParentingFB_TryToAvoid                    | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| d. My parent(s) and I decide together how much junk food or sugary drinks I can have<br>TDPFBDECIDE: TD_ParentingFB_DecideTogether                 | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| e. My parent(s) have to make sure that I don't eat too much junk food or drink too many sugary drinks<br>TDPFBNOTEAT: TD_ParentingFB_NotEatTooMuch | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| f. My parent(s) decide how much junk food or sugary drinks I can have<br>TDPFBPARDEC: TD_ParentingFB_ParentDecideHowMuch                           | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
| g. It's okay for my parent(s) to make rules about how much junk food or sugary drinks I have<br>TDPFBMKRULE: TD_ParentingFB_MakeRules              | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

## Appendix C

In order to assess if the demographic variables are potential confounders between the association of adolescents eating behaviors with their food preferences and attitudes, we also performed separate Chi-Squared tests. Attached is the R output of our results. We found that the demographic covariates causes systematic differences in the different responses regarding food attitudes and preferences. Sex were found to have the most systematic differences among the eight variables of food preferences and attitudes. Additionally, the Chi-squared tests indicated that weight and ethnicity are two variables that showed significance with multiple exposure variables as well, which indicates potential confounding.

In the following tables, 0 refers to the “Seldom” group, 1 refers to the “Sometimes” group while 2 refers to the “Often” group.

|               |                       | Stratified by fv_att level |            |            | p     | test |
|---------------|-----------------------|----------------------------|------------|------------|-------|------|
|               |                       | 0                          | 1          | 2          |       |      |
| n             |                       | 217                        | 155        | 1285       |       |      |
| age (%)       | 12 years old          | 30 (14.1)                  | 19 (12.5)  | 170 (13.4) | 0.771 |      |
|               | 13 years old          | 44 (20.7)                  | 32 (21.1)  | 250 (19.7) |       |      |
|               | 14 years old          | 37 (17.4)                  | 24 (15.8)  | 215 (16.9) |       |      |
|               | 15 years old          | 40 (18.8)                  | 27 (17.8)  | 221 (17.4) |       |      |
|               | 16 years old          | 31 (14.6)                  | 28 (18.4)  | 267 (21.0) |       |      |
| sex (%)       | 17 years old          | 31 (14.6)                  | 22 (14.5)  | 149 (11.7) | 0.007 |      |
|               | Male                  | 118 (55.4)                 | 89 (58.6)  | 603 (47.6) |       |      |
| weight (%)    | Female                | 95 (44.6)                  | 63 (41.4)  | 665 (52.4) | 0.009 |      |
|               | underweight or normal | 142 (65.4)                 | 108 (69.7) | 961 (74.8) |       |      |
|               | overweight            | 35 (16.1)                  | 23 (14.8)  | 187 (14.6) |       |      |
| ethnicity (%) | obese                 | 40 (18.4)                  | 24 (15.5)  | 137 (10.7) | 0.315 |      |
|               | Hispanic              | 17 (8.1)                   | 13 (8.6)   | 130 (10.3) |       |      |
|               | Non-Hispanic Black    | 24 (11.5)                  | 25 (16.6)  | 223 (17.7) |       |      |
|               | Non-Hispanic white    | 146 (69.9)                 | 98 (64.9)  | 793 (62.9) |       |      |
|               | Other                 | 22 (10.5)                  | 15 (9.9)   | 115 (9.1)  |       |      |

**Var 1: I feel confident in my ability to eat fruits and vegetables every day.**

|               |                       | Stratified by jf_att |            |            | p      | test |
|---------------|-----------------------|----------------------|------------|------------|--------|------|
|               |                       | level 0              | 1          | 2          |        |      |
| n             |                       | 360                  | 252        | 1045       |        |      |
| age (%)       | 12 years old          | 54 (15.3)            | 32 (12.7)  | 133 (12.9) | 0.770  |      |
|               | 13 years old          | 73 (20.6)            | 47 (18.7)  | 206 (20.0) |        |      |
|               | 14 years old          | 66 (18.6)            | 45 (17.9)  | 165 (16.0) |        |      |
|               | 15 years old          | 60 (16.9)            | 43 (17.1)  | 185 (17.9) |        |      |
|               | 16 years old          | 61 (17.2)            | 57 (22.7)  | 208 (20.2) |        |      |
|               | 17 years old          | 40 (11.3)            | 27 (10.8)  | 135 (13.1) |        |      |
| sex (%)       | Male                  | 174 (49.2)           | 131 (52.2) | 505 (49.1) | 0.672  |      |
|               | Female                | 180 (50.8)           | 120 (47.8) | 523 (50.9) |        |      |
| weight (%)    | underweight or normal | 237 (65.8)           | 170 (67.5) | 804 (76.9) | <0.001 |      |
|               | overweight            | 66 (18.3)            | 45 (17.9)  | 134 (12.8) |        |      |
|               | obese                 | 57 (15.8)            | 37 (14.7)  | 107 (10.2) |        |      |
| ethnicity (%) | Hispanic              | 27 (7.7)             | 25 (10.1)  | 108 (10.6) | 0.225  |      |
|               | Non-Hispanic Black    | 73 (20.9)            | 43 (17.3)  | 156 (15.2) |        |      |
|               | Non-Hispanic white    | 221 (63.1)           | 159 (64.1) | 657 (64.2) |        |      |
|               | Other                 | 29 (8.3)             | 21 (8.5)   | 102 (10.0) |        |      |

**Var 2: I feel confident in my ability to limit the amount of junk food and sugary drinks I eat and drink.**

|               |                       | Stratified by fruitdrink_pref |            |            | p      | test |
|---------------|-----------------------|-------------------------------|------------|------------|--------|------|
|               |                       | level 0                       | 1          | 2          |        |      |
| n             |                       | 231                           | 175        | 1251       |        |      |
| age (%)       | 12 years old          | 27 (11.7)                     | 25 (14.4)  | 167 (13.5) | 0.031  |      |
|               | 13 years old          | 38 (16.5)                     | 30 (17.2)  | 258 (20.9) |        |      |
|               | 14 years old          | 27 (11.7)                     | 28 (16.1)  | 221 (17.9) |        |      |
|               | 15 years old          | 53 (23.0)                     | 32 (18.4)  | 203 (16.5) |        |      |
|               | 16 years old          | 51 (22.2)                     | 29 (16.7)  | 246 (20.0) |        |      |
|               | 17 years old          | 34 (14.8)                     | 30 (17.2)  | 138 (11.2) |        |      |
| sex (%)       | Male                  | 102 (44.5)                    | 103 (60.2) | 605 (49.1) | 0.006  |      |
|               | Female                | 127 (55.5)                    | 68 (39.8)  | 628 (50.9) |        |      |
| weight (%)    | underweight or normal | 177 (76.6)                    | 128 (73.1) | 906 (72.4) | 0.299  |      |
|               | overweight            | 36 (15.6)                     | 24 (13.7)  | 185 (14.8) |        |      |
|               | obese                 | 18 (7.8)                      | 23 (13.1)  | 160 (12.8) |        |      |
| ethnicity (%) | Hispanic              | 20 (8.7)                      | 18 (10.5)  | 122 (10.0) | <0.001 |      |
|               | Non-Hispanic Black    | 17 (7.4)                      | 21 (12.3)  | 234 (19.2) |        |      |
|               | Non-Hispanic white    | 176 (76.2)                    | 113 (66.1) | 748 (61.4) |        |      |
|               | Other                 | 18 (7.8)                      | 19 (11.1)  | 115 (9.4)  |        |      |

**Var 3: Sugar sweetened drinks like Capri Sun, Sunny D, Arizona Tea, etc.**

|               |                       | Stratified by soda_pref |            |            | p     | test |
|---------------|-----------------------|-------------------------|------------|------------|-------|------|
|               |                       | level 0                 | 1          | 2          |       |      |
| n             |                       | 239                     | 144        | 1274       |       |      |
| age (%)       | 12 years old          | 38 (16.1)               | 11 (7.9)   | 170 (13.5) | 0.067 |      |
|               | 13 years old          | 37 (15.7)               | 32 (22.9)  | 257 (20.4) |       |      |
|               | 14 years old          | 34 (14.4)               | 18 (12.9)  | 224 (17.8) |       |      |
|               | 15 years old          | 48 (20.3)               | 24 (17.1)  | 216 (17.1) |       |      |
|               | 16 years old          | 46 (19.5)               | 29 (20.7)  | 251 (19.9) |       |      |
|               | 17 years old          | 33 (14.0)               | 26 (18.6)  | 143 (11.3) |       |      |
| sex (%)       | Male                  | 90 (38.1)               | 71 (50.7)  | 649 (51.6) | 0.001 |      |
|               | Female                | 146 (61.9)              | 69 (49.3)  | 608 (48.4) |       |      |
| weight (%)    | underweight or normal | 185 (77.4)              | 110 (76.4) | 916 (71.9) | 0.401 |      |
|               | overweight            | 30 (12.6)               | 18 (12.5)  | 197 (15.5) |       |      |
|               | obese                 | 24 (10.0)               | 16 (11.1)  | 161 (12.6) |       |      |
| ethnicity (%) | Hispanic              | 18 (7.7)                | 17 (12.2)  | 125 (10.0) | 0.010 |      |
|               | Non-Hispanic Black    | 24 (10.3)               | 19 (13.7)  | 229 (18.3) |       |      |
|               | Non-Hispanic white    | 169 (72.2)              | 84 (60.4)  | 784 (62.8) |       |      |
|               | Other                 | 22 (9.3)                | 18 (12.7)  | 110 (8.8)  |       |      |

**Var 4: Regular soda or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc.**



|               |                       | Stratified by water_pref level |            |            |       |      |
|---------------|-----------------------|--------------------------------|------------|------------|-------|------|
|               |                       | 0                              | 1          | 2          | p     | test |
| n             |                       | 135                            | 197        | 1325       |       |      |
| age (%)       | 12 years old          | 21 (16.0)                      | 33 (16.8)  | 165 (12.6) | 0.226 |      |
|               | 13 years old          | 34 (26.0)                      | 41 (20.8)  | 251 (19.2) |       |      |
|               | 14 years old          | 24 (18.3)                      | 31 (15.7)  | 221 (16.9) |       |      |
|               | 15 years old          | 17 (13.0)                      | 26 (13.2)  | 245 (18.7) |       |      |
|               | 16 years old          | 24 (18.3)                      | 39 (19.8)  | 263 (20.1) |       |      |
|               | 17 years old          | 11 (8.4)                       | 27 (13.7)  | 164 (12.5) |       |      |
| sex (%)       | Male                  | 60 (45.8)                      | 115 (58.4) | 635 (48.7) | 0.026 |      |
|               | Female                | 71 (54.2)                      | 82 (41.6)  | 670 (51.3) |       |      |
| weight (%)    | underweight or normal | 98 (72.6)                      | 140 (71.1) | 973 (73.4) | 0.917 |      |
|               | overweight            | 22 (16.3)                      | 30 (15.2)  | 193 (14.6) |       |      |
|               | obese                 | 15 (11.1)                      | 27 (13.7)  | 159 (12.0) |       |      |
| ethnicity (%) | Hispanic              | 10 (7.7)                       | 27 (13.8)  | 123 (9.5)  | 0.120 |      |
|               | Non-Hispanic Black    | 16 (12.3)                      | 25 (12.8)  | 231 (17.8) |       |      |
|               | Non-Hispanic white    | 94 (72.3)                      | 125 (63.8) | 818 (63.2) |       |      |
|               | other                 | 10 (7.7)                       | 19 (9.7)   | 123 (9.5)  |       |      |

**Var 5: Any water that is not sweetened like tap, filtered, bottled or sparkling water.**

|               |                       | Stratified by fruit_pref level |           |             |        |      |
|---------------|-----------------------|--------------------------------|-----------|-------------|--------|------|
|               |                       | 0                              | 1         | 2           | p      | test |
| n             |                       | 88                             | 128       | 1441        |        |      |
| age (%)       | 12 years old          | 10 (11.6)                      | 18 (14.4) | 191 (13.4)  | 0.936  |      |
|               | 13 years old          | 20 (23.3)                      | 20 (16.0) | 286 (20.1)  |        |      |
|               | 14 years old          | 12 (14.0)                      | 18 (14.4) | 246 (17.3)  |        |      |
|               | 15 years old          | 15 (17.4)                      | 27 (21.6) | 246 (17.3)  |        |      |
|               | 16 years old          | 18 (20.9)                      | 25 (20.0) | 283 (19.8)  |        |      |
|               | 17 years old          | 11 (12.8)                      | 17 (13.6) | 174 (12.2)  |        |      |
| sex (%)       | Male                  | 60 (69.8)                      | 85 (67.5) | 665 (46.8)  | <0.001 |      |
|               | Female                | 26 (30.2)                      | 41 (32.5) | 756 (53.2)  |        |      |
| weight (%)    | underweight or normal | 59 (67.0)                      | 98 (76.6) | 1054 (73.1) | 0.423  |      |
|               | overweight            | 18 (20.5)                      | 14 (10.9) | 213 (14.8)  |        |      |
|               | obese                 | 11 (12.5)                      | 16 (12.5) | 174 (12.1)  |        |      |
| ethnicity (%) | Hispanic              | 7 (8.4)                        | 7 (5.6)   | 146 (10.3)  | 0.440  |      |
|               | Non-Hispanic Black    | 13 (15.7)                      | 17 (13.5) | 242 (17.1)  |        |      |
|               | Non-Hispanic white    | 57 (68.7)                      | 90 (71.4) | 890 (63.0)  |        |      |
|               | other                 | 6 (7.2)                        | 12 (9.5)  | 134 (9.5)   |        |      |

**Var 6: Fruit like apples, bananas, melon, etc. Count fresh, frozen, canned or dried fruits.**

|               |                       | Stratified by veg_pref level |            |            |        |      |
|---------------|-----------------------|------------------------------|------------|------------|--------|------|
|               |                       | 0                            | 1          | 2          | p      | test |
| n             |                       | 252                          | 242        | 1163       |        |      |
| age (%)       | 12 years old          | 34 (13.8)                    | 39 (16.4)  | 146 (12.7) | 0.029  |      |
|               | 13 years old          | 60 (24.3)                    | 35 (14.7)  | 231 (20.1) |        |      |
|               | 14 years old          | 44 (17.8)                    | 45 (18.9)  | 187 (16.2) |        |      |
|               | 15 years old          | 32 (13.0)                    | 42 (17.6)  | 214 (18.6) |        |      |
|               | 16 years old          | 52 (21.1)                    | 37 (15.5)  | 237 (20.6) |        |      |
|               | 17 years old          | 25 (10.1)                    | 40 (16.8)  | 137 (11.9) |        |      |
| sex (%)       | Male                  | 149 (60.1)                   | 136 (57.4) | 525 (45.7) | <0.001 |      |
|               | Female                | 99 (39.9)                    | 101 (42.6) | 623 (54.3) |        |      |
| weight (%)    | underweight or normal | 180 (71.4)                   | 174 (71.9) | 857 (73.7) | 0.941  |      |
|               | overweight            | 39 (15.5)                    | 38 (15.7)  | 168 (14.4) |        |      |
|               | obese                 | 33 (13.1)                    | 30 (12.4)  | 138 (11.9) |        |      |
| ethnicity (%) | Hispanic              | 20 (8.1)                     | 37 (15.7)  | 103 (9.0)  | 0.001  |      |
|               | Non-Hispanic Black    | 29 (11.7)                    | 37 (15.7)  | 206 (18.1) |        |      |
|               | Non-Hispanic white    | 168 (68.0)                   | 132 (56.2) | 737 (64.7) |        |      |

**Var 7: A green salad, or other non-fried vegetables like carrots, broccoli, etc.**

|               |                       | Stratified by healthy_pref |            |            |        |
|---------------|-----------------------|----------------------------|------------|------------|--------|
|               |                       | level 0                    | 1          | 2          | p      |
| n             |                       | 413                        | 368        | 876        |        |
| age (%)       | 12 years old          | 63 (15.4)                  | 41 (11.4)  | 115 (13.3) | 0.275  |
|               | 13 years old          | 77 (18.8)                  | 77 (21.4)  | 172 (19.8) |        |
|               | 14 years old          | 64 (15.6)                  | 59 (16.4)  | 153 (17.6) |        |
|               | 15 years old          | 58 (14.1)                  | 70 (19.4)  | 160 (18.5) |        |
|               | 16 years old          | 85 (20.7)                  | 69 (19.2)  | 172 (19.8) |        |
|               | 17 years old          | 63 (15.4)                  | 44 (12.2)  | 95 (11.0)  |        |
| sex (%)       | Male                  | 202 (49.3)                 | 168 (46.9) | 440 (50.9) | 0.450  |
|               | Female                | 208 (50.7)                 | 190 (53.1) | 425 (49.1) |        |
| weight (%)    | underweight or normal | 259 (62.7)                 | 268 (72.8) | 684 (78.1) | <0.001 |
|               | overweight            | 73 (17.7)                  | 53 (14.4)  | 119 (13.6) |        |
|               | obese                 | 81 (19.6)                  | 47 (12.8)  | 73 (8.3)   |        |
| ethnicity (%) | Hispanic              | 38 (9.4)                   | 44 (12.3)  | 78 (9.1)   | 0.028  |
|               | Non-Hispanic black    | 75 (18.5)                  | 67 (18.7)  | 130 (15.2) |        |
|               | Non-Hispanic white    | 242 (59.8)                 | 222 (62.0) | 573 (66.8) |        |
|               | other                 | 50 (12.3)                  | 25 (7.0)   | 77 (9.0)   |        |

**Var 8: I eat a healthy diet.**

## Appendix D

Appendix C refers to the tabular analysis of the exposures and outcomes.

The following tables complements information related with Table 6 and 7, which are the ordinal logistic regression estimates among the different models.

Healthy eating behavior as outcomes:

| Var 1            | Seldom | Sometimes | Outcomes |
|------------------|--------|-----------|----------|
| Disagree/Dislike | 66     | 148       | 3        |
| Neutral          | 41     | 109       | 5        |
| Agree/Like       | 135    | 1018      | 132      |

**Var 1: I feel confident in my ability to eat fruits and vegetables every day.**

| Var 2            | Seldom | Sometimes | Outcomes |
|------------------|--------|-----------|----------|
| Disagree/Dislike | 77     | 270       | 13       |
| Neutral          | 50     | 185       | 17       |
| Agree/Like       | 115    | 820       | 110      |

**Var 2: I feel confident in my ability to limit the amount of junk food and sugary drinks I eat and drink**

| Var 3            | Seldom | Sometimes | Outcomes |
|------------------|--------|-----------|----------|
| Disagree/Dislike | 32     | 173       | 26       |
| Neutral          | 27     | 129       | 19       |

|            |     |     |    |
|------------|-----|-----|----|
| Agree/Like | 115 | 973 | 95 |
|------------|-----|-----|----|

**Var 3: Sugar sweetened drinks like Capri Sun, Sunny D, Arizona Tea, etc.**

| <b>Var 4</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 23            | 191              | 25              |
| Neutral          | 16            | 114              | 14              |
| Agree/Like       | 203           | 970              | 101             |

**Var 4: Regular soda or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc.**

| <b>Var 5</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 40            | 92               | 3               |
| Neutral          | 43            | 146              | 8               |
| Agree/Like       | 159           | 1037             | 129             |

**Var 5: Any water that is not sweetened like tap, filtered, bottled or sparkling**

**water.**

| <b>Var 6</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 32            | 55               | 1               |
| Neutral          | 30            | 94               | 4               |
| Agree/Like       | 180           | 1126             | 135             |

**Var 6: Fruit like apples, bananas, melon, etc. Count fresh, frozen, canned or**

**dried fruits.**

| <b>Var 7</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 76            | 176              | 0               |
| Neutral          | 47            | 185              | 10              |
| Agree/Like       | 119           | 914              | 130             |

**Var 7: A green salad, or other non-fried vegetables like carrots, broccoli, etc.**

| <b>Var 8</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 110           | 286              | 17              |
| Neutral          | 55            | 298              | 15              |
| Agree/Like       | 77            | 691              | 108             |

**Var 8: I eat a healthy diet.**

Unhealthy eating behaviors as outcomes:

| <b>Var 1</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 24            | 187              | 6               |
| Neutral          | 28            | 122              | 5               |
| Agree/Like       | 231           | 1012             | 42              |

**Var1: I feel confident in my ability to eat fruits and vegetables every day.**

| <b>Var 2</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 34            | 312              | 14              |
| Neutral          | 39            | 205              | 8               |

|            |     |     |    |
|------------|-----|-----|----|
| Agree/Like | 210 | 804 | 31 |
|------------|-----|-----|----|

**Var 2: I feel confident in my ability to limit the amount of junk food and sugary drinks I eat and drink**

| <b>Var 3</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 79            | 150              | 2               |
| Neutral          | 40            | 128              | 7               |
| Agree/Like       | 164           | 1043             | 44              |

**Var 3: Sugar sweetened drinks like Capri Sun, Sunny D, Arizona Tea, etc.**

| <b>Var 4</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 72            | 166              | 1               |
| Neutral          | 44            | 95               | 5               |
| Agree/Like       | 167           | 1060             | 47              |

**Var 4: Regular soda or pop like Coke, Pepsi, Sprite, Dr. Pepper, etc.**

| <b>Var 5</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 17            | 115              | 3               |
| Neutral          | 33            | 157              | 7               |
| Agree/Like       | 233           | 1049             | 43              |

**Var 5: Any water that is not sweetened like tap, filtered, bottled or sparkling water.**

| <b>Var 6</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 10            | 76               | 2               |
| Neutral          | 26            | 98               | 4               |
| Agree/Like       | 247           | 1147             | 47              |

**Var 6: Fruit like apples, bananas, melon, etc. Count fresh, frozen, canned or dried fruits.**

| <b>Var 7</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 31            | 218              | 3               |
| Neutral          | 43            | 186              | 13              |
| Agree/Like       | 209           | 917              | 37              |

**Var 7: A green salad, or other non-fried vegetables like carrots, broccoli, etc.**

| <b>Var 8</b>     | <b>Seldom</b> | <b>Sometimes</b> | <b>Outcomes</b> |
|------------------|---------------|------------------|-----------------|
| Disagree/Dislike | 47            | 350              | 16              |
| Neutral          | 52            | 302              | 14              |
| Agree/Like       | 184           | 669              | 23              |

**Var 8: I eat a healthy diet.**

## Appendix D

This Appendix refers to the results of the Brant test for both logistic regression models to test the assumption of proportional odds. As the null hypotheses assumes proportional odds holds, we have p-values larger than the significance level, which supports the assumption of proportional odds. Attached are the output of Brant test performed with R Studio.

Test for healthy eating behaviors as outcomes:

| Test for               |      | x2    | df   | probability |
|------------------------|------|-------|------|-------------|
| Omnibus                |      | 14.32 | 16   | 0.58        |
| fv_attneutral          |      | 1.21  | 1    | 0.27        |
| fv_attagree            |      | 0.88  | 1    | 0.35        |
| jf_attneutral          |      | 2.18  | 1    | 0.14        |
| jf_attagree            |      | 1.34  | 1    | 0.25        |
| fruitdrink_prefneutral | 0.1  | 1     | 0.75 |             |
| fruitdrink_prefagree   |      | 1.63  | 1    | 0.2         |
| soda_prefneutral       |      | 0     | 1    | 0.98        |
| soda_prefagree         |      | 1.59  | 1    | 0.21        |
| water_prefneutral      |      | 0.11  | 1    | 0.74        |
| water_prefagree        | 0.37 | 1     | 0.54 |             |
| fruit_prefneutral      |      | 0.11  | 1    | 0.74        |
| fruit_prefagree        | 0.22 | 1     | 0.64 |             |
| veg_prefneutral        | 0    | 1     | 0.97 |             |
| veg_prefagree          |      | 0     | 1    | 0.97        |
| healthy_prefneutral    |      | 5.26  | 1    | 0.02        |
| healthy_prefagree      |      | 0.6   | 1    | 0.44        |

H0: Parallel Regression Assumption holds

Test for unhealthy eating behaviour as outcomes:



| Test for               |      | x2    | df   | probability |
|------------------------|------|-------|------|-------------|
| Omnibus                |      | 17.75 | 16   | 0.34        |
| fv_attneutral          |      | 0.11  | 1    | 0.75        |
| fv_attagree            |      | 0.07  | 1    | 0.79        |
| jf_attneutral          |      | 0.02  | 1    | 0.88        |
| jf_attagree            |      | 0.55  | 1    | 0.46        |
| fruitdrink_prefneutral | 0.69 | 1     | 0.41 |             |
| fruitdrink_prefagree   |      | 0.03  | 1    | 0.87        |
| soda_prefneutral       |      | 3.06  | 1    | 0.08        |
| soda_prefagree         |      | 1.76  | 1    | 0.18        |
| water_prefneutral      |      | 0.4   | 1    | 0.53        |
| water_prefagree        | 0.78 | 1     | 0.38 |             |
| fruit_prefneutral      |      | 0.03  | 1    | 0.86        |
| fruit_prefagree        | 0.09 | 1     | 0.76 |             |
| veg_prefneutral        | 5.97 | 1     | 0.01 |             |
| veg_prefagree          |      | 3.3   | 1    | 0.07        |
| healthy_prefneutral    |      | 0.09  | 1    | 0.77        |
| healthy_prefagree      |      | 0     | 1    | 0.96        |

H0: Parallel Regression Assumption holds

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