

RELATIONSHIP BETWEEN PERSONALITY TYPE AND FRUIT AND VEGETABLE
PREFERENCE IN THIRD AND FOURTH GRADE STUDENTS

A Thesis
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

Megan Denise Myrdal

In Partial Fulfillment of the Requirements
for the Degree of
MASTER OF SCIENCE

Major Department:
Health, Nutrition, and Exercise Sciences

March 2015

Fargo, North Dakota

North Dakota State University

Graduate School

Title

Relationship Between Personality Type and Fruit and
Vegetable Preference in Third and Fourth Grade Students

By

Megan Denise Myrdal

The Supervisory Committee certifies that this *disquisition* complies with
North Dakota State University's regulations and meets the accepted standards
for the degree of

MASTER OF SCIENCE

SUPERVISORY COMMITTEE:

Abby Gold
Chair

Jim Deal

Mary Larson

Approved:

04-07-2015

Date

Margaret Fitzgerald

Department Chair

ABSTRACT

The purpose of this study was to investigate the relationship between personality type and fruit and vegetable preferences of third and fourth grade children. A cross-sectional, quantitative survey study was used to gather information from parents or caregivers (N = 345) about their child's fruit and vegetable preference, healthful eating practices (produced by the Healthy Eating Index, HEI), and personality. Multiple regression analyses revealed the combined effect of *openness to experience*, *agreeableness* and *neuroticism* was significant for the fruit preference ($p < 0.05$), vegetable preference ($p < 0.001$), combined fruit/vegetable preference ($p < 0.01$), and the HEI ($p < 0.01$). These results indicate that children who are more “agreeable” and “open” may prefer healthful foods, like fruits and vegetables, and children who are more “neurotic” may have lower preferences for healthful foods. These results support the consideration of personality as a factor that influences the development of food preference.

ACKNOWLEDGEMENTS

I wish to thank my adviser, Dr. Abby Gold, for her patience, guidance and support throughout my thesis education. Dr. Gold's invaluable advice and continual encouragement brought this thesis to fruition. Dr. Jim Deal brought incredible direction for the entire project, as well as brilliant insight into methods and statistical analysis. I also wish to thank Dr. Mary Larson for her willingness to serve on my committee and provide important input from the public health perspective. Michelle Strang brought great assistance and direction in the statistical analysis. Finally, I want to thank the North Dakota State University Extension Agents who assisted with school recruitment and survey distribution.

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CHAPTER 1. INTRODUCTION

Childhood obesity continues to be a major concern in the United States, and most children today do not meet the dietary recommendations, eating too many energy-dense, nutrient-poor foods and too few nutrient-dense foods like fruits and vegetables (Ogden, Carroll, Curtin, Lamb & Flegal, 2010; Reedy & Krebs-Smith; 2010; and Lorson, Melgar-Quinonez & Taylor, 2009). Research suggests positive health outcomes for a diet rich in fruits and vegetables, including improved nutrient intake, weight control, and a reduced risk of chronic diseases (Hyson, 2011; Harding et al., 2008; and Crowe et al., 2010). Despite the considerable health benefits found with fruit and vegetable intake, consumption remains low, with less than a quarter of Americans consuming the United States Department of Agriculture (USDA) recommendation for fruits and vegetables (Lutfiyya, Chang, & Lipsky, 2012). Numerous intervention attempts have been made to change and improve eating practices, however, the overweight and obesity epidemic remains a serious national concern.

Determining the factors that influence a child's eating behavior and ways to increase consumption of nutrient-dense foods and decrease consumption of nutrient-poor foods, have been identified as public health priorities (Lobstein, Baur, & Uauy, 2004). Dietary intervention strategies may prove more successful if they are tailored to the individual, accounting for such variables as sex, age, cultural health beliefs and personality attributes. Additionally, understanding all the determinants of health (social and economic environment, physical environment, and the person's individual characteristics and behaviors) has been recognized as vital in the development of policy and intervention strategies to improve the health and wellbeing of a population (World Health Organization, 2013).

Purpose of the Study

The purpose of this study was to investigate the relationship between a child's personality dimension and his or her preference for healthy foods, namely fruits and vegetables, in order to support and expand previous research associating personality dimensions with certain dietary behaviors.

The objective of this research study was to determine if certain personality dimensions (*neuroticism*, *openness to experience*, and *agreeableness*) are correlated with fruit preference, vegetable preference, combined fruit and vegetable preference, and the Healthy Eating Index score.

Hypotheses

H1: A positive correlation exists between the personality dimensions of *openness to experience* and *agreeableness* and the sum score of preferred fruits, preferred vegetables, and combined preferred fruits and vegetables.

H2: A negative correlation exists between the personality dimension of *neuroticism* and the sum score of preferred fruits, preferred vegetables, and combined preferred fruits and vegetables.

H3: A positive correlation exists between the personality dimensions of *openness to experience* and *agreeableness* and the overall score on the Healthy Eating Index questionnaire.

H4: A negative correlation exists between the personality dimension of *neuroticism* and the overall score on the Healthy Eating Index questionnaire.

Limitations of the Study

This was a correlational study, so causation cannot be inferred. Furthermore, parents served as personality and food preference reporters for their children. While parents have been found to be accurate reporters, in certain situations, for their child's dietary intake and food preferences (Linneman et al., 2004) this method is not as accurate as direct observation of eating patterns. Further, this study examined and controlled for the potential confounding variables of age, education level, and distance to a full service grocery store in relation to the healthy eating index, vegetable preference, fruit preference, and total fruit and vegetable preference. The study did not examine other known influences on children's food consumption and preference, including parental feeding styles, the home food environment, and school's participation in the USDA Fresh Fruit and Vegetable Program, to name a few. Finally, the sample demographics are not representative of the United States population, and therefore, the findings cannot be expanded to the broader U.S. population. Future research would benefit from an increased sample size pulled from a wider geographic region.

Definition of Terms

Food preference – a term that refers to the liking and/or selection of one food over another (Birch, 1999).

National Health and Nutrition Examination Survey (NHANES) – a program of studies designed to assess the health and nutritional status of adults and children in the United States. The survey is unique in that it combines interviews and physical examinations (National Health and Nutrition Examination Survey, 2015).

Nutrient-dense – a term used to describe foods and beverages that provide vitamins, minerals, and other substances that may have positive health effects, with relatively few calories. The term “nutrient-dense” indicates that the nutrients and other beneficial substances in a food have not been “diluted” by the addition of calories from added solid fats, added sugars, or added refined starches, or by the solid fats naturally present in the food. Nutrient-dense foods and beverages are lean or low in solid fats, and minimize or exclude added solid fats, sugars, starches, and sodium. Ideally, they also are in forms that retain naturally occurring components, such as dietary fiber. Vegetables, fruits, whole grains, seafood, eggs, beans and peas, unsalted nuts and seeds, fat-free and low-fat milk and milk products, and lean meats and poultry – when prepared without solid fats or added sugars – are nutrient-dense foods (United States Department of Agriculture, 2010).

Personality – a psychological trait that refers to a person’s tendency to behave, think, and feel in a certain way (Shiner, 2006).

United States Department of Agriculture (USDA) – the government agency that provides leadership on food, agriculture, and natural resources, and associated issues based on public policy, available sciences, and efficient management (United States Department of Agriculture, 2010).

World Health Organization (WHO) – the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries, and monitoring and assessing health trends (World Health Organization, 2013).

CHAPTER 2. REVIEW OF LITERATURE

The purpose of this study was to investigate the relationship between a child's personality dimensions and preference for healthful food. The research specifically examined a child's preference for fruits, vegetables, and combined fruits and vegetables in order to support previous research associating personality dimensions with certain dietary behaviors, and to further understand the potential determinants and contributors to food preference.

Childhood obesity is a major concern in the United States, and most children today do not meet the dietary recommendations, eating too many energy-dense, nutrient-poor foods and too few nutrient-dense foods like fruits and vegetables (Ogden, Carroll, Curtin, Lamb & Flegal, 2010; Reedy & Krebs-Smith; 2010; and Lorson, Melgar-Quinonez & Taylor, 2009). Research suggests positive health outcomes for a diet rich in fruits and vegetables, including improved nutrient intake, weight control, and a reduced risk of chronic diseases (Hyson, 2011; Harding et al., 2008; and Crowe et al., 2010). Despite the considerable health benefits found with fruit and vegetable intake, consumption remains low, with less than a quarter of Americans consuming the USDA recommendation for fruits and vegetables (Lutfiyya, Chang, & Lipsky, 2012).

Determining the factors that influence a child's eating behavior and ways to increase consumption of nutrient-dense foods and decrease consumption of nutrient-poor foods, have been identified as public health priorities (Lobstein, Baur, & Uauy, 2004). Dietary intervention strategies may prove more successful if they are tailored to the individual, accounting for such variables as sex, age, cultural health beliefs and personality attributes. Moreover, understanding all the determinants of health (social and economic environment, physical environment, and the person's individual characteristics and behaviors) has been recognized as vital in the

development of policy and intervention strategies to improve the health and wellbeing of a population (World Health Organization, 2013).

State of Children's Health in America

Results from the 2007-2008 National Health and Nutrition Examination Survey (NHANES) indicate 16.9% of children and adolescents aged 2-19 years are obese, with prevalence being even higher in children ages 6-11 years at 21.2% (Ogden, Carroll, Curtin, Lamb & Flegal, 2010). Children with a high BMI have a higher likelihood of becoming obese adults (Serdula et al., 1993) and adult obesity is associated with a greater risk and earlier development of chronic health conditions such as diabetes, cardiovascular disease and certain cancers (National Institute of Health, 1998). Childhood obesity left unchecked could shorten the present generation's lifespan as much as five years, essentially leading to the first generation in United State's history to live a less healthful, shorter life than their parents (Olshansky et al., 2005).

Today, most children do not meet the dietary recommendations, eating too many energy-dense, nutrient-poor foods and too few nutrient-dense foods like fruits and vegetables. In a cross-sectional examination of data from the NHANES, results revealed nearly 40% of the total energy consumed by 2- to 18-year olds was in the form of empty calories, with half of the foods coming from soda, fruit drinks, dairy desserts, grain desserts, pizza and whole milk (Reedy & Krebs-Smith, 2010). The results are consistent with other findings, suggesting that the majority of children's diets are providing too many calories from nutrient-poor foods, and do not meet the recommendations for nutrient-dense foods like vegetables (Lorson, Melgar-Quinonez & Taylor, 2009).

The research suggesting an association between fruit and vegetable intake and a reduced risk of major chronic diseases has continued to grow in recent years (Hyson, 2011). Fruits and vegetables are considered “nutrient-dense foods” and contribute important under-consumed nutrients including folate, magnesium, potassium, dietary fiber and vitamins A, C and K (Harding et al., 2008). Current health promotion messaging from the USDA MyPlate food guidance system recommends making “half your plate” fruits and vegetables, and emphasizes the need to “focus on fruit” and “vary your veggies” as building blocks for a healthy diet (United States Department of Agriculture, 2010). Fruits and vegetables are recognized as important foods for overall health, and research has suggested a possible risk reduction related to fruit and vegetable consumption for several chronic health issues including diabetes, heart disease, some forms of cancer, and obesity (Hyson, 2011). Additionally, the majority of available data suggests an inverse relationship between fruit and vegetable consumption and body weight (Hyson, 2011). A large prospective study (89,432 subjects) from 6 cohorts revealed that fruit and vegetable intake was related to smaller weight gain; for every 100 grams of fruits and vegetables consumed, there was a 14 gram lowering of weight gain per year (Crowe et al., 2010). Collectively, the majority of available data suggests positive health outcomes associated with high fruit and vegetable consumption.

Despite the considerable health benefits found with fruit and vegetable intake, consumption remains low. The current USDA daily recommendation for fruits and vegetables is 2 to 6.5 cups (depending on calorie needs) and less than a quarter of Americans consume the recommended amount (Lutfiyya, Chang, & Lipsky, 2012). According to the Center for Disease Control and Prevention’s (2013) *State Indicator Report on Fruits and Vegetables*, adolescents in the United States consume fruit about 1.0 times per day and vegetables 1.3 times per day.

According to data from the Youth Risk Behavior Survey, only 21.9% of students had eaten fruit or drunk 100% fruit juice three or more times per day during the 7 days before the survey, and only 15.7% had eaten vegetables three or more times per day during the 7 days before the survey (Center for Disease Control, 2013). These data suggest that the majority of youth in America are not meeting the recommended daily intake for fruits and vegetables. Despite numerous intervention attempts to change and improve eating practices, the overweight and obesity epidemic remains a serious national concern.

Food Preference

The topic of food preference has been researched widely in relation to children's health and food consumption patterns, based on the fact that children "eat what they like," and food likes and dislikes have been determined to be significant predictors of food acceptance and consumption (Cooke & Wardle, 2005; Gibson, Wardle, & Watts, 1998; and Raynor, Polley, Wing, & Jefry, 2004). Food preference refers to the liking and/or selection of one food over another (Birch, 1999), and taste or distaste for a certain food has been established as the first criterion in food acceptance (Rozin, 1990). Humans are born with a biological predisposition to like sweet tastes and to reject sour and bitter tastes, and it has been suggested that this developed as a protective adaptation: sweet tastes signal a safe carbohydrate source of calories, and bitterness may signal a potential poison (Desor, Mahler, & Greene, 1977). Humans also have a preference for calorie-dense foods because for most of human history, calorie-dense foods were scarce. In order to subsist, humans needed to take in and store as much energy as possible to meet the high physical activity demands required for survival (Birch, McPhee, Shoba, Steinberg, & Krehbiel, 1987). While high-calorie foods, rich in sugar, salt, and fat, are the first tastes preferred, humans also have a sensory-specific satiety mechanism, whereby they get tired of one

taste and move on to another. This likely developed as another adaptive tool to ensure that people eat a variety of foods in order to attain the necessary nutrients required for normal body function (Rolls & Rolls, 1997). Biological predisposition has a significant impact on the development of food preference, and research also shows that physiological and social conditioning strongly influence food preference.

An individual's acceptance of and liking for specific foods may result from exposure to and early experiences with a food, as well as the negative or positive consequences that arise from this condition (Birch, 1999). Early research conducted by Birch and Marlin (1982) found that when two-year-olds were given opportunities to taste new fruits or cheeses, their preference increased with frequency of exposure; new foods took between 5 to 10 exposures before they became familiar and accepted. Further, researchers have shown that children's food preference is affected by what they see other people eating (especially their parents), what foods they are offered, and how parents or caregivers control food intake at home (Birch, 1999; Cooke et al., 2004; and Vereecken, Keukelier, & Maes, 2004).

Food preference research is particularly important because most people report their food choices to be largely determined by "taste" (Glanz et al., 1998). This is especially true of children. In a literature review of intervention strategies to increase consumption of fruits and vegetables among 6-12 year-old children, fruit and vegetable taste preference, as well as availability and access, were all consistently related to fruit and vegetable consumption (Blanchette & Brug, 2005). A cross-sectional analysis of 13,305 children in 9 European countries revealed that daily fruit and vegetable intake was more likely to be reported in children with a positive liking for the taste of fruit and vegetables and with a preference for many different types of fruit and vegetables (De Bourdeaudhuij et al., 2008). Further, Domel et al. (1996) examined

various psychosocial predictors of fruit and vegetable consumption among elementary school children and concluded that preference was the only significant predictor of fruit and total fruit/vegetable consumption, as well as the main predictor of vegetable consumption. Much of the present literature suggests fruit and vegetable preference is a significant predictor of fruit and vegetable consumption.

The biological determinants, environment, and early experiences with food are undoubtedly important in relation to food preference; however, considerably less attention has been paid to the characteristics of children, such as personality and its impact on food preference.

Personality

Personality is a psychological trait that refers to a person's tendency to behave, think, and feel in a certain way (Shiner, 2006). Personality traits may be predictive of behaviors due to behavioral and biological underpinnings (Shiner & Caspi, 2003). Research on personality structure has revealed that personality is organized hierarchically, and specific behavioral descriptors, such as talkative, are explained by lower order traits (sociability) with the correlated variation of these traits explained by broad higher order traits (extraversion) (Shiner, 2006). The Five-Factor Model (FFM or "Big Five") is a way to describe the main dimensions of personality based on a hierarchical model of trait structure in which narrow and specific traits are organized into five broad factors – *extraversion*, *neuroticism*, *agreeableness*, *conscientiousness*, and *openness to experience* (Digman, 1990, McCrae & John, 1992, & Saucier, 2008). This higher order structure of individual differences has been observed in preschool and school-aged children, and is very similar to the structure observed in adolescents and adults (Shiner, 2006).

Extraversion refers to a person's tendency to engage in the world in an energetic, vigorous, and emotionally positive way (Shiner, 2006). The Big Five describes extraverted

children as sociable, lively, physically active, socially potent, and expressive (Shiner, 2006). *Neuroticism* refers to a general degree of negativity, avoidance motivation, and emotional reactivity. Big Five studies describe children and adolescents high on neuroticism as anxious, vulnerable, tense, easily frightened, “falling apart” under stress, guilt-prone, moody, lower in frustration tolerance, and insecure in relationships with others (Shiner, 2006). *Agreeableness* refers to a tendency to get along, be warm, sympathetic and understanding, and individuals with high degrees of *agreeableness* are described as considerate, empathic, generous, gentle, protective of others, and kind (Shiner, 2006). The Big Five studies describe individuals high in *conscientiousness* as responsible, attentive, persistent, and orderly (Shiner, 2006). These individuals also tend to possess high standards and often think before acting (Shiner, 2006). Finally, persons who measure high in *openness to experience* are described as eager, quick to learn, imaginative, knowledgeable, perceptive, curious, and original (Shiner, 2006).

Personality research has not only shown certain personality dimensions to be associated with behaviors, but possibly to foreshadow life outcomes. Shiner, Masten, and Roberts (2003) demonstrated that *extraversion* in children was predictive of positive changes in social competence over time. However, research has also shown negative outcomes to childhood *extraversion*, including an increased risk for externalizing symptoms and aggression (Chen et al., 2002). Childhood *conscientiousness* has been shown to predict positive outcomes, and researchers demonstrated that high degrees of conscientiousness in adolescents were associated with higher incomes, occupational status, and job satisfaction in their adult careers (Judge et al., 1999). The research on *neuroticism* (or the negative emotionality trait) has associated high negative emotionality with a variety of negative life outcomes, and suggests that irritability,

anxiety and fear may prevent highly neurotic individuals from fully engaging in their social and work worlds (Shiner, 2006).

Personality and Food-and Nutrition-related Behavior

The behavioral sciences have developed numerous theories to explain behaviors and their determinants. While there are significant differences amongst the major theories, most include some person-related determinants that might influence behaviors. Figure 1 provides a model that is widely utilized in nutrition education to understand the person-related determinants that influence food choices and dietary behavior (Contento, 2011).

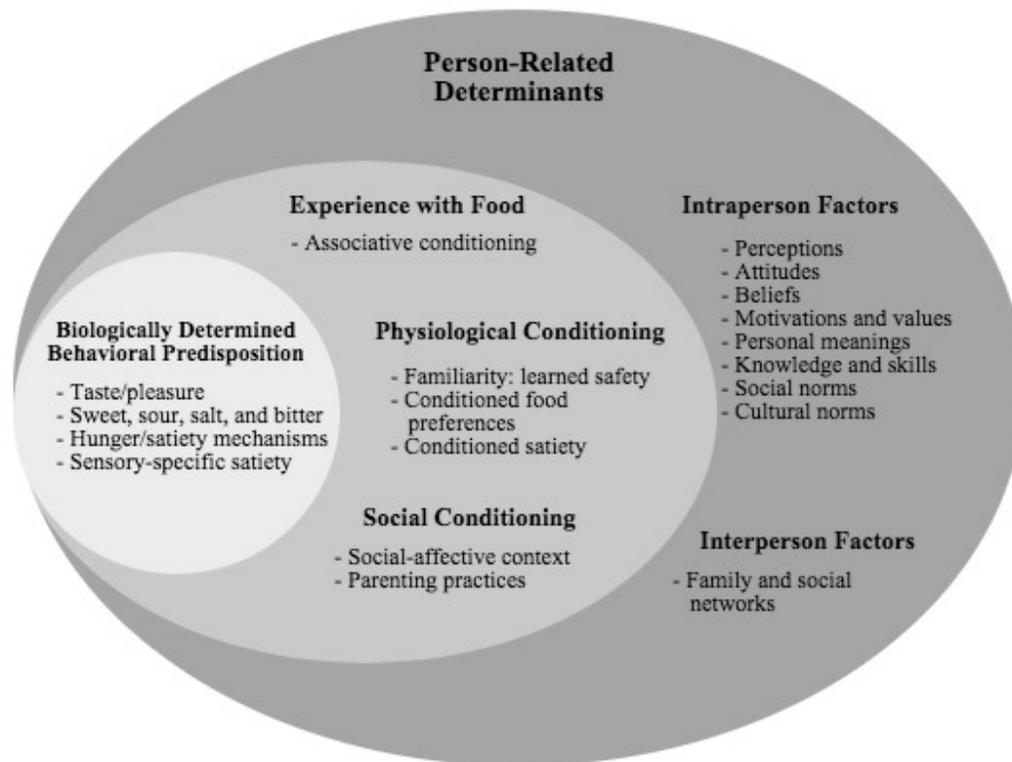


Figure 1. Intra- and interpersonal factors influencing food choice and dietary behavior (Contento, 2011).

While these biological, physiological, social, and intra- and interpersonal factors are undoubtedly important, considerably less attention has been paid to the impact of personality and

how it might influence food preference and dietary behaviors. Additionally, current models utilized to predict food and nutrition behaviors, as shown in Figure 1, rarely consider personality. This review will now examine the literature in this area.

Goldberg and Strycker (2002) assessed personality traits and dietary behaviors in a large, community-based sample of 470 women and 280 men. Of the five personality domains from the NEO-PI-R tool (a psychological personality inventory to measure the Big Five personality traits), *openness to experience* was found to be the most consistent predictor of general healthy eating practices, including fiber consumption, avoidance of meat fats, and avoiding foods flavored by fat. *Openness to experience* also had a significant negative relationship in the prediction of substituting low-fat for high-fat food. *Conscientiousness* played a significant role in the prediction of general healthy dietary practices, including avoiding fats, substituting low-fat for high-fat foods, and avoiding non-meat fats. *Extraversion* was negatively associated with avoiding meat, and *neuroticism* was negatively associated with avoiding foods flavored with fat. *Agreeableness* was not significant for any of the predictions. Their results suggest certain personality traits are predictive of dietary behavior.

Similar research was conducted in Finland exploring the association between food and nutrient intake, personality traits, and resilience in older adults (Tiainen et al., 2013). This large sample (n = 1,681) completed semi-quantitative food frequency questionnaires and the NEO-personality inventory. After adjusting for age, education and energy intake, multiple linear regression analysis revealed *openness to experience* in men was associated with higher vegetable intake and lower confectionery/chocolate intake. In women, *neuroticism* was associated with lower vegetable and fish intake, and higher soft drink consumption. *Extraversion* in women was associated with higher vegetable and meat intake, *openness to experience* with higher fruit and

vegetable intake, *agreeableness* with lower soft drink intake, and *conscientious* associated with higher vegetable intake. While the research in these two studies captures a connection between personality dimensions and general eating practices, it does little to explain why individuals high in certain personality dimensions make healthful or less healthful food choices.

Researchers in the Netherlands explored the associations between the Big Five personality dimensions and fruit and vegetable consumption and physical activity in adolescents (De Bruijn, Kremers, van Mechelen, & Brug, 2005). Bivariate correlation and multiple regression analyses revealed *agreeableness* was positively associated with vegetable consumption, and *openness to experience* was positively associated with fruit and vegetable consumption. The authors proposed an interesting discussion regarding the association between *openness to experience* and fruit and vegetable consumption by suggesting the food environment was unhealthy because fruits and vegetables were somewhat scarce. They hypothesize individuals high in the *openness to experience* personality dimension may seek out less readily available foods because of their novelty. While this hypothesis seems plausible for adolescents, it is unlikely that young children have the means or ability to seek out novel foods.

A recent study by Vollrath, Hampson and Júlíusson (2012) explored the role of personality traits on food consumption in Norwegian children aged 6-to 12-years old. Mothers rated their child's personality on the Hierarchical Personality Inventory for Children (HiPIC), which assesses the five broad personality traits: *extraversion*, *benevolence* (corresponding to *agreeableness*), *neuroticism*, *conscientiousness*, and *imagination* (corresponding to *openness to experience*). Mothers also completed a food frequency questionnaire assessing their child's consumption of sweet drinks, sweet foods, and fruit and vegetables, and reported their child's height and weight. Controlling for age and mothers' education, boys and girls who were less

benevolent (agreeable) consumed more sweet drinks, and girls who were less *conscientious* and more *neurotic* consumed more sweet drinks. *Benevolent* and *imaginative* boys and girls consumed more fruits and vegetables, and *extraverted, conscientious,* and less *neurotic* boys consumed more fruits and vegetables. While the findings in this study are similar to those of De Bruijn et al. (2005), with *openness to experience* and *agreeableness* positively associated with fruit and vegetable consumption, it is unlikely the proposed hypothesis by De Bruijn fits for 6-12 year old children, as they have little ability to seek out novel food choices on their own.

Not all research exploring personality and food consumption produce a positive association. Treloar, Marks, Health, and Martin (1997) explored the causes of individual difference in food consumption in 1,613 twin pairs, aged 18-26 years old enrolled in the volunteer Australian National Health and Medical Research Council Twin Register (ATR). A semi-quantitative short dietary questionnaire was used to measure consumption of high fat, salt and fiber foods (frequency and last-time eaten), and zygosity (degree of similarity) was determined by twin's responses to the Health and Lifestyle Questionnaire (HLQ) about physical similarity and being mistaken for one another. Additionally, participants completed the Eysenck Personality Questionnaire and a short form of Cloninger's Tridimensional Personality Questionnaire. Statistically significant but weak associations were found for all personality traits measured (*psychoticism, extraversion, neuroticism, social conformity, impulsiveness, novelty seeking, harm avoidance, and reward dependence*) and food consumption (last time eaten and frequency) for fat, salt and fiber. However, multivariate genetic analysis revealed genetic and shared environmental factors were more influential factors in food consumption than personality traits. Overall, this evidence did not support a positive association between personality type and fat, salt and fiber consumption.

Summary

In summary, research has associated many positive health outcomes to fruit and vegetable consumption, yet the specific and collective determinants of this healthful behavior remain unclear. Some research has found a positive association between certain personality dimensions and dietary intake, but the research is mixed, limited and further definition of the relationship is needed. Furthermore, studies examining the relationship between personality type and fruit and vegetable preference are sparse. The research is significant connecting food preference to consumption, and the health benefits of a diet rich in fruits and vegetables are well established. The purpose of this study is to investigate the association between personality type and fruit and vegetable preferences in young children, aiming to identify if certain personality dimensions have a preference or liking towards certain fruits and vegetables. The research also seeks to determine if preference might support the previous research associating personality dimensions with certain dietary behaviors.

CHAPTER 3. METHODOLOGY

The purpose of this study was to investigate the relationship between a child's personality dimension and his or her preference for healthy foods, in order to support previous research associating personality dimensions with certain dietary behaviors, and to further understand the potential determinants of food preference.

Population Sample and Sample Procedures

The study participants were parents or caregivers of third and fourth grade students. Inclusion criteria for study participants required them to live in the same home as the child, be the person in the household responsible for the majority of purchasing and preparation decisions related to food, and be fluent in English. Survey distribution and completion occurred during the 2014 school year at 22 elementary schools in North Dakota.

Schools were contacted by North Dakota State University Extension Service agents and asked to voluntarily participate. Agents were recruited via email by the researcher, and were informed that participation in the study entered them for a chance to win an iPad. Following Institutional Review Board approval, the volunteer North Dakota State University Extension Service agents distributed 1,593 surveys packets to third and fourth grade students in participating school. Packets included an informational letter, letter of consent, demographic questionnaire and three surveys (Inventory of Children's Individual Differences - Short Version, Fruit and Vegetable Preference Questionnaire, and Caregiver Food Behavior Checklist). The instruments underwent cognitive pretesting and pilot testing with appropriate parent audiences with criteria established by Fink (2003). Packets were given to students to bring home to their parents or guardians. Parents or guardians completed the surveys at home and returned them to the researcher via self addressed stamped envelope. Parents or caregivers had the option to fill

out and return a name and contact information form for a chance to win one of three, \$50 gift cards. No identifying information was obtained from the parent or student on the surveys.

Data Collection

Demographic Questionnaire. The demographic questionnaire was used to ensure that the person completing the entire survey packet was the individual in the household typically responsible for making the purchasing and preparation decisions related to food. The questionnaire obtained information about the child's grade level (third or fourth grade) and gender. It also obtained information about the person completing the survey's relationship to the child (mother, father, grandmother, grandfather, and other), gender, age, ethnicity, education level (high school or less, some college, bachelor's degree, or graduate degree), home ownership status, and household's proximity to a grocery store (< 1 mile, 1-5 miles, 6-10 miles, 11-15 miles, 16-20 miles, > 20 miles). Dummy variables were created for three categorical items: child's gender (boy or girl), ethnic origin (white/other or Native American), and home ownership status (own or rent/other). The education and home ownership variables were used to account for socioeconomic status, and the proximity to a full service grocery store was used to account for access to fruits and vegetables.

Inventory of Children's Individual Differences (ICID). The ICID is an age and cultural neutral instrument designed to assess the Five Factor Model of personality in children and adolescents ages 2 to 15 using parental, non-parental or self-reports (Halverson et al., 2003). The short version of the ICID (ICID-S) has been shown to maintain the same levels of validity and reliability as the original ICID, successfully measuring the five broad personality dimensions: *neuroticism, extraversion, openness to experience, agreeableness* and *conscientiousness*, while minimizing the time required for completion (Deal, Halverson, Martin, Victor, & Baker, 2007).

Personality dimensions were generated based on responses to 50 questions asking parents to choose the degree to which the statement describes their child, in comparison to other children his/her age. Responses ranged from “*much less than the average child or not at all*” to “*much more than the average child*” on a 7-point Likert scale. These response scores were combined to create 15 intermediate personality dimensions, including items such as “considerate” and “intelligent.” Finally, these variables were combined to compute the five personality facets of: *neuroticism* ($\alpha = 0.85$), *extraversion* ($\alpha = 0.66$), *openness to experiences* ($\alpha = 0.71$), *agreeableness* ($\alpha = 0.87$), and *conscientiousness* ($\alpha = 0.76$). These scores were used as independent variables in multiple regression analyses.

Fruit and Vegetable Preference Questionnaire (FVPQ). The FVPQ is an adaptation of the SLU4Kids Food Frequency Questionnaire (Linneman et al., 2004). Reliability and validity of the original tool is based on a study assessing the accuracy of parents as reports of their own and their child’s (age 2-5) fruit and vegetable intake. The study compared observational data (one meal intake assessed by an independent observer) and intake reported from a telephone survey using a 29-item fruit, juice, and vegetable food frequency questionnaire. Observational and reported data revealed that parents were accurate reporters of their child’s intake on most fruits and vegetables ($\kappa = 0.59 - 0.61$), with the exception of raisins on oatmeal raisin cookies and 100% fruit juice.

The original SLU4Kids FFQ is intended for interview use and relies on parental reporting to measure a child’s food preference. The adapted FVPQ is designed to be easily and independently completed by parents or caregivers. The FVPQ eliminates original questions related to fruit and vegetable consumption and focuses solely on preference. The FVPQ was adapted to include a more robust listing of fruits and vegetables (23 fruits and 24 vegetables) to

further capture the relationship between personality dimensions and fruit and vegetable preference. The scale measures preference of fruits and vegetables and summary scores were computed based on a Likert Scale: Favorite (4), Likes It (3), Doesn't Like It (2), Hates It (1), Has Never Had It (0), Not Sure (0). A sum score was calculated for each child's preference for fruits, vegetables, and fruits and vegetables combined ($\alpha = .95$). Scale scores were used as dependent variables in multiple regression analyses.

Caregiver Food Behavior Checklist (CFBC). The CFBC is an adaptation of the Food Behavior Checklist (FBC); a 22 item tool measuring eating behaviors of adults participating in the USDA Expanded Food and Nutrition Program (EFNEP) (Townsend, Kaiser, Allen, Block-Joy, & Murphy, 2003). The instrument measures consumption of fruits, vegetables, milk, sugar-sweetened beverages, as well as the use of food labels and food insecurity. The FBC was found to have a low respondent burden and met the requirements for validity, reliability and sensitivity to change. The tool was adapted for children by Branscum, Sharma, Kayle, and Succop (2010) and evaluated for construct validity and internal consistency reliability with low-income, EFNEP eligible children (Food Behavior Checklist modified for children – FBC-MC). The tool was found to be suitable for evaluating dietary behaviors among EFNEP eligible children, but further work is needed to meet reliability and validity criteria.

The CFBC utilizes 12 of the 16 original questions on the FBC, but adapted to have parents serve as food behaviors reporters for children. An example of this adaptation: the first question on the FBC asks “Do you eat more than 1 kind of fruit daily?” The CFBC asks “Does your child eat more than 1 kind of fruit daily?” The first ten questions on the CFBC were used to produce a Healthy Eating Index (HEI) score by summing responses (questions 1-7, 1 = yes and 0 = no, questions 8-10, 0 = yes, 1 = no) for a potential range of scores from 0 to 10. HEI scores

were used as dependent variables in multiple regression analyses. The final two measures on the CFBC report the number of times per day a child eats fruit and vegetables (0, 1, 2, 3, 4, 5 more than 5, or don't know).

Procedures

The surveys were administered by North Dakota State University Extension agents to a convenience sample of third and fourth grade parents/caregivers. Agents selected at least one school in their respective counties to distribute surveys. Fourteen agents volunteered and selected twenty-two schools, resulting in a sample distribution of 1593 ($n = 1593$). Survey packets were mailed to agents, and agents worked directly with third and fourth grade teachers to arrange instrument delivery and take home. Agents have connections with schools and rapport within their respective counties, therefore increasing the survey distribution and return.

The packets contained an informational/cover letter asking that the person in the household who typically makes the food purchasing and preparation decisions complete the surveys. Completed surveys were returned directly to the researcher via a self addressed stamped envelope. Parents or caregivers had the option to complete and return a contact information form for a chance to win one of three, \$50 gift cards. A total of 347 survey packets were returned to the researcher and of those, 345 were included in the data analysis (two surveys did not complete a sufficient number of questions on the ICID to produce valid personality dimensions). This resulted in a completion rate of 21.66%. All data were entered and analyzed using the Statistical Package for the Social Sciences SPSS 15.0.1.1 (SPSS Inc., Chicago, IL, 2007).

Data Analysis

Pearson correlations were computed between fruit and vegetable preference, Healthy Eating Index, age, education level, and the Big Five personality dimensions. Correlational matrices were examined for the five personality dimensions, and multicollinearity issues were found for *extraversion* and *conscientiousness*. It was not hypothesized that these dimensions would be related to fruit and vegetable preference and HEI score, and due to the correlation issues, they were omitted from data analysis.

Hierarchical multiple linear regressions were conducted to determine the combined personality dimensions of *openness to experience*, *agreeableness*, and *neuroticism* (independent variable) contributed to the prediction of fruit preference, vegetable preference, fruit and vegetable preference, and the Healthy Eating Index scores (dependent variables), above and beyond what was accounted for by demographic factors. In each analysis, demographic variables were entered as the first set, followed by *openness to experience* and *agreeableness*, and *neuroticism* in the second set.

CHAPTER 4. ARTICLE

Introduction

Childhood obesity continues to be a major concern in the United States, and most children today do not meet the dietary recommendations, eating too many energy-dense, nutrient-poor foods and too few nutrient-dense foods like fruits and vegetables (Ogden, Carroll, Curtin, Lamb & Flegal, 2010; Reedy & Krebs-Smith, 2010; and Lorson, Melgar-Quinonez & Taylor, 2009). Research suggests positive health outcomes for a diet rich in fruits and vegetables, including improved nutrient intake, weight control, and a reduced risk of chronic diseases (Hyson, 2011; Harding et al., 2008; and Crowe et al., 2010). Despite the considerable health benefits found with fruit and vegetable intake, consumption remains low, with less than a quarter of Americans consuming the United States Department of Agriculture (USDA) recommendation for daily fruits and vegetables (Lutfiyya, Chang, & Lipsky, 2012). Numerous intervention attempts have been made to change and improve eating practices, however, the overweight and obesity epidemic remains a serious national concern.

Determining the factors that influence a child's eating behavior and ways to increase consumption of nutrient-dense foods and decrease consumption of nutrient-poor foods, have been identified as public health priorities (Lobstein, Baur, & Uauy, 2004). Dietary intervention strategies may prove more successful if they are tailored to the individual, accounting for such variables as sex, age, cultural health beliefs, genetics, and personality attributes. Additionally, understanding all the determinants of health (social, psychological, and economic environment; physical environment; and the person's individual characteristics and behaviors) has been recognized as vital in the development of policy and intervention strategies to improve the health and wellbeing of a population (World Health Organization, 2013).

The topic of food preference has been researched widely in relation to children's health and food consumption patterns based on the fact that children "eat what they like," and food likes and dislikes have been determined to be significant predictors of food acceptance and consumption (Cooke & Wardle, 2005; Gibson, Wardle, & Watts, 1998; and Raynor, Polley, Wing, & Jefry, 2004). Significant research has focused on the factors that influence the development of food preference, including what children see other people eating (especially their parents), what foods they are offered and how often, and how parents or caregivers promote and control food intake at home (Birch 1999; Cooke et al., 2004; and Vereecken, Keukelier, & Maes, 2004). These factors are undoubtedly important; however, considerably less attention has been paid to the characteristics of children, such as personality, and its impact on food preference.

Personality refers to a person's tendency to behave, think, and feel in a certain consistent way, and personality traits have been shown to predict behaviors due to biological and behavioral underpinnings (Caspi & Shiner, 2006). In recent years, the research evaluating the relationship between personality and dietary behaviors has grown, with some research showing positive associations between personality dimensions and dietary intake (Goldberg & Stryker, 2002; Tiainen et al., 2013; De Bruijn, Kremers, van Mechelen, & Brug, 2005; and Vollrath, Hampson, and Júlíusson, 2012) and others producing null results (Yeo, Treloar, Marks, Health, and Martin, 1997). Since the research connecting food preference to consumption is significant, the purpose of this study was to investigate the association between personality type and fruit preference, vegetable preference, and combined fruit and vegetable preference in young children, aiming to identify if personality might explain part of the pathway leading to preference or liking towards fruits and vegetables. It also seeks to determine if preference may support the previous research associating personality dimensions with certain dietary behaviors. We hypothesized that

the personality dimensions of *openness to experience* and *agreeableness* would have a positive relationship to the sum score of preferred fruits, preferred vegetables, combined preferred fruits and vegetables, and the Healthy Eating Index (HEI) score, and that *neuroticism* would have a negative relationship to the sum score of preferred fruits, preferred vegetables, combined preferred fruits and vegetables, and HEI Score.

Methods

Survey instruments were chosen, modified and underwent cognitive pretesting and pilot testing with appropriate parent audiences with criteria established by Fink (2003). These materials included a demographic questionnaire, Inventory of Children's Individual Differences - Short Version, Fruit and Vegetable Preference Questionnaire, and Caregiver Food Behavior Checklist.

The demographic questionnaire was used to ensure that the person completing the surveys was the individual in the household typically responsible for making the purchasing and preparation decisions related to food. The questionnaire obtained the following information about the child: grade level and gender; about the parent or caregiver: relationship to the child, gender, age, ethnicity, education level, home ownership status, and household's proximity to a grocery store. The education and homeownership status variables were used to account for socioeconomic status, and the proximity to a full service grocery store was used to account for access to fruits and vegetables.

The Inventory of Children's Individual Differences (ICID) is an age and cultural neutral instrument designed to assess the Five Factor Model (FFM or "Big Five") of personality in children and adolescents ages 2 to 15 using parental, non-parental or self-reports (Halverson et al., 2003). The FFM is a way to describe the main dimensions of personality based on a

hierarchical model of trait structure in which narrow and specific traits are organized into five broad factors – *extraversion*, *neuroticism*, *agreeableness*, *conscientiousness*, and *openness to experience* (Digman, 1990, McCrae & John, 1992, & Saucier, 2008). The short version of the ICID (ICID-S) has been shown to maintain the same levels of validity and reliability as the original ICID, successfully measuring the five broad personality dimensions while minimizing the time required for completion (Deal, Halverson, Martin, Victor, & Baker, 2007).

The Fruit and Vegetable Preference Questionnaire (FVPQ) is an adaptation of the SLU4Kids Food Frequency Questionnaire (Linneman et al., 2004). Reliability and validity of the original tool is based on a study assessing the accuracy of parents as reporters of their own and their child's (age 2-5) fruit and vegetable intake. The adapted FVPQ is designed to be easily and independently completed by parents or caregivers, and eliminated original questions related to fruit and vegetable consumption and focuses solely on preference. The FVPQ was adapted to include a more robust listing of fruits and vegetables (23 fruits and 23 vegetables) to further capture the relationship between personality dimensions and fruit and vegetable preference. The scale measures preference of fruits and vegetables and summary scores were computed based on a Likert Scale: Favorite, Likes It, Doesn't Like It, Hates It, Has Never Had It, Not Sure. A sum score was calculated for each child's preference for fruits, vegetables, and fruits and vegetables combined ($\alpha = 0.95$).

The Caregiver Food Behavior Checklist (CFBC) is an adaptation of the Food Behavior Checklist (FBC); a 22 item tool measuring eating behaviors of adults participating in the USDA Expanded Food and Nutrition Program (EFNEP) (Townsend, Kaiser, Allen, Block-Joy, & Murphy, 2003). The instrument measures consumption of fruits, vegetables, milk, and sugar-sweetened beverages. The tool was adapted for children by Branscum, Sharma, Kayle, and

Succop (2010) and evaluated for construct validity and internal consistency reliability with low-income, EFNEP eligible children (Food Behavior Checklist modified for children – FBC-MC). The CFBC utilizes 12 of the 16 original questions on the FBC-MC, but adapted to have parents serve as food behavior reporters for children. An example of this adaptation: the first question on the FBC-MC asks “Do you eat more than 1 kind of fruit daily?” The CFBC asks “Does your child eat more than 1 kind of fruit daily?” The first ten questions on the CFBC were used to produce a Healthy Eating Index (HEI) score by summing responses (questions 1-7, 1 = yes and 0 = no, questions 8-10, 0 = yes, 1 = no) for a potential range of scores from 0 to 10. HEI scores were used as dependent variables in multiple regression analyses. The final two measures on the CFBC report the number of times per day a child eats fruit and vegetables (0, 1, 2, 3, 4, 5 more than 5, or don’t know).

Following Institutional Review Board approval, volunteer North Dakota State University Extension Service agents distributed 1,593 surveys packets to third and fourth grade students in 22 participating North Dakota elementary school in the spring of 2014. Packets were given to students to take home to their parents or guardians. Inclusion criteria for study participants required them to live in the same home as the third and fourth grade child and be fluent in English. Parents or guardians completed the surveys at home and returned them to the researcher via a self addressed stamped envelope. Subjects had the option to complete and return a contact information form for a chance to win one of three, \$50 gift cards.

A total of 347 survey packets were returned to the researcher and of those, 345 (n = 345) were included in the data analysis (two surveys did not complete a sufficient number of questions on the ICID to produce valid personality dimensions). This resulted in a completion rate of 21.66%. All data was entered and analyzed using the Statistical Package for the Social Sciences SPSS 15.0.1.1 (SPSS Inc., Chicago, IL, 2007).

Hierarchical multiple regressions were conducted to determine if personality contributed to the prediction of fruit preference, vegetable preference, fruit and vegetable preference, and the HEI scores in children, above and beyond what was accounted for by demographic factors.

Results

Personality dimensions were generated based on responses to the 50-item ICID, asking parents to choose the degree to which the statement describes their child, in comparison to other children his/her age. Responses ranged from “*much less than the average child or not at all*” to “*much more than the average child*” on a 7-point Likert scale. These response scores were combined to create 15 intermediate personality dimensions, including items such as “considerate” and “intelligent.” Finally, these variables were combined to compute the five personality facets of: *neuroticism* ($\alpha = 0.85$), *extraversion* ($\alpha = 0.66$), *openness to experiences* ($\alpha = 0.71$), *agreeableness* ($\alpha = 0.87$), and *conscientiousness* ($\alpha = 0.76$).

Correlational matrices were examined for the five personality dimensions measured on the ICID. Multicollinearity issues were found for *extraversion* and *conscientiousness*. It was not hypothesized that these dimensions would be related to fruit and vegetable preference and HEI score, and due to these correlation issues, *extraversion* and *conscientiousness* were omitted from data analysis.

Descriptive statistics were run for all demographic variables and can be seen in Table 1. In the majority of cases, persons completing the survey were responsible for making the purchasing and preparation decisions related to food (n = 343; 99.1%), mothers (n = 305; 87.9%), 30-49 years of age (n = 294; 85%), female (n = 323, 93.4%), attended at least some college (n = 282, 81.7%), and white (n = 310; 89.3%). The majority of households were within 5 miles of a grocery store (n = 263, 75.8%) and owned their home (n = 268; 77.2%).

Descriptive statistics were also run for the fruit and vegetable preference questionnaire and can be seen in Table 2. Participants had the option to select that their child “Has Never Had It” or “Not Sure” for each fruit and vegetable. These responses were omitted from data analysis. The most preferred fruits among third and fourth grade students, according to their parents or caregivers, were watermelon (3.71; SD = 0.546), strawberries (3.70; SD = 0.552) and juice (3.67; SD = 0.518), and the least preferred is papaya (2.45, SD = 0.829). The most preferred vegetables are corn (3.60; SD = 0.547), carrots (3.41; SD = 0.627), and potatoes (3.38; SD 0.721), and the least preferred is mushrooms (2.11; SD = 0.879).

Table 1. *Characteristics of the Sample.*

	n = 345
Food person	99.1%
Child grade - 3	51.9%
Child grade - 4	48.1%
Relationship to child	
Mother	87.9%
Father	6.6%
Grandmother	3.2%
Grandfather	0.3%
Other	2.0%
Child gender - boy	51.7%
Child gender - girl	48.0%
Parent/caregiver's age	
Less than 20	0.6%
20-29	8.1%
30-39	48.6%
40-49	36.4%
50-59	5.2%
60-69	0.6%
70 or over	0.6%
Parent/caregiver's gender – female	93.4%
Parent/caregiver's gender - male	6.6%
Ethnicity	
White	89.3%
Hispanic/Latino	2.3%
Native American	8.4%
Education of parent/caregiver	
High school or less	18.3%
Some college	36.8%
Bachelor's degree	33.0%
Graduate degree	11.9%
Grocery Store Proximity	
Less than 1 mile	41.8%
1-5 miles	34.0%
6-10 miles	8.6%
11-15 miles	5.2%
16-20 miles	5.9%
More than 20 miles	4.3%
Household home ownership status	
Own	77.2%
Rent	19.3%
Other	3.5%

Table 2. *Hierarchical Order of Fruit & Vegetable Preference Descriptive Statistics.*

Fruit	N	M	SD	Vegetable	N	M	SD
Watermelon	345	3.71	0.546	Corn	345	3.60	0.547
Strawberry	344	3.70	0.552	Carrot	344	3.41	0.627
Juice	345	3.67	0.518	Potato	345	3.38	0.721
Grapes	345	3.62	0.558	Lettuce	334	3.13	0.734
Apple	345	3.61	0.559	Green Beans	340	3.10	0.760
Orange	345	3.55	0.650	Cucumber	329	3.09	0.884
Banana	345	3.51	0.605	Broccoli	337	3.00	0.818
Pineapple	338	3.36	0.738	Celery	333	2.83	0.784
Pear	339	3.34	0.634	Cauliflower	317	2.75	0.822
Peach	343	3.34	0.702	Dark Greens	294	2.70	0.782
Raspberry	324	3.34	0.744	Green Peas	337	2.70	0.891
Cantaloupe	334	3.31	0.749	Bean	319	2.69	0.809
Blueberry	329	3.28	0.737	Asparagus	248	2.52	0.909
Cherry	332	3.27	0.783	Sweet Potato	268	2.50	0.786
Kiwi	325	3.25	0.756	Cabbage	273	2.44	0.736
Nectarines	279	3.24	0.681	Tomato	342	2.39	1.009
Tangerine	282	3.20	0.712	Green Pepper	300	2.38	0.824
Honeydew	318	3.14	0.751	Red Pepper	284	2.36	0.764
Plum	279	3.06	0.756	Squash	345	2.36	0.790
Mango	218	2.90	0.761	Kale	81	2.32	0.629
Apricot	211	2.79	0.765	Onion	328	2.21	0.832
Grapefruit	259	2.55	0.840	Beets	203	2.12	0.812
Papaya	97	2.45	0.829	Mushrooms	304	2.11	0.879

Demographic dummy variables were created for three categorical items: child’s gender (boy or girl), ethnic origin (white/other or Native American), and home ownership (own or rent/other), and continuous variables were created for age and education level of the parent/caregiver, and distance to a full service grocery store. These demographic variables were utilized in the regression analysis, and descriptive statistics for the items are shown in Tables 3 and 4.

Table 3. *Frequency Statistics for Categorical Demographic Variables.*

Variable		N	Valid Percent
Child’s Gender	Male	179	51.9
	Female	166	48.1
Ethnicity	White/Other	317	91.6
	Native American	28	8.4
Home Ownership	Own Home	267	77.2
	Rent/Other	78	22.8

Table 4. *Descriptive Statistics for Continuous Demographic Variables.*

Variable	Mean	SD
Age	3.40	.78
Education Level	2.39	.92
Distance from Store	2.12	1.40

Age: 1 = less than 20; 2 = 20-20; 3 = 30-39; 4 = 40-49; 5 = 50-59; 6 = 60-69; 7 = 70 or over

Education Level: 1 = high school or less; 2 = some college, 3 = bachelor’s degree; 4 = graduate degree

Distance from Store: 1 = less than 1 mile, 2 = 1-5 miles, 3 = 6-10 miles, 4 = 11-15 miles, 5 = 16-20 miles, 6 = more than 20 miles

From the CFBC and FVPQ, continuous variables were created for the HEI Score (0 to 10), Vegetable Preference Score (23 vegetables with a potential preference score ranging from 0 to 92), Fruit Preference Score (23 fruits with a potential preference score range of 0 to 92), and total Fruit and Vegetable Score (46 fruits and vegetables with a potential preference score range of 0 to 184). These descriptive statistics can be seen in Table 5.

Table 5. *Descriptive Statistics and Correlations for Fruit/Vegetable Preference Scores, HEI Scores, and Personality Facet Scores.*

	M	SD	Agreeableness	Openness to Experience	Neuroticism
Agreeableness	1.04	4.80	1	.495**	-.838**
Openness to Experience	15.06	2.46	.495**	1	-.373**
Neuroticism	19.62	5.41	-.838**	-.373**	1
Fruit Preference Score	67.34	12.46	.149**	.135*	-.120*
Vegetable Preference Score	54.35	12.10	.236**	.161**	-.209**
Total Fruit/Vegetable Preference Score	121.69	21.87	.216**	.166**	-.184**
HEI Score	7.70	1.59	.208**	.124*	-.201**

Note. N = 345.

* $p < .05$. ** $p < .01$. *** $p < .001$

It was hypothesized that *openness to experience*, *agreeableness*, and *neuroticism* would be correlated to fruit/vegetable preference and HEI scores. Due to strong correlations among these variables, as shown in Table 5, personality facets were regressed in one equation. Diagnostic tests for linearity and homoscedasticity indicated that assumptions of regression were not substantively violated, and all variables used in the regression analyses were normally distributed.

To conduct the analysis, four separate regressions were run for each of the dependent variables (fruit preference, vegetable preference, combined fruit and vegetable preference, and HEI score). Demographic variables (child's gender, parent's age, ethnicity, parent's education, and household distance from a grocery store) were entered into the first block followed by the three personality types (*openness to experience*, *agreeableness*, and *neuroticism*) in the second block. The combined personality dimensions of *openness to experience*, *agreeableness*, and *neuroticism* accounted for a significant proportion of the fruit preference score (R^2 change = .024, $F = 2.765$, $p = .04$), the vegetable preference scores (R^2 change = .062, $F = 7.426$, $p < .001$), the combined fruit/vegetable preference score (R^2 change = .051, $F = 5.964$, $p = .001$), and the Healthy Eating Index Score (R^2 change = .049, $F = 5.720$, $p = .001$). As seen in Table 6, the personality dimensions of *openness to experience* and *agreeableness* had positive regression weight for the dependent variables. These results indicate that children who are more “agreeable” and “open” in nature may have stronger preferences for fruits and vegetables, and they may score higher on the Healthy Eating Index. As seen in Tables 6, the personality facet of *neuroticism* had negative regression weights for all of the dependent variables. These results support the hypothesis that children who are more “neurotic” may have lower preferences for fruits and vegetables, and may score lower on the HEI.

Table 6. Summary of Hierarchical Regression Analysis for Variables Predicting Fruit Preference, Vegetable Preference, Combined Fruit and Vegetable Preference, and the Healthy Eating Index Score (N = 345).

<i>Fruit Preference</i>						
	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Gender	-.998	1.375	-.40	-.981	1.369	-.039
Parent Age	.291	.883	.018	.312	.882	.020
Ethnicity	2.792	2.608	.060	2.325	2.597	.050
Education	-.299	.779	-.022	-.469	.777	-.035
Grocery Store	-.225	.492	-.025	-.217	.488	-.024
Home Owner	-1.289	1.723	-.043	-1.591	1.721	-.053
Agreeableness				.169	.273	.065
Openness to Experience				.397	.319	.078
Neuroticism				-.104	.231	-.044
R ²		.011			.035	
R ² Change		.011			.024*	
<i>Vegetable Preference</i>						
	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Gender	-1.992	1.342	-.079	-1.776	1.310	-.073
Parent Age	.295	.862	.019	.428	.844	.028
Ethnicity	-1.493	2.546	-.033	-2.368	2.485	-.052
Education	-.260	.760	-.020	-.494	.744	-.037
Grocery Store	.124	.480	.014	.125	.467	.014
Home Owner	.353	1.682	.012	-.272	1.647	-.009
Agreeableness				.317	.261	.124
Openness to Experience				.328	.305	.066
Neuroticism				-.228	.221	-.100
R ²		.008			.070	
R ² Change		.008			.062***	

*p < 0.05. **p < 0.01. ***p < 0.001

Continued

Table 6. Summary of Hierarchical Regression Analysis for Variables Predicting Fruit Preference, Vegetable Preference, Combined Fruit and Vegetable Preference, and the Healthy Eating Index Score (N = 345).{Continued}

<i>Fruit & Vegetable Preference</i>						
	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Gender	-2.920	2.423	-.067	-2.757	2.380	-.063
Parent Age	.586	1.556	.021	.740	1.533	.026
Ethnicity	1.300	4.595	.016	-.043	4.514	-.001
Education	-.559	1.372	-.023	-.963	1.351	-.040
Grocery Store	-.102	.866	-.006	-.092	.849	-.006
Home Owner	-0.936	3.036	-.018	-1.863	2.992	-.036
Agreeableness				.485	.474	.106
Openness to Experience				.725	.554	.081
Neuroticism				-.332	.401	-.081
R ²		.007			.058	
R ² Change		.007			.051**	
<i>Healthy Eating Index Score</i>						
	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Gender	-.274	.175	-.087	-.250	.172	-.079
Parent Age	-.095	.112	-.047	-.073	.111	-.036
Ethnicity	-.080	.332	.013	-.028	.326	-.005
Education	.082	.099	.048	.055	.098	.032
Grocery Store	-.015	.063	-.013	-.017	.061	-.015
Home Owner	-.048	.219	-.013	-.131	.216	-.035
Agreeableness				.025	.034	.077
Openness to Experience				.021	.040	.033
Neuroticism				-.041	.029	-.139
R ²		.011			.060	
R ² Change		.011			.049**	

*p < 0.05. **p < 0.01. ***p < 0.001

Discussion

The purpose of this study was to investigate the relationship between personality type and fruit and vegetable preference in third and fourth grade children. Hypotheses 1 and 3 address the personality facets of *openness to experience* and *agreeableness* and their relationship to fruit and vegetable preference and the HEI score. Hypotheses 2 and 4 address *neuroticism* and the relationship to fruit and vegetable preference and HEI score. The following section examines the results from each hypotheses, evaluates them against the current literature, and provides recommendations for future research. The section will conclude with an examination of current food and nutrition behavior models, and the recent consideration of factoring personality type as a food behavior determinant.

Hypotheses 1 & 3

The results of this study suggest that children who measured high in *agreeableness* and *openness to experience* have a significantly higher preference for fruits, vegetables, combined fruits and vegetables, and scored higher on the Healthy Eating Index. These results are in line with previous research that has shown *agreeableness* and *openness to experience* to be predictive of fruit and vegetable consumption and healthful eating (De Bruijn, Kremers, van Mechelen, & Brug, 2005; Tiainen et al., 2013).

Openness to experience is characterized by seeking novel and new experiences, curiosity, intellect, and creativity components (Caspi, Roberts, & Shiner, 2005), and previous research has shown this personality facet to play a role in consuming a healthful, balanced diet, including fruits and vegetables (Mottus et al., 2012; Raynor & Levine, 2009; and Tiainen et al., 2013). Researchers have hypothesized that the *openness to experience* personality dimension, in relation to food preference and behavior, may create more willingness to seek out and try new fruits and

vegetables, and with increased exposure comes increased preference and consumption (Birch, 1999; Birch & Fisher, 1998). The majority of studies that support *openness to experience* with positive eating behaviors have been found in adults, as adults have more independence, ability, and free will to make their own food choices.

The findings of this study are unique, as children in the third and fourth grade have limited ability to seek their own food choices, and previous research has suggested that parental influence and foods made available in the household may overrule the influence of personality on food consumption and preference in children (Vollrath, Hampson, & Júlíusson, 2012). Parents or caregivers typically determine the kind, quality, and content of food brought into the home and consumed outside of the home in early childhood. As *openness to experience* is characterized by novelty seeking, might parents of these children indulge this personality type's desire for new and unique experiences with new food choices? Research by de Bruijn, Kremers, Mechelen, and Brug (2005) found *openness to experience* to have a strong, significant effect on fruit and vegetable consumption in adolescents, and our study demonstrated *openness to experience* to have a significant effect on fruit and vegetable preference in young children. It is of interest to consider how these individuals with limited ability to seek their own food choices might be gaining a preference, and if personality may play a role in the pathway to food preference and choice. Parenting based on personality type is not a new concept, and significant information exists on the topic in the research-based and consumer literature. However, to the researcher's knowledge, there have been no studies examining if the personality of a child might influence the foods available in the home. If children express a desire to try new foods (fulfilling the novelty seeking aspect of their personality type), if the desired new foods fall into the family's description of what a healthful, suitable food choice is, and if the family has the means

to purchase those foods, might the child's personality influence the foods made available inside the home and consumed outside the home? To the researcher's knowledge, this question is unknown and may be a potential direction for future research.

Agreeableness is characterized by individuals who are cooperative, considerate, and kind, and this personality type has been linked to a willingness to accommodate others' wishes (Caspi, Roberts, & Shiner, 2005). This study demonstrated that children with a high degree of *agreeableness* were associated with an increased preference for fruits, vegetables, fruits and vegetables, and scored higher on the Healthy Eating Index. De Bruijn et al. (2005) found *agreeableness* in adolescents to be associated with vegetable consumption, and hypothesized that as vegetables are likely a food group encouraged by parents/caregivers, it is likely *agreeable* children/adolescents may be more easily encouraged to follow a healthful diet if they are motivated, encouraged, and placed in an environment where they are able to do so.

The present food environment is considered "obesogenic," making less healthful foods easily accessible, and making it difficult for individuals to choose healthy foods, like fruits and vegetables (Larson & Story, 2009). A significant improvement to increase healthy food offerings to children was the overhaul of the National School Lunch and School Breakfast Programs, increasing the amount and diversity of fruits and vegetables served to students each week (National Standards in the National School Lunch and School Breakfast Programs, 2012). These guidelines require students to take a fruit serving at breakfast and lunch, and established subgroups and weekly requirements for vegetable categories, including dark green, dark orange/red, legumes, starchy, and other vegetables. These healthful food choices may be "novel" to many children in our present environment, which may motivate children high in *openness to experience* to try them. Additionally, in order to encourage young people to consume

these food choices, many school nutrition programs have undergone staff training to teach personnel how to “prompt” or “encourage” young people to try new fruits and vegetables. As children high in *agreeableness* have a desire to cooperate and obey requests, they may be more likely to accept and try the suggested foods. Young people who are high in openness to experience and agreeableness may be more willing to immediately try novel foods that are now being offered in the National School Meal programs. Young people who are high in neuroticism may require repeated exposures to gain a preference for novel foods. This pathway is currently unknown, but personality in acceptance of fruits and vegetables in school feeding programs may be of interest for future research.

Finally, as parents and caregivers play a significant role in the development of food preference and consumption, future research may benefit from exploring the mediating effect of *openness to experience* and *agreeableness* amongst parents who provide and encourage consumption of fruits and vegetables at home. The results of this study demonstrate that *openness to experience* and *agreeableness* may be factors that encourage a preference towards healthful foods, like fruits and vegetables, amongst third and fourth grade children. However, the direct pathway of this relationship is unknown.

Hypotheses 2 & 4

Neuroticism was found to have an inverse relationship with all the measures, indicating the children who are more *neurotic* have a lower preference for fruits, vegetables, combined fruits and vegetables, and score lower on the Healthy Eating Index. These results are in line previous research showing *neurotic* personality types to be correlated with eating a less healthful diet.

Mottus et al. (2013) examined the relationship between personality type and a Mediterranean-style diet, rich in fruits and vegetables and lower in meat products, in older adults. The authors found that *neuroticism* was negatively associated with the Mediterranean-style diet, but positively associated with convenience foods, higher in sugar, salt and fat. Keller and Siegrist (2015) examined the direct and indirect effects of the Big Five personality traits on eating styles and food choices in a large, community based sample. *Neuroticism* was found to promote the consumption of sweet and savory foods via counter-regulatory emotional and external eating pathways.

Neuroticism is associated with emotional instability and experiencing negative emotions, and neurotic individuals may use convenience foods – higher in sugar and fat, to cope with the negative emotions (Groesz et al., 2012). Highly palatable foods, rich in sugar, trigger the production of dopamine in the nucleus accumbens of the brain, and produce a pleasure response in the body that can surpass cocaine rewards in rats (Lenoir, Serre, Cantin, and Ahmed, 2007). Schaefer, Knuth & Rumpel (2011) demonstrated *neuroticism* to be positively correlated with increased activity in the brain's reward circuits. Neurotic individuals may utilize pleasure-producing foods, rich in sugar and fat, to combat negative emotions, and may be more sensitive to the neurochemical response produced from such foods.

A recent study of college students (n = 670) asked subjects and their parents to recall the frequency of consumption of foods in childhood, and looked at the relationship with current liking (Wadhera, Capaldi Phillips, Wilkie, and Boggess, 2015). Frequent consumption of specific foods in childhood was significantly related to the current liking of that food. These findings highlight the importance of establishing healthful feeding practices in childhood to instill lifelong

habits. Understanding how to best introduce healthy foods to children seems an important direction for future research.

Neuroticism is associated with a variety of physical and mental health problems (Lahey, 2009). Consideration should be given to parents of neurotic children in order to determine early dietary interventions and best feed practices for this personality type to promote consumption of nutrient-dense foods and decrease consumption of nutrient-poor foods. How parents feed their children clearly matters regarding short and long-term nutrient intake and food behaviors practices. Numerous approaches are taken by parents and caregivers to influence their child's food consumption. Birch and Marlin (1982) demonstrated that preference for foods increases with familiarity, and new foods may take between 5 to 10 exposures before they become familiar and accepted. In a retrospective analysis of forced feeding episodes with college students, respondents reported experiencing at least one forced food consumption experience during childhood. The most common type of forced consumption involved an authority figure (parent or teacher) forcing the child to eat a food (Batsell et al, 2002). The most negative aspect of forced feeding was the lack of control and feeling of helplessness, creating a distaste for the forced food.

As demonstrated in this study, children high in neuroticism may have a lower preference for fruits and vegetables based on their personality. Parents may struggle to encourage consumption of fruits and vegetables; possibly leading to negative feeding scenarios and distaste for certain healthful foods. Parents of *neurotic* children may benefit from education and support to recognize and address the feeding challenges. Future research should examine the *neurotic* child to determine best feeding practices and strategies to encourage preference and consumption of healthful foods like fruits and vegetables.

Personality & Food Intake Behavior Models

Various models exist to understand the highly complex determinants of food and diet related behaviors. Until recently, little consideration has been given to personality in these models. As discussed by Falconer, Baghurst, and Rump (1993), “personality is a highly complex concept, and there are numerous scales to assess the various proposed aspects. In practice, the nutrition educator will not be able to undertake a full personality assessment of all potential participants in a nutrition program before designing the appropriate intervention...” This sentiment was widely accepted by the nutrition community due to the limited understanding and complexities of personality dimensions, and lack of individuals cross trained to understand both personality and nutrition research.

Lunn, Nowson, Worsley, and Torres (2014) evaluated the associations between the Big Five personality dimensions, and dietary intake, and compliance to dietary recommendations. This review gave considerable discussion to the known determinant of food behaviors, and the previous challenges of incorporating personality dimensions into food and diet models. The review highlights how the core components of personality (basic tendencies, characteristic adaptations, and expressed personality) can be explained and incorporated into well-established dietary behavior models, and provides a proposed model (Figure 2) to explain how the personality theory may fit.

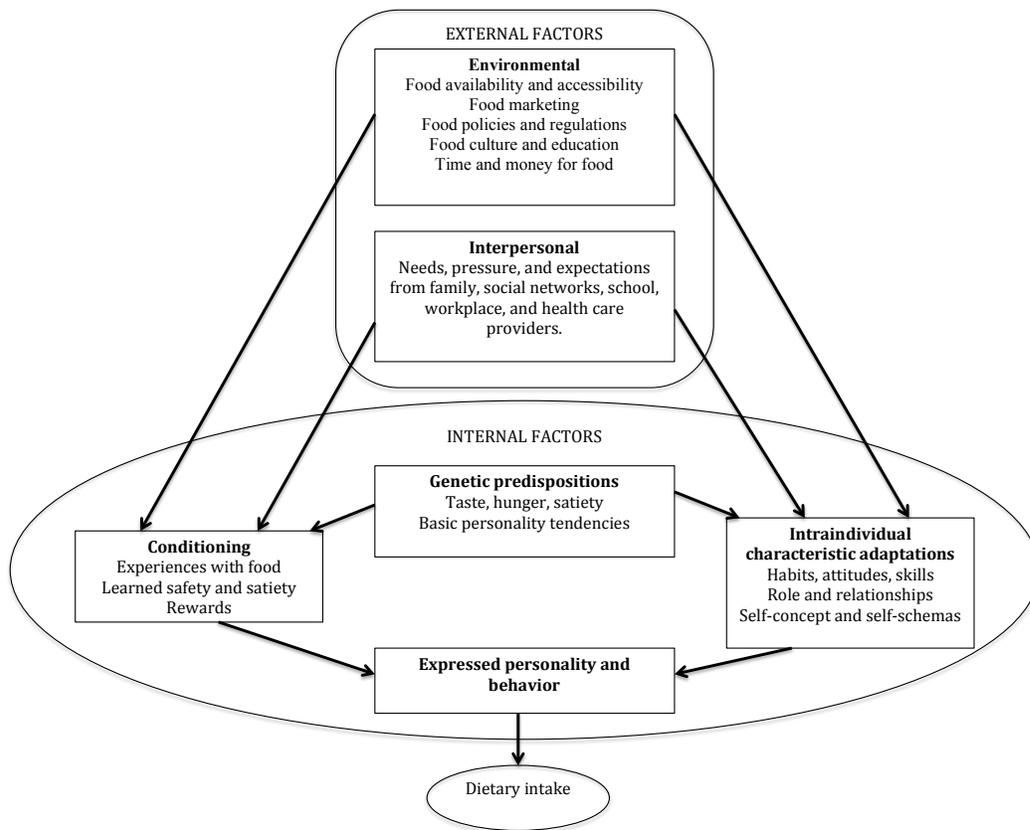


Figure 2: Model explaining how genetically inherited basic personality traits interact with environmental and interpersonal factors to develop intraindividual characteristic adaptations and conditioned responses, and how this might result in expressed personality and behavior, and ultimately dietary intake.

It is important to consider personality in the models of dietary intake, because knowledge of this relationship can be used to generate tailored interventions that may produce dramatically better results. While personality-based nutrition education for groups, or establishing personality in the selection criteria for nutrition interventions is currently of little use, the ability to tailor a food plan based on personality facets would be quite useful for professionals working with parents of children struggling to introduce new foods and establish healthful eating practices. The results of the current study demonstrate that children who are more *neurotic* may have a lower preference for fruits and vegetables, and parents of children who are more neurotic may

benefit from additional education and support to determine strategies to best encourage and promote children's acceptance of healthful food. Additionally, as *neuroticism* is characterized by being tense, anxious and moody (Shiner, 2006), support should be given to parents or caregivers of neurotic children to recognize the struggles they are experiencing to feed their child, and work to develop best practices to develop lifelong preference and consumption of healthful foods.

Limitations of the Study

This was a correlational study, so causation cannot be inferred. Further, parents served as personality and food preference reporters for their children. While parents have been found to be accurate reporters, in certain situations, for their child's dietary intake and food preferences (Linneman et al., 2004) this method is not as accurate as direct observation of eating patterns. Further, this study examined and controlled for the potential confounding variables of age, education level, and distance to a full service grocery store in relation to the healthy eating index, vegetable preference, fruit preference, and total fruit and vegetable preference. The study did not examine other known influences on children's food consumption and preference, including parental feeding styles, the home food environment, and school's participation in the USDA's Fresh Fruit and Vegetable Program, to name a few. Finally, the sample demographics are not representative of the United States population, and therefore, the findings cannot be expanded to the broader U.S. population. Future research would benefit from an increased sample size pulled from a wider geographic region.

In summary, these results indicate that children who are more "agreeable" and "open" in nature may have stronger preferences for fruits, vegetables, and fruits and vegetables in general, and they may score higher on the HEI, and children who are more "neurotic" may have lower preferences for fruits and vegetables, and they may score lower on the HEI. These results support

the consideration of personality as a factor that influences food preference, and future research should look to better understand the feeding preferences and behaviors of neurotic children, and how best to influence and encourage healthful dietary practices.

References

- Birch, L. L. (1999). Development of food preferences. *Annual Review of Nutrition, 19*(1), 41.
- Birch, L.L. & Fisher, J.O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics, 101*(3 Pt 2), 539-549.
- Birch, L. L., & Marlin, D. W. (1982). I don't like it; I never tried it: effects of exposure on two-year-old children's food preferences. *Appetite, 3*(4), 353-360.
- Branscum, P., Sharma, M., Kaye, G., & Succop, P. (2010). An evaluation of the validity and reliability of a food behavior checklist modified for children. *Journal of Nutrition Education and Behavior, 42*(5), 349-352.
- Caspi, A., Roberts, B.W., & Shiner, R.L. (2005). Personality development: Stability and change. *Annual Review of Psychology, 56*, 453-484.
- Caspi, A. & Shiner, R.L. (2006). Personality development. *Handbook of Child Psychology, 3*, 300-365.
- Cooke, L. J., Wardle, J., Gibson, E. L., Sapochnik, M., Sheiham, A., & Lawson, M. (2004). Demographic, familial and trait predictors of fruit and vegetable consumption by pre-school children. *Public Health Nutrition, 7*(2), 295-302.
- Cooke, L. J., & Wardle, J. (2005). Age and gender differences in children's food preferences. *British Journal of Nutrition, 93*(5), 741-746.
- Crowe, F. L. Roddam, A. W., Key, T. J., Appleby, P. N., Overvad, K., Jakobsen, M. U.,... Rodriguez, L. (2011). Fruit and vegetable intake and mortality from ischaemic heart

- disease: Results from the European Prospective Investigation into Cancer and Nutrition (EPIC)-Heart study. *European Heart Journal*, 32(10), 1235-1243.
- De Bruijn, G.J., Kremers, S.P.J., Van Mechelen, W., & Brug, J. (2005). Is personality related to fruit and vegetable intake and physical activity in adolescents? *Health Education Research*, 20(6), 635-644.
- Deal, J. E., Halverson, C. F., Martin, R. P., Victor, J., & Baker, S. (2007). The inventory of children's individual differences: Development and validation of a short version. *Journal of Personality Assessment*, 89(2), 162-166.
- Falconer, H., Baghurts, K.I., & Rump, E.E. (1993). Nutrient intakes in relation to health-related aspects of personality. *Journal of Nutrition Education*, 25, 307-319.
- Fink, A. (2003). *The survey handbook*. (2 ed., pp. 107-112). Thousand Oaks, CA: Sage Publications, Inc.
- Gibson, E. L., Wardle, J., & Watts, C. J. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite*, 31(2), 205-228.
- Goldberg, L. R. & Strycker, L.A. (2002). Personality traits and eating habits: the assessment of food preferences in a large community sample. *Personality and Individual Differences*, 32, 49-65.
- Groesz, L., McCoy, S., Carl, J., Saslow, L., Stewart, J., Adler, N., Laraia, B., & Epel, E. (2012). What is eating you? Stress and the drive to eat. *Appetite*, 58(2), 717-721.
- Halverson, C. F., Havill, V. L., Deal, J., Baker, S. R., Victor, J. B., Pavlopoulos, V., . . . Wen, L. (2003). Personality structure as derived from parental ratings of free descriptions of children: the inventory of child individual differences. *Journal of Personality*, 71(6), 995.
- Harding, A. H., Wareham, N. J., Bingham, S. A., Khaw, K., Luben, R., Welch, A., & Forouhi, N.

- G. (2008). Plasma vitamin C level, fruit and vegetable consumption, and the risk of new-onset type 2 diabetes mellitus: the European Prospective Investigation of Cancer-Norfolk Prospective Study. *Archives of Internal Medicine*, 168, 1493-1499.
- Hyson, D. (2011). Fruits, vegetables, and health: A scientific overview. Produce for Better Health Foundation. Retrieved from <http://www.pbhfoundation.org> on October 13, 2013.
- Keller, C. & Siegrist, M. (2015). Does personality influence eating styles and food choices? Direct and indirect effects. *Appetite*, 84, 128-138.
- Lahey, B.B. (2009). Public health significance of neuroticism. *American Psychologist*, 64(4), 241-256.
- Lenoir, M., Serre, F., Cantin, L., & Ahmed, S.H. (2007). Intense sweetness surpasses cocaine reward. *PLoS One*, 2(8), e698.
- Linneman, C., Hessler, K., Nanney, S., Steger-May, K., Huynh, A., & Haire-Joshu, D. (2004). Parents are accurate reporters of their preschoolers' fruit and vegetable consumption under limited conditions. *Journal of Nutrition Education & Behavior*, 36(6), 305-308.
- Lobstein, T., Baur, L., & Uauy, R. (2004a). Obesity in children and young people: a crisis in public health. *Obesity Reviews*, 5, 4-85.
- Lorson, B., Melgar-Quinonez, H., & Taylor, C. (2009). Correlates of fruit and vegetable intake in U.S. children. *Journal of the American Dietetic Association*, 109, 474-478.
- Lunn, T.E., Nowson, C.A., Worsley, A., & Torres, S.J. (2014). Does personality affect dietary intake? *Nutrition*, 30(4), 403-409.
- Lutfiyya, M.N., Chang, L.F., & Lipsky, M.S. (2012). A cross-sectional study of US rural adults' consumption of fruits and vegetables: Do they consume at least five servings daily? *BMC Public Health*, 12(1), 280-295.

- Mottus, R., McNeill, G., Craig, L., Starr, J.M., & Deary, I.J. (2013). The association between personality, diet, and body mass index in older people. *Health Psychology, 32*, 353-360.
- National Standards in the National School Lunch and School Breakfast Programs. Food and Nutrition Service, United States Department of Agriculture. (2012). *Federal Register, 77*(17): 4088-4167.
- Ogden, C. L., Carroll, M. D., Curtin, L. R., Lamb, M. M., & Flegal, K. M. (2010). Prevalence of high body mass index in US children and adolescents, 2007-2008. *Journal of the American Medical Association, 303*(3), 242-249.
- Raynor, D. A., Polley, B. A., Wing, R. R., & Jeffery, R. W. (2004). Is dietary fat intake related to liking or household availability of high- and low-fat foods? *Obesity Research, 12*(8), 816-823.
- Raynor, D.A. and Levine, H. (2009). Associations between the five-factor model of personality and health behaviors among college students. *Journal of American College Health, 58*(1), 73-81.
- Reedy, J., & Krebs-Smith, S. M. (2010). Dietary sources of energy, solid fats, and added sugars among children and adolescents in the United States. *Journal of the American Dietetic Association, 110*(10), 1477-1484.
- Schaefer, M., Knuth, M., and Rumpel, F. (2011). Striatal response to favorite brands as a function of neuroticism and extraversion. *Brain Research, 1425*, (83-89).
- Shiner, R. (2006). Temperament and Personality in Childhood. In D. Mroczek & T. Little (Eds.), *Handbook of personality development* (pp. 213-230). Mahwah, N.J.: Lawrence Erlbaum.
- SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.

- Tiainen, A.-M. K., Männistö, S., Lahti, M., Blomstedt, P. A., Lahti, J., Perälä, M.-M., . . .
Eriksson, J. G. (2013). Personality and dietary intake – findings in the Helsinki Birth Cohort Study. *PLoS ONE*, *8*(7), 1-8.
- Townsend, M. S., Kaiser, L. L., Allen, L. H., Joy, A. B., & Murphy, S. P. (2003). Selecting items for a food behavior checklist for a limited-resource audience. *Journal of Nutrition Education & Behavior*, *35*(2), 69.
- Vereecken, C. A., Keukelier, E., & Maes, L. (2004). Influence of mother's educational level on food parenting practices and food habits of young children. *Appetite*, *43*(1), 93-103.
- Vollrath, M. E., Hampson, S. E., & Júlíusson, P. B. (2012). Children and eating. Personality and gender are associated with obesogenic food consumption and overweight in 6- to 12-year-olds. *Appetite*, *58*(3), 1113-1117.
- Wadhera, D., Capaldi Phillips, E.D., Wilkie, L.M., & Boggess, M.M. (2015). Perceived recollection of frequent exposure to foods in childhood is associated with adulthood liking. *Appetite*. 89:22-32.
- Yeo, M. A., Treloar, S. A., Marks, G. C., Heath, A. C., & Martin, N. G. (1997). What are the causes of individual differences in food consumption and are they modified by personality? *Personality and Individual Differences*, *23*(4), 535-542.

CHAPTER 5. SUMMARY AND CONCLUSION

A multitude of factors exist that influence children's dietary preference and choices, and understanding how these determinants shape preference and choice is of the utmost importance in the development of programs, policies, and interventions geared towards prevention and the promotion of a healthy lifestyle. In the present study, we explored the relationship between a child's personality type and their preference towards fruits, vegetables, combined fruits and vegetables, and the Healthy Eating Index score. Results supported our hypotheses that *openness to experience* and *agreeableness* would be correlated with a higher preference towards fruits and vegetables, and a higher score on the Healthy Eating Index, and that *neuroticism* would have a negative correlation with the dependent variables.

Our current food environment is considered "obesogenic," making less healthful foods cheap and easily accessible, and making it far too difficult for individuals to choose healthy foods (Larson & Story, 2009). While the need to change the environment to make the healthful choice the easier choice is of high importance, it is also imperative that we understand how innate characteristics and behaviors might explain some food choices, and work with families to establish the best dietary practices and preferences possible for young people based on these distinctive attributes.

The home food environment, and the way food is introduced and modeled for a child are key to establishing children's current and future dietary choices, and may influence their risk of obesity (Gruber and Haldeman, 2009). In the world of nutrition counseling and education, it is quite common to hear stories from parents discussing their continued efforts to encourage their child to eat a healthful, balanced diet, but the child will not accept their advances. Parents also frequently share how they used one form of feeding strategies with one child and had great

success, while the exact same practices with another child were unsuccessful. Those unexplainable instances were the reason for undertaking this study. Will some children, no matter how many times a food is offered, modeled, encouraged, or shared, never have a preference for that food? Or, and more hopefully, might parents of children with a certain personality dimension require additional encouragement, education and support to learn the best feeding practices for children to create a positive preference towards healthful foods? We hypothesize the latter, and recommend this be a future direction of research to determine how parents of neurotic children might introduce and establish preference and healthful eating practices.

REFERENCES

- Batsell, W. R., Jr., Brown, A. S., Ansfield, M. A., & Paschall, G. Y. (2002). "You WILL eat all of that!" A retrospective analysis of forced consumption episodes. *Appetite*, 38, 211-219
- Birch, L. L. (1999). Development of food preferences. *Annual Review of Nutrition*, 19(1), 41.
- Birch, L.L. & Fisher, J.O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics*, 101(3 Pt 2), 539-549.
- Birch, L. L., & Marlin, D. W. (1982). I don't like it; I never tried it: effects of exposure on two-year-old children's food preferences. *Appetite*, 3(4), 353-360.
- Birch, L.L., McPhee, B.C., Shoba, E., Steinberg, L., & Krehbiel, R. (1987). Clean up your plate: Effects of child feeding practices on conditioning of meal size. *Learning and Motivation*, 18, 301-317.
- Blanchette, L., & Brug, J. (2005). Determinants of fruit and vegetable consumption among 6–12-year-old children and effective interventions to increase consumption. *Journal of Human Nutrition & Dietetics*, 18(6), 431-443.
- Branscum, P., Sharma, M., Kaye, G., & Succop, P. (2010). An evaluation of the validity and reliability of a food behavior checklist modified for children. *Journal of Nutrition Education and Behavior*, 42(5), 349-352.
- Caspi, A. & Shiner, R.L. (2006). Personality development. *Handbook of Child Psychology*, 3, 300-365.
- Caspi, A., Roberts, B.W., & Shiner, R.L. (2005). Personality development: Stability and change. *Annual Review of Psychology*, 56, 453-484.
- Center for Disease Control and Prevention: Youth Online: High School Youth Risk

- Behavior Survey. (2013). Atlanta, GA: Centers for Disease Control and Prevention, United States Department of Health and Human Services.
- Chen, X., Li, D., Li, Z., Li, B., & Liu, M. (2000). Sociable and prosocial dimensions of social competence in Chinese children: Common and unique contributions to social, academic, and psychological adjustment. *Developmental Psychology*, 36, 302-314.
- Contento, I. (2011). Foundation in Theory and Research: Increasing Awareness and Enhancing Motivation. In *Nutrition education: Linking research, theory, and practice* (2nd ed., pp. 64-91). Sudbury, Mass.: Jones and Bartlett.
- Cooke, L. J., & Wardle, J. (2005). Age and gender differences in children's food preferences. *British Journal of Nutrition*, 93(5), 741-746.
- Cooke, L. J., Wardle, J., Gibson, E. L., Sapochnik, M., Sheiham, A., & Lawson, M. (2004). Demographic, familial and trait predictors of fruit and vegetable consumption by pre-school children. *Public Health Nutrition*, 7(2), 295-302.
- Crowe, F. L., Roddam, A. W., Key, T. J., Appleby, P. N., Overvad, K., Jakobsen, M. U., . . . Rodriguez, L. (2011). Fruit and vegetable intake and mortality from ischaemic heart disease: Results from the European Prospective Investigation into Cancer and Nutrition (EPIC)-Heart study. *European Heart Journal*, 32(10), 1235-1243.
- De Bruijn, G.J., Kremers, S.P.J., Van Mechelen, W., & Brug, J. (2005). Is personality related to fruit and vegetable intake and physical activity in adolescents? *Health Education Research*, 20(6), 635-644.
- De Bourdeaudhuij, I., te Velde, S., Brug, J., Due, P., Wind, M., Sandvik, C., . . . Klepp, K. I. (2008). Personal, social and environmental predictors of daily fruit and vegetable intake in 11-year-old children in nine European countries. *European Journal of Clinical*

- Nutrition*, 62(7), 834-841.
- Deal, J. E., Halverson, C. F., Martin, R. P., Victor, J., & Baker, S. (2007). The inventory of children's individual differences: Development and validation of a short version. *Journal of Personality Assessment*, 89(2), 162-166.
- Desor, J.A., Mahler, O., & Greene, L.S. (1977). Preference for sweet in humans: Infants, children, and adults. In *Taste and the development of the genesis for the sweet preference*, edited by J. Weiffenback. Bethesda, MD: U.S. Department of Health, Education, and Welfare.
- Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, 41, 417-440.
- Domel, S. B., Thompson, W. O., Davis, H. C., Baranowski, T., Leonard, S. B., & Baranowski, J. (1996). Psychosocial predictors of fruit and vegetable consumption among elementary school children. *Health Education Research*, 11(3), 299-308.
- Falconer, H., Baghurts, K.I., & Rump, E.E. (1993). Nutrient intakes in relation to health-related aspects of personality. *Journal of Nutrition Education*, 25, 307-319.
- Fink, A. (2003). *The survey handbook*. (2nd ed., pp. 107-112). Thousand Oaks, CA: Sage Publications, Inc.
- Gibson, E. L., Wardle, J., & Watts, C. J. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite*, 31(2), 205-228.
- Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. (1998). Why Americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association*, 98(10), 1118-1126.
- Goldberg, L. R. & Strycker, L.A. (2002). Personality traits and eating habits: the assessment of

- food preferences in a large community sample. *Personality and Individual Differences*, 32, 49-65.
- Groesz, L., McCoy, S., Carl, J., Saslow, L., Stewart, J., Adler, N.,... Epel, E. (2012). What is eating you? Stress and the drive to eat. *Appetite*, 58(2), 717-721.
- Gruber, K.J. & Haldeman, L.A. (2009). Using the family to combat childhood and adolescent obesity. *Preventing Chronic Disease*. 6, A106.
- Halverson, C. F., Havill, V. L., Deal, J., Baker, S. R., Victor, J. B., Pavlopoulos, V., . . . Wen, L. (2003). Personality structure as derived from parental ratings of free descriptions of children: the inventory of child individual differences. *Journal of Personality*, 71(6), 995.
- Harding, A. H., Wareham, N. J., Bingham, S. A., Khaw, K., Luben, R., Welch, A., & Forouhi, N. G. (2008). Plasma vitamin C level, fruit and vegetable consumption, and the risk of new-onset type 2 diabetes mellitus: the European Prospective Investigation of Cancer-Norfolk Prospective Study. *Archives of Internal Medicine*, 168, 1493-1499.
- Hyson, D. (2011). Fruits, vegetables, and health: A scientific overview. Produce for Better Health Foundation. Retrieved from <http://www.pbhfoundation.org> on October 13, 2013.
- Judge, T.A., Higgins, C.A., Thoresen, C.J., & Barrick, M.R. (1999). The Big Five personality traits, general mental ability, and career success across the life span. *Personnel Psychology*, 52, 621-652.
- Keller, C. & Siegrist, M. (2015). Does personality influence eating styles and food choices? Direct and indirect effects. *Appetite*. 84, 128-138.
- Lahey, B.B. (2009). Public health significance of neuroticism. *American Psychologist*, 64(4), 241-256.
- Larson, N. & Story, M. (2009). A review of environmental influences on food choices. *Annals of*

- Behavioral Medicine*, 38, S56-73.
- Lenoir, M., Serre, F., Cantin, L., & Ahmed, S.H. (2007). Intense sweetness surpasses cocaine reward. *PLoS One*, 2(8), e698.
- Linneman, C., Hessler, K., Nanney, S., Steger-May, K., Huynh, A., & Haire-Joshu, D. (2004). Parents are accurate reporters of their preschoolers' fruit and vegetable consumption under limited conditions. *Journal of Nutrition Education & Behavior*, 36(6), 305-308.
- Lobstein, T., Baur, L., & Uauy, R. (2004). Obesity in children and young people: a crisis in public health. *Obesity Reviews*, 5, 4-85.
- Lorson, B., Melgar-Quinonez, H., & Taylor, C. (2009). Correlates of fruit and vegetable intake in U.S. children. *Journal of the American Dietetic Association*, 109, 474-478.
- Lunn, T.E., Nowson, C.A., Worsley, A., & Torres, S.J. (2014). Does personality affect dietary intake? *Nutrition*, 30(4), 403-409.
- Lutfiyya, M.N., Chang, L.F., and Lipsky, M.S. (2012). A cross-sectional study of US rural adults' consumption of fruits and vegetables: do they consume at least five servings daily? *BMC Public Health*, 12(1), 280-295.
- McCrae, R. R., & John, O. P. (1992). An Introduction to the five-factor model and its applications. *Journal of Personality*, 60(2), 175-215.
- Mottus, R., McNeill, G., Craig, L., Starr, J.M., and Deary, I.J. (2013). The association between personality, diet and body mass index in older people. *Health Psychology*, 32, 353-360.
- National Health and Nutrition Examination Survey (2015). Retrieved from <http://www.cdc.gov/nchs/nhanes.htm> on January 16, 2015.
- National Institute of Health. (1999). Clinical Guidelines: Identification, Evaluation, and Treatment of Overweight and Obesity. *Family Economics & Nutrition Review*, 12(1), 59.

- Ogden, C. L., Carroll, M. D., Curtin, L. R., Lamb, M. M., & Flegal, K. M. (2010). Prevalence of high body mass index in US children and adolescents, 2007-2008. *Journal of the American Medical Association, 303*(3), 242-249.
- Olshansky, S. J., Passaro, D. J., Hershow, R. C., Layden, J., Carnes, B. A., Brody, J.,... Ludwig, D. S. (2005). A potential decline in life expectancy in the United States in the 21st century. *New England Journal of Medicine, 352*(11), 1138-1145.
- Raynor, D.A. & Levine, H. (2009). Associations between the five-factor model of personality and health behaviors among college students. *Journal of American College Health, 58*(1), 73-81.
- Raynor, D. A., Polley, B. A., Wing, R. R., & Jeffery, R. W. (2004). Is dietary fat intake related to liking or household availability of high- and low-fat foods? *Obesity Research, 12*(8), 816-823.
- Reedy, J., & Krebs-Smith, S. M. (2010). Dietary sources of energy, solid fats, and added sugars among children and adolescents in the United States. *Journal of the American Dietetic Association, 110*(10), 1477-1484.
- Rolls, E.T. & Rolls, J.H. (1997). Olfactory sensory-specific satiety in humans. *Physiology & Behavior, 61*, 461-473.
- Rozin, P. (1990). Development in the food domain. *Developmental Psychology, 26*(4), 555-562.
- Saucier, G. (2008). Measures of the personality factors found recurrently in human lexicons. In G. J. Boyle, G. Matthews & D. H. Saklofske (Eds.), *The SAGE handbook of personality theory and assessment, Vol 2: Personality measurement and testing*. (pp. 29-54). Thousand Oaks, CA US: Sage Publications, Inc.
- Schaefer, M., Knuth, M., & Rumpel, F. (2011). Striatal response to favorite brands as a function

- of neuroticism and extraversion. *Brain Research*, 1425, (83-89).
- Serdula, M. K., Ivery, D., Coates, R. J., Freedman, D. S., Williamson, D. F., & Byers, T. (1993). Do obese children become obese adults? A review of the literature. *Preventive Medicine*, 22(2), 167-177.
- Shiner, R.L. (2006). Temperament and Personality in Childhood. In D. Mroczek & T. Little (Eds.), *Handbook of personality development* (pp. 213-230). Mahwah, N.J.: Lawrence Erlbaum.
- Shiner, R.L. & Caspi, A. (2003). Personality differences in childhood and adolescence: measurement, development, and consequences. *Journal of Child Psychology & Psychiatry & Allied Disciplines*, 44(1), 2-32.
- Shiner, R.L., Masten, A.S., & Roberts, J.M. (2003). Childhood personality foreshadows adult personality and life outcomes two decades later. *Journal of Personality*, 71, 1145-1170.
- SPSS Inc. Released 2007. SPSS for Windows, Version 16.0. Chicago, SPSS Inc.
- Tiainen, A.-M. K., Männistö, S., Lahti, M., Blomstedt, P. A., Lahti, J., Perälä, M.-M., . . . Eriksson, J. G. (2013). Personality and dietary intake – findings in the Helsinki Birth Cohort Study. *PLoS ONE*, 8(7), 1-8.
- Townsend, M. S., Kaiser, L. L., Allen, L. H., Joy, A. B., & Murphy, S. P. (2003). Selecting items for a food behavior checklist for a limited-resource audience. *Journal of Nutrition Education & Behavior*, 35(2), 69.
- United States Department of Agriculture. Dietary Guidelines for Americans, 2010. Washington, DC: U.S. Department of Health and Human Services; 2010.
- Vereecken, C. A., Keukelier, E., & Maes, L. (2004). Influence of mother's educational level on food parenting practices and food habits of young children. *Appetite*, 43(1), 93-103.

- Vollrath, M. E., Hampson, S. E., & Júlíusson, P. B. (2012). Children and eating. Personality and gender are associated with obesogenic food consumption and overweight in 6- to 12-year-olds. *Appetite*, 58(3), 1113-1117.
- Wadhera, D., Capaldi Phillips, E.D., Wilkie, L.M., & Boggess, M.M. (2015). Perceived recollection of frequent exposure to foods in childhood is associated with adulthood liking. *Appetite*, 89, 22-32.
- World Health Organization (2013). Health impact assessment (hia): the determinants of health. Retrieved from <http://www.who.int/hia/evidence/doh/en/> on October 14, 2013.
- Yeo, M. A., Treloar, S. A., Marks, G. C., Heath, A. C., & Martin, N. G. (1997). What are the causes of individual differences in food consumption and are they modified by personality? *Personality and Individual Differences*, 23(4), 535-542.

APPENDIX A. IRB APPROVAL



December 17, 2013

FederalWide Assurance FWA00002439

Abby Gold
Health, Nutrition & Exercise Sciences
EML 351

Re: IRB Certification of Exempt Human Subjects Research:
Protocol #HE14106, "Personality-type and food choices in 2nd and 4th grader students"

Co-investigator(s) and research team: Megan Myrdal, James Deal, Peggy Netzer, Vanessa Hoines, Caroline Homan, Michelle Effertz, Nicole Johnson, Karla Monson, Rebecca Jensen, Callie Johnson, Colleen Svingen, Sara Laite, Christina Rittenbach, Brenda Langerud, Marcia Hellandsaas, Hellen Volk-Schill, Sue Milender

Certification Date: 12/17/2013

Expiration Date: 12/16/2016

Study site(s): varied

Funding: n/a

The above referenced human subjects research project has been certified as exempt (category # 2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*). This determination is based on protocol materials (received 11/22/2013) and training (completed 12/11/2013).

Please also note the following:

- If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.
- Conduct the study as described in the approved protocol. If you wish to make changes, obtain approval from the IRB prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
- Report any significant new findings that may affect the risks and benefits to the participants and the IRB.
- Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

Sincerely,

Kristy Shirley, CIP, Research Compliance Administrator

NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | ndsu.edu/irb

Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo, ND 58102

NDSU is an EO/AA university.

APPENDIX B. PARENTAL CONSENT STATEMENT

NDSU Extension Service
North Dakota State University
Health, Nutrition, and Exercise Science
NDSU Dept. 7270
351 E. Morrow Lebedeff Hall
P.O. Box 6050
Fargo, ND 58108-6050

Personality and Fruit/Vegetable Liking Survey

Consent Statement

Dear Parent or Guardian:

Our names are Abby Gold and Megan Myrdal. We work for North Dakota State University and are conducting a research study to look at how a child's personality type influences their liking towards fruits and vegetables. To help us gather information, we are asking for assistance in the completion of three surveys and a demographic questionnaire. These surveys are the Inventory of Children's Individual Differences – Short Version, the Caregiver Food Behavior Checklist, and Fruit and Vegetable Preference Questionnaire. **Please have the person in the household who typically makes the purchasing and preparation decisions related to food fill out these surveys.** We hope this research will help us to better understand what influence food choices, and ways to encourage healthy, nutrient-dense foods like fruits and vegetables. The surveys should take about 15-20 minutes to complete. After completion, please place all the completed surveys in the self-addressed, pre-paid envelope and return to the researchers.

No risk is anticipated for your participation in this survey study. As a thank you for your help, you have the option to also complete the enclosed contact information form and return with the surveys for a chance to win 1 of 3, \$50 gift cards. This identifying information will be kept separate from the survey materials and will only be used to notify you if you are the recipient of a gift card.

Completion of these surveys is voluntary and you may refuse to participate with no penalty to you. By completing the surveys, you indicate your willingness to participate. We will keep private all research records. Your information will be combined with information from other people taking part in the study, and we will write about the combined information that we have gathered. You will not be identified in these written materials.

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701-231-8908 or toll free at 1-855-800-6717, ndsu.irb@ndsu.edu, or by mail at NDSU HRPP Office, NDSU Dept. 4000, PO Box 6050, Fargo, ND 58108-6050.

Thank you for taking part in this research. If you have questions about this project or wish to receive a copy of the results, please contact me by phone at 701-231-7478 or email abby.gold@ndsu.edu

Sincerely,

Abby Gold, PhD, MPH, RD
Assistant Professor and Extension Specialist

Megan Myrdal, RD, LRD
Graduate Assistant

APPENDIX C. DEMOGRAPHIC QUESTIONNAIRE

1. **Are you the person in the household who typically makes the purchasing and preparation decisions related to food?**
 - a. Yes
 - b. No

2. **Is your child in the 3rd or 4th grade?**
 - a. 3rd
 - b. 4th

3. **What is your relationship to the 3rd or 4th grade child?**
 - a. Mother
 - b. Father
 - c. Grandmother
 - d. Grandfather
 - e. Other (Please write in) _____

4. **Is your 3rd or 4th grade child a boy or girl?**
 - a. Boy
 - b. Girl
 - c. Prefer not answer

5. **How old are you?**
 - a. Less than 20
 - b. 20-29
 - c. 30-39
 - d. 40-49
 - e. 50-59
 - f. 60-69
 - g. 70 or over

6. **Are you:**
 - a. Male
 - b. Female
 - c. Prefer not answer

7. **Ethnic origin (or race). Please specify your ethnicity:**
 - a. White
 - b. Hispanic or Latino
 - c. Black or African American
 - d. Native American or American Indian
 - e. Asian / Pacific Islander
 - f. Other

8. **Education: What is the highest degree or level of school you have completed? *If currently enrolled, highest degree received.***
 - a. High school or less
 - b. Some college
 - c. Bachelor's degree
 - d. Graduate degree

9. How far is the nearest full service grocery store to your home (not a convenience store or gas station)? A full service grocery store sells a broad selection of foods, such as canned and frozen foods, fresh fruit and vegetables, and fresh and prepared meats, fish, seafood, and poultry.

- a. Less than 1 mile
- b. 1-5 miles
- c. 6-10 miles
- d. 11-15 miles
- e. 16-20 miles
- f. More than 20 miles

10. Do you own or rent your home?

- a. Own
- b. Rent
- c. Other

APPENDIX D. YOUR CHILD’S FOOD BEHAVIOR CHECKLIST

Does your child eat more than 1 kind of fruit daily?	Yes	No	Don't Know
Does your child eat more than 1 kind of vegetable a day?	Yes	No	Don't Know
Does your child eat 2 or more servings of vegetables at your main meal?	Yes	No	Don't Know
Does your child eat fruits or vegetables as snacks?	Yes	No	Don't Know
During the past week, did your child eat raw vegetables?	Yes	No	Don't Know
Does your child drink milk daily?	Yes	No	Don't Know
During the past week, did your child have milk as a beverage or on cereal?	Yes	No	Don't Know
Does your child drink regular soda pop daily?	Yes	No	Don't Know
Does your child drink diet soda pop daily?	Yes	No	Don't Know
Does your child drink Kool-Aid, Gatorade, Sunny Delite, or other fruit drink/punch	Yes	No	Don't Know

11. How many times does your child eat vegetables each day?	0	1	2	3	4	5	More than 5	Don't Know
12. How many times does your child eat vegetables each day?	0	1	2	3	4	5	More than 5	Don't Know

APPENDIX E. FRUIT AND VEGETABLE PREFERENCE QUESTIONNAIRE

Fruit and Vegetable Preference Questionnaire

1. Green Peas	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	6. Iceberg Lettuce	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
2. Apples	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	7. Grapes	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
3. Tomatoes	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	8. Kale	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
4. Beets	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	9. Nectarines	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
5. Cherries	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	10. Cucumbers	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure

TURN OVER.

11. Peaches	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	17. Celery	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
12. Potatoes (baked, mashed, or boiled; not fried!)	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	18. Bananas	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
13. Oranges (including clementine and mandarin)	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	19. Raspberries	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
14. Beans & Peas (black beans, lentils, pinto, navy, kidney)	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	20. Green Peppers	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
15. Apricots	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	21. Honeydew Melon	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
16. Green Beans	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	22. Asparagus	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure

23. Strawberries	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	29. 100% Fruit Juice (Orange, Apple, Grape, Grapefruit)	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
24. Cabbage	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	30. Mushrooms	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
25. Grapefruit	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	31. Mangoes	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
26. Sweet Potatoes	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	32. Broccoli	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
27. Red Peppers	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	33. Pears	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
28. Kiwi Fruit	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	34. Cauliflower	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure

35. Pineapple	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	41. Watermelon	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
36. Onions	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	42. Carrots	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
37. Corn	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	43. Blueberries	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
38. Plums	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	44. Cantaloupe	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
39. Tangerines	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	45. Squash (acorn, winter, butternut)	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure
40. Dark Greens (spinach, romaine)	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure	46. Papaya	<input type="checkbox"/> Loves It <input type="checkbox"/> Likes It <input type="checkbox"/> Doesn't Like It <input type="checkbox"/> Hates It <input type="checkbox"/> Has Never Had It <input type="checkbox"/> Not Sure

APPENDIX F: INVENTORY OF CHILDREN'S INDIVIDUAL DIFFERENCES—

SHORT VERSION

Please read each statement. Look at the scale and **circle** the number that corresponds to the degree that you think that statement describes your child in comparison to other children his/her age. Return with the other surveys in the stamped envelope.

- 1 = Much less than the average child or not at all
- 2 = Less than the average child
- 3 = Slightly less than the average child
- 4 = Same as the average child
- 5 = Slightly more than the average child
- 6 = More than the average child
- 7 = Much more than the average child

My Child...

1.	Is self-disciplined	1	2	3	4	5	6	7
2.	Is energetic	1	2	3	4	5	6	7
3.	Is mean.....	1	2	3	4	5	6	7
4.	Is obedient.....	1	2	3	4	5	6	7
5.	Is thoughtful of others	1	2	3	4	5	6	7
6.	Has a short attention span.....	1	2	3	4	5	6	7
7.	Is insecure.....	1	2	3	4	5	6	7
8.	Is quick to learn	1	2	3	4	5	6	7
9.	Is irritable	1	2	3	4	5	6	7
10.	Has a lot of imagination.....	1	2	3	4	5	6	7
11.	Is disorganized.....	1	2	3	4	5	6	7
12.	Is a joy to be with	1	2	3	4	5	6	7
13.	Is withdrawn	1	2	3	4	5	6	7
14.	Is sociable	1	2	3	4	5	6	7
15.	Is stubborn.....	1	2	3	4	5	6	7
16.	Is a hard worker	1	2	3	4	5	6	7
17.	Is always on the move.....	1	2	3	4	5	6	7
18.	Is rude.....	1	2	3	4	5	6	7
19.	Is considerate.....	1	2	3	4	5	6	7

20.	Is easily distracted.....	1	2	3	4	5	6	7
21.	Is fearful	1	2	3	4	5	6	7
22.	Has a good memory	1	2	3	4	5	6	7
23.	Is quick-tempered.....	1	2	3	4	5	6	7
24.	Is interested in new things.....	1	2	3	4	5	6	7
25.	Is organized.....	1	2	3	4	5	6	7
26.	Is sweet	1	2	3	4	5	6	7
27.	Is slow to warm up to new people or situations	1	2	3	4	5	6	7
28.	Is outgoing.....	1	2	3	4	5	6	7
29.	Is hard-headed.....	1	2	3	4	5	6	7
30.	Has a drive to do better.....	1	2	3	4	5	6	7
31.	Is active physically.....	1	2	3	4	5	6	7
32.	Is disobedient.....	1	2	3	4	5	6	7
33.	Is dependable and trustworthy.....	1	2	3	4	5	6	7
34.	Is sensitive to others' feelings.....	1	2	3	4	5	6	7
35.	Forgets things easily	1	2	3	4	5	6	7
36.	Is afraid of a lot of things.....	1	2	3	4	5	6	7
37.	Has good thinking abilities.....	1	2	3	4	5	6	7
38.	Gets angry easily.....	1	2	3	4	5	6	7
39.	Is curious	1	2	3	4	5	6	7
40.	Keeps things neat and tidy	1	2	3	4	5	6	7
41.	Is loving	1	2	3	4	5	6	7
42.	Has difficulty making friends	1	2	3	4	5	6	7
43.	Loves to be with other people	1	2	3	4	5	6	7
44.	Wants things his/her own way.....	1	2	3	4	5	6	7
45.	Lacks confidence	1	2	3	4	5	6	7
46.	Likes to ask questions	1	2	3	4	5	6	7
47.	Does things carefully and with thought	1	2	3	4	5	6	7
48.	Has difficulty adjusting to new situations	1	2	3	4	5	6	7
49.	Makes friends easily	1	2	3	4	5	6	7

50. Manipulates to get his/her own way 1 2 3 4 5 6 7