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A Study Of The Associations Between Demographics And Socioeconomic Status Of Parents And Use Of Functional Foods In Feeding Their Child(Ren)

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A STUDY OF THE ASSOCIATIONS BETWEEN DEMOGRAPHICS AND SOCIOECONOMIC STATUS OF PARENTS AND USE OF FUNCTIONAL FOODS IN FEEDING THEIR CHILD(REN)

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ABSTRACT

The present study was conducted to examine associations between demographics and socioeconomic status of parents and their use of functional foods in feeding their child(ren). Using a quantitative, descriptive study design, surveys were disseminated through both email and take home flyer within the Tupelo and Lafayette County Public School Districts in North Mississippi. A total of 187 parents met the inclusion criteria and completed the survey. This study found that parental education, race, marital status, self-reported overall health, and the age of children in their household significantly predicted use of functional foods by parents in feeding their child(ren). Implications from this research study stress the fact that children's dietary preferences and habits are formed during early childhood. Thus the implementation of school-based nutrition programs and the inclusion of parental figures may improve children's overall dietary practices, possibly reducing the risk of diet-related chronic disease in the future.

LIST OF ABBREVIATIONS

HEI Healthy Eating Index

BMI Body Mass Index

NHANES National Health and Nutrition Examination Survey

IRB International Review Board

IFIC International Food Information Council

SPSS Statistical Package for Social Sciences

NCG Norwegian Child Growth Study

LSAC Longitudinal Study of Australian Children

RDA Recommended Daily Allowance

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I. INTRODUCTION

INTRODUCTION

In the United States, few children consume a diet that corresponds with dietary guidelines, while the majority is failing to meet recommendations for a healthful diet (Birbilis, Moschonis, Mougios, & Manios, 2013). Food preferences and dietary habits are formed during early childhood and are heavily influenced by parental figures (Ford, Slining, & Popkin, 2013; Laster et al., 2013; Ohly et al., 2013; Riediger, Shooshtari, & Moghadasian, 2007; Skala et al., 2012; Story, Neumark-Sztainer, & French, 2002; Xie, Gilliland, Li, & Rockett, 2002). Role models and their demographic characteristics may influence child(ren)'s health in the future and children(s) ability to form healthful dietary practices of their own (Birbilis et al., 2013; Cutler, Flood, Hannan, & Neumark-Sztainer, 2011; Skala et al., 2012). By establishing recommended dietary habits during adolescence, the risk of developing chronic disease in adulthood is greatly reduced (Xie et al., 2002).

Healthful dietary practices include the consumption of nutrient-dense foods for the promotion of optimal health and disease prevention. Despite these recommendations, many Americans fail to adhere to US Dietary Guidelines that encourage a balance of healthful dietary habits and daily physical activity (USDA, 2013). Due to the unhealthy status of Americans, the food industry has shifted their focus. Prior to 1995, the food industry concentrated on dietary components that should be subtracted from food in order to create healthier food items. Recently, the focus has been placed on adding beneficial ingredients to food items, thus creating the same effect and providing positive health benefits (Academy of Nutrition and Dietetics, 2013).

With the heightened interest in health benefits of food and dietary components, functional foods have emerged onto the market (Ares & Gambaro, 2006; Mullie et al., 2009). Defined as foods or dietary components that may provide a health benefit beyond basic nutrition and may play a role in reducing or minimizing the risk of certain diseases and other health conditions, functional foods offer consumers the ability to gain control over their health (International Food Information Council, 2013). Through the consumption of health-enhancing ingredients, consumers can facilitate positive change in bone, immune, digestive, eye, heart, circulatory, and oral health, as well as the maintenance of healthy body weight (Academy of Nutrition and Dietetics, 2013; International Food Information Council, 2013). As parental figures adopt the inclusion of functional foods into their familial dietary practices, incidence of chronic disease may decrease in the future (International Food Information Council, 2013).

Although research has been conducted on functional foods, the concentration on demographic differences of functional food consumption and the inclusion into dietary practices in family eating behaviors is minimal. During the past two decades, dietary patterns have been altered due to the growing awareness of the impact of food on minimizing the risk of disease, such as cardiovascular disorders and diabetes mellitus (Butt & Sultan, 2013). According to Lucan (2015), diet-related chronic diseases are a leading cause of death in the United States. Looking into the future of today's youth, necessary changes must be made in order to decrease the prevalence of specific health disparities. In order to develop interventions to prevent dietary related health disparities, the determinants of these specific disparities must first be understood (Wang & Chen, 2011).

Therefore, the purpose of this study was to examine relationships between demographics and socioeconomic statuses of parents and the use of functional foods in feeding their child(ren). Specifically, this study analyzed the relationships between parental age, education level, household income, race/ethnicity, gender, marital status, self-reported overall health, Body Mass Index (BMI), age of children in the household, and primary household grocery shopper and parental use of functional foods in feeding their child(ren). Two research questions were examined:

- Is there an association between parents feeding their child(ren) functional foods for their health benefits and demographic and socioeconomic variables (age, education level, household income, race/ethnicity, gender, marital status, self-reported overall health, BMI, age of children in the household, and primary household grocery shopper)?
- Is there an association between parents feeding their child(ren) functional foods for specific health benefits (digestive, heart, cancer, weight, bone, and other) and demographic and socioeconomic variables (age, education level, household income, race/ethnicity, gender, marital status, self-reported overall health, BMI, age of children in the household, and primary household grocery shopper)?

II. REVIEW OF LITERATURE

REVIEW OF LITERATURE

Although current literature on differences by demographics and socioeconomic statuses and incorporation of functional food into the family's dietary practices is minimal, research has identified an association between some characteristics and the inclusion of certain food groups in dietary practices. Specific parental demographic variables that were most identified in the literature related to familial dietary practices include education level, household income, race/ethnicity, and parental health. Other variables such as marital status, gender, age, and primary household grocery shopper have also been found to be important in some studies.

1. Parental Age

Researchers have concluded that there is a relationship between functional foods and age based on specific functional foods (Mullie et al., 2009). Older individuals (aged 40-59) have been found to have higher intakes of cholesterol-lowering margarines in comparison to younger age groups (ages 20-39) (Mullie et al., 2009). Brecic, Gorton, and Barjolle (2014) stated that the relationship between functional food consumption and age is ambiguous primarily due to older individuals placing a higher importance on the healthfulness of foods and are more likely to be willing to adopt disease preventative food habits. The willingness to adopt disease preventative food habits may affect their child(ren)'s overall health and the parental figure's likeliness to include functional foods into the family diet. In one study examining the likeliness of children being overweight and obese based on the parental figure's age and weight status, researchers

found an inverse relationship between parental age and the likeliness of their child(ren) to be overweight or obese (Birbilis et al., 2013). Researchers concluded that children of fathers who are older than 46 years of age and children of mothers older than 42 years of age were less likely to be obese than children belonging to younger parental figures. This could reflect more health conscious practices in parents who are older (Birbilis et al., 2013). Overall, there is contrasting results in previous research conducted on parental age and the likeliness of the child's parent(s) to include functional foods in their dietary practices.

2. Parental Education Level

In looking at dietary practices of parents and the dietary habits their child(ren) form, similarities have been observed (Kirkpatrick, Dodd, Reedy, & Krebs-Smith, 2012). In fact, educational attainment of parents has been found to influence children's dietary intake (Goodwin et al., 2006). More educated parental figures have been proven to be more health conscious and have healthier dietary patterns in comparison to those with less education (Crawford et al., 1995; Cutler et al., 2011; Johnson et al., 2010; Mullie et al., 2009; Ohly et al., 2013; Xie et al., 2002). This may be due to an increased knowledge of chronic disease and overall health and wellbeing (Riediger et al., 2007). Additionally, parents with a college degree have an increased Health Eating Index (HEI) score in consuming whole fruit, total vegetables, and whole grains in comparison to lower education levels (Hiza, Casavale, Guenther, & Davis, 2013). Studies note a positive correlation between higher parental education and an increased fruit and vegetable intake of their child(ren) (Riediger et al., 2007; Xie et al., 2002).

In utilizing the 1994-1996 Continuing Survey of Food Intakes by Individuals, analyzing HEI scores based on participant two-day dietary recalls, researchers found that educational

attainment of the head of the household was one of the few demographic factors that significantly relates to the quality of their child(ren)'s diet. Compared to adolescents whose parental figures had education beyond high school, adolescents in households headed by parental figures with educational attainment of a high school diploma or less were more likely to consume a lower quality diet (Goodwin et al., 2006). Furthermore, Cutler et al. (2011) positively correlated low levels of parental education with an increase of their child's intake of high-fat, salty snacks. However, children whose parents have attained four or more years of college consumed diets higher in calcium, vitamin C, and potassium, and lower in trans, saturated, and monounsaturated fats (Crawford et al., 1995; Xie et al., 2002).

Birbilis et al. (2013) found that higher levels of child BMI and obesity decrease as parental education levels increase. Higher education levels have been inversely related to the child's consumption of energy-dense foods, while there have been positive relations in whole-grain, fruit, and vegetable consumption. This may be due to an increase in parental awareness of healthy eating and physical activity as education levels increase (Birbilis et al., 2013). Additionally, it was reported that higher education levels reflect higher socioeconomic status, which has been associated with healthier eating habits, physical activity, and weight-control practices among families (Birbilis et al., 2013).

3. Household Income

Food choices and motives of individuals can be determined by household income and the cost and availability of food items (Laster et al., 2013; Roos, Lehto & Ray, 2011). Directly relating to food choices, household income affects energy intake as well as fruit and vegetable consumption. For example, a lower intake of fruits and vegetables and an increased consumption

of sodium have been associated with the dietary practices of children belonging to families with lower household income (Kirkpatrick et al., 2012; Riediger et al., 2007; Story, Neumark-Sztainer & French, 2002). Furthermore, families with lower household incomes have higher intakes of energy-dense, satiating foods such as refined grains and added sugars (Drewnowski & Darmon, 2005; Yu, Penner Protudjer, Anderson, & Fieldhouse, 2010; Xie et al., 2002). According to Drewnowski and Darmon (2005), these dietary choices may be due to the relative price of fruits and vegetables as well as healthful food options offered at local grocery stores. Additionally, there are less grocery store locations found in low income neighborhoods that offer healthful foods at affordable prices. These researchers also reported that families may select energy-dense foods as an effective way to save money. Moreover, Skala et al. (2012) reported that while some believe fresh produce provides many health benefits, energy-dense foods are lower in cost. Thus, the high-calorie items may be more attractive due to their low cost, convenience, and extended shelf life (Skala et al, 2012). According to Cutler et al. (2011) and Skala et al. (2012), healthier eating patterns are observed in children belonging to higher income households.

Individuals of the highest income level are more likely to achieve the recommended daily intake of fruit and dairy products and have been observed to consume lower amounts of fat and higher intakes of vitamin C. Families earning a higher income can afford a more diverse diet and more frequently consume fish, fruit, and vegetables (Xie et al., 2002). In addition, Hiza et al. (2013) reported that food consumption by both adults and children with income ≥ 500% poverty had higher scores on the HEI when being compared to those with 130% to 299% poverty level income. However, other research has found that children of lower income families have a better quality diet than children belonging to high income households (Doyle, Jenkins, Crawford, & Puvandendran, 1994). This may reflect greater participation in food-assistance programs such as

the National School Breakfast and Lunch Programs as well as Summer Feeding Programs (Doyle et al.,1994). Although these children may participate in food-assistance programs, Doyle et al. (1994) found that two-thirds of children in an inner city school made up of low-income families consumed a nutritionally poor diet.

4. Parental Race/Ethnicity

Although research has been conducted on racial disparities and cultural factors that influence dietary habits, there is limited research focusing on the association between race/ethnicity and whether or not parents include functional food in their child(ren's) diet. Previous research has identified that both racial disparities and cultural factors influence dietary habits of both parental figures and their child(ren) (Skala et al., 2012; Zhang & Wang, 2012). Examining a nationally representative sample of roughly 5,000 persons per year, the National Health and Nutrition Examination Survey (NHANES) assessed the dietary habits and nutritional status of US adults and children. Utilizing dietary intake data, biochemical tests, clinical assessments, and physical measurements, researchers determined nutritional deficiencies and toxicities among a variety of race and ethnic backgrounds (Centers for Disease Control and Prevention, 2015). Studies utilizing NHANES data broke down dietary variables based on race and ethnicity into the following categories: total fruit and vegetable, whole grains, meat and beans, and dairy (Hiza, Casavale, Guenther, & Davis, 2013; Kirkpatrick et al., 2012; Neumark-Sztainer, Story, Hannan, & Croll, 2002). In looking at multiple dietary variables, Kirkpatrick et al. (2012) found that non-Hispanic black adults are more likely to meet minimum recommendations for total fruit and vegetable intake as well as total grains and milk, in comparison to other ethnicities, who are less likely to meet minimum recommendations.

Additionally, research has concluded that Mexican-American adults are more likely to meet recommendations for dry beans and peas as well as total grains in comparison to other ethnicities that are less likely to meet minimum recommendations (Kirkpatrick et al., 2012).

Food preferences and dietary habits are heavily influenced by parental figures (Ford et al., 2013; Laster et al., 2013; Ohly et al., 2013; Riediger et al., 2007; Skala et al., 2012; Story et al., 2002; Xie et al., 2002). Due to this research finding, studies have been conducted on specific parental dietary practices and their association with parental race/ethnicity (Skala et al., 2012). According to Xie et al. (2002), eating behaviors and nutrient intakes vary across different ethnic subpopulations. For example, Asian Americans had significantly lower intakes of calcium and are less likely to meet calcium recommendations in comparison to non-Hispanic white individuals. Furthermore, researchers found that the non-Hispanic white population had the lowest consumption of fruits while Hispanic whites had the lowest intake of vegetables. Overall, researchers concluded that ethnic differences were prevalent in the nutrient intakes and food consumption of the research participants (Xie et al., 2002). Additionally, researchers reported that Mexican-American children met the minimum recommendation for total fruit in comparison to non-Hispanic white and non-Hispanic black children (Kirkpatrick et al., 2012). A study conducted by Riediger et al. (2007) established patterns of fruit and vegetable consumption of Canadian adolescents, finding that 38.3% of study participants consumed fruits and vegetables 5 to 10 times per day, meeting current recommendations.

5. Parental Gender

In a few studies, researchers have found that there are gender differences regarding attitude towards certain food groups and dietary habits (Ares and Gambaro, 2007). Previous research has found that parental gender, in association with other demographic characteristics such as income and education level, correlates with parental feeding practices (Riediger et al., 2007). Although very little has been conducted on the direct correlation between parental gender and the likeliness to include functional foods into parental feeding practices, current research has found that women are more likely to consume fruits and vegetables in comparison to men (Brecic et al., 2014; Riediger et al., 2007).

6. Parental Marital Status

Although there appears to be no research focusing on marital status and use of functional foods, previous studies have provided some understanding of familial dietary behaviors. For example, researchers have found that as divorce rates dramatically increase, marital status has played a crucial role on familial dietary habits (Riediger et al., 2007; Schoen & Canudas-Romo, 2006). In one study examining fruit and vegetable consumption among Canadian adolescents, researchers found that children living in a two-parent household had a higher proportion of fruit and vegetable consumption in comparison to children living in a single-parent household (Riediger et al., 2007). In looking at the recommended amount of daily fruit and vegetable consumption (5-10 servings daily), 39% of children living in two-parent households consumed the recommended intake while only 36% of children in single-parent households consumed the recommended intake of fruits and vegetables. In a study conducted by Ohly et al. (2013), researchers found an increased consumption of fruits and vegetables in children living in a two-

parent household, while an increased consumption of sugary beverages was observed in single-parent households.

Similar to other research variables within the proposed research study, marital status and the effect on familial dietary practices is jointly associated with multiple other variables including income level and educational attainment. Due to limited research specifically looking at marital status and functional foods, this study aimed to determine the correlation between marital status and the inclusion of functional foods into their familial dietary practices.

7. Parental Health and Weight

Previous research has assessed self-reports of parental health status as well as parental BMI, but it is limited in relation to functional food dietary habits. Herath, Cranfield, and Henson (2008) examined respondents self-reported health status in which participants identified whether or not they had a poor or very good/excellent health status. These researchers found that participants who reported that they had poor health status were less receptive to functional foods in comparison to those who reported having a very good/excellent health status. Interestingly, Devine, Connors, Bisogni, and Sobal (1998) found that individuals reported fluctuations in their interest with consumption of healthful food items due to fluctuating interest in health and fitness.

Dietary practices and lifestyle habits of parental figures influence the dietary behaviors of their child(ren). In a study conducted by Birbilis et al. (2013), researchers examined diet and health quality, as well as demographic characteristics, of 2,294 children 9-13 years of age. Researchers found that children of overweight parental figures were significantly more likely to be overweight when compared to children of normal weight parents (Birbilis et al., 2013). Additionally, the likeliness of overweight or obesity is significantly increased for children of

overweight or obese parental figures. Supplementary research that has been conducted also reports findings of parental health status reflecting on the health status and dietary practices of their child(ren) (Abu-Rmeileh et al., 2008; Laster et al., 2013).

8. Household Grocery Shopper

Due to parental influence of their child's dietary habits, the individual who purchases groceries for the household may have a significant influence over the types of food their child(ren) consume. According to Befort et al. (2006), 97% of parental figures classified themselves as the main grocery shopper in their households, most likely increasing their knowledge of and impact over the type of foods in the home. Little research has been conducted on the associations between parental figures purchasing groceries for the home and their child's intake of functional foods.

9. Age of Children

Although research on functional foods throughout childhood and adolescence is minimal, there is existing research focusing on factors that influence food choices and dietary habits of children and adolescence. For example, in a study conducted by Gillman et al. (2000), researchers examined associations between the frequency of family meals and the diet quality of children nine to 14 years of age. Results from this study concluded that children were less likely to have family meals as they reached the top of this age range. Interestingly, researchers found that children who ate family meals everyday consumed less fried food and soda and an average of 0.8 more servings of fruits and vegetables in comparison to those who ate family meals less

frequently. In looking at functional food components, children who consumed family meals more frequently reported higher intakes of dietary fiber, folate, calcium, and Vitamins B_6 and B_{12}.

An additional factor in functional food usage is food preference changes as children age. In looking at age differences and food preferences, Cooke and Wardle (2005) utilized a cross-sectional survey to examine both age and gender differences in food preferences. The survey used in this research consisted of a list of 115 food items that included 'single' foods, 'mixed' foods, and 'condiments'. Children were then asked how much they would like to consume each food and were given six response options varying from 'never tried it' to 'I love it'. Researchers found that as the age of the children increased, the more foods they had tried, liked, and disliked. This means that as children age, their parents have exposed them to more food, thus allowing the children to gain a better understanding for what they like and dislike.

While associations between parental dietary habits and the foods they feed their child(ren) are present in the literature, evidence of associations between specific parental demographic characteristics is limited, with literature specifically focusing on parental demographics and feeding functional foods to their child(ren) especially sparse. A modest amount of research has been conducted on how healthful family dietary practices are associated with parental education, household income, and parental race/ethnicity, while less literature is available on parental health, marital status, gender, age, and whether they are the primary household grocery shopper and familial dietary practices. This research study sought to fill some of these gaps found in the literature.

Therefore, this study sought to answer the research question on whether there is an association between the inclusion of functional foods and functional food health benefit

categories in family dietary practices and the following parental demographic and socioeconomic categories: age, education level, household income, race/ethnicity, gender, marital status, self-reported overall health, BMI, age of children in the household, and primary household grocery shopper. By identifying significant associations between the level of functional foods used by parents in feeding their children and the demographic and socioeconomic categories, the significance of the research questions has been determined.

III. METHODOLOGY

METHODOLOGY

1. Research Design

A quantitative, descriptive study design was utilized in conducting research on specific demographics and socioeconomic statuses of parents/guardians and their relationship to functional foods in family dietary practices. The Institutional Review Board (IRB) of the University of Mississippi approved the research protocol. A pilot study involving 12 adult participants was conducted from July 2 to August 28, 2014 in order to determine the average time it took to complete the survey and to discover any errors in the instrument. Based on the pilot test, ways to improve the questionnaire were identified and implemented.

2. Participants

Participants of this study were 18 years of age or older and had (a) child(ren) 18 years of age or younger living in their household at the time of survey completion. Additionally, their child(ren) was enrolled in public school in one of two urban clusters in Northern Mississippi (Tupelo or Oxford area). In order to recruit participants, an email or paper flyer containing a link to an electronic survey was disseminated in three schools in the Tupelo Public School District (Joyner Elementary, Tupelo Middle School, and Tupelo High School) and four schools in the Lafayette County School District (Lafayette Elementary, Lafayette Upper Elementary, Lafayette Middle School, and Lafayette High School). Permission letters from both school districts can be found in Appendix A.

3. Instrument

The instrument used in this research study was a quantitative survey using specific, verbatim questions from the 2009 and 2013 International Food Information Council surveys (IFIC, 2009; IFIC, 2013). In order to address the research questions for this study, the questionnaire included seven categorical questions on parental age, education, household income, race/ethnicity, gender, marital status, and primary household grocery shopper, along with questions on parent's use of specific functional foods when feeding their children. In addition, it included a Likert-type question regarding self-reported parental health; and questions requesting the parent's height, weight, and the age of their child(ren) living in their household. The survey instrument was part of a larger study that included three additional questionnaire sections addressing research questions on attitudes and knowledge toward nutrition and certain foods for health benefits, awareness and usage of functional foods, and barriers toward functional food usage.

Prior to beginning the survey, potential participants answered YES or NO to two screening questions: "I am 18 years of age or older" and "I am the parent/guardian of (a) child(ren) 18 years of age or younger currently living in my home." Participants who answered "NO" to either question were thanked for their time; their participation in the research study ended. Survey questions for this study can be found in Appendix B.

4. Procedures

Parent/guardian recruitment to participate in the study took place at the pre-selected Lafayette County and Tupelo, Mississippi school districts February 2-28, 2015. Researchers utilized two different recruitment approaches as required by the two school districts. Parents of (a) child(ren) enrolled in Lafayette Elementary and Upper Elementary received a take-home flyer

with instructions regarding the survey link. Those belonging to the Tupelo Public Schools and the Lafayette Middle and High School received an email with the same flyer with instructions regarding the survey link. Students were asked to let their parent(s) know they had been sent an email regarding the survey. The take-home flyer and email described the purpose of the study and how the participant would benefit from participating in research on this topic. The flyer can be found in Appendix C. Grade levels of each school involved in this study can be found in Table 3.1.

Table 3.1
Information on Lafayette and Tupelo schools participating in study

School District	*Grade Levels*
Lafayette County Public Schools	
Elementary School	Pre-Kindergarten – 2nd Grade
Upper Elementary School	3rd – 5th Grade
Middle School	6th - 8th Grade
High School	9th – 12th Grade
Tupelo Public Schools	
Joyner Elementary School	Kindergarten – 2nd Grade
Middle School	7th – 8th Grade
High School	9th – 12th Grade
National Average *	
Pre-Kindergarten	
Elementary School	Kindergarten – 5th Grade
Middle School	6th – 8th Grade
High School	9th – 12th Grade

Note: * Average age of children within specific grade levels was determined based on national averages.

5. Variables

The independent variables were represented by ten demographic and socioeconomic categories (age, education level, household income, race/ethnicity, gender, marital status, self-reported overall health, BMI, age of children in the household, and primary household grocery

shopper). The dependent variable was based on reported use of 27 functional foods with specific health benefits and food examples in order for the participant to fully understand the potential food components or nutrients. In addition, the 27 functional foods were organized into six categories based on the specific health benefits they provided: digestive, heart, cancer, weight, bone, and other. The functional foods' health benefit categories can be seen in Table 3.2.

Specifics on each independent variable after responses were categorized include:

- Parental age was assessed based on three categories: 18-34, 35-44, and 45 or older.
- Parental education was obtained by asking the participant the highest level of education they completed. From the six options, three categories were created: some high school/high school graduate, some college or associate degree, and college/graduate degree.
- Parental income was assessed based on six categories: less than $35,000, $35,000 to less than $50,000, $50,000 to less than $75,000, $75,000 to less than $100,000, $100,000 to less than $150,000, and $150,000 and above. .
- Parental race/ethnicity included three categories: white, black or African American, and other (American Indian or Alaska Native, Hispanic/Latino/Spanish, Asian, native Hawaiian or other Pacific Islander).
- Parental gender was determined by asking the participant if they were male or female.
- Parental marital status was determined by asking the participant to specify their current marital status using five options: single, married, divorced, widowed, and other.
- A Likert-type question on the parent's self-reported overall health included three categories: poor/fair, good, or very good/excellent.
- Questions requested the parent's weight (measured in pounds) and height (measured in feet and inches), and were calculated into BMI.

- One question asked the participant who in their household did the majority of the grocery shopping with three possibilities: mother/female guardian, father/male guardian, and other (please specify).
- Age of Children was determined by asking the participant to fill in the ages of their children in the provided spaces.

Table 3.2
27 Functional foods by functional food health benefit category

Function Food Health Benefit Category	*Functional Food*
Digestive	Prebiotic fiber Fiber Probiotics
Heart	Monounsaturated fats Plant sterols Potassium B vitamins Whole grains Fiber Soy/soy protein Folate or folic acid Omega-3 fatty acids
Cancer	Antioxidants Lycopene Fiber Soy/soy protein
Weight	Herbs and spices Fiber Protein
Bone	Calcium Vitamin D
Other	Lutein and other carotenoids Xylitol Folate or folic acid Omega-3 fatty acids Probiotics Protein

6. Analysis

Considering that not all parents/guardians may have access to a computer or Internet, the study's recruitment flyer encouraged families without a computer to use the public library or

contact the researchers for a paper copy that would be mailed to their home address. Both the flyer and the survey reminded participants that only one survey should be completed per household. Participants were able to complete the survey by following the electronic link address provided on the flyer at http://www.kidsfood.us. The link lead the participant to an online survey administered through Qualtrics (Version 2.4, Qualtrics LLC, 2005). When the participant completed the survey, he/she was thanked for their time and participation in the research. In addition to the email and take home flyer, additional flyers were distributed at a variety of sporting and school events in both the Tupelo Public School District and the Lafayette County School District during the month of February.

Once research gathering ended, data was exported from Qualtrics (Version 2.4, Qualtrics LLC, 2005) into an Excel (Version 14.4.8, Microsoft Corp., 2011) file. After cleaning incomplete responses, it was exported to SPSS (Version 22.0, IBM Corp., 2011) in order to analyze the data. Initially, there were a total of 392 surveys completed by respondents; 205 survey responses were dropped due to incomplete data, leaving 187 total responses. Explanation for dropped surveys can be seen below in Table 3.3.

Table 3.3
Explanation for survey deletions

Number of Surveys Deleted	*Explanation for Deletion*
116	Participants did not answer a majority of survey questions
21	Participants did not answer any questions
16	Participants did not answer all demographic questions
52	Participants did not answer all 4C question(s) on feeding their children functional foods for their health benefits

During statistical analysis, all data was recoded and categories were combined when less than 10% of participants selected that specific answer. BMI was calculated using self-reported height and weight into two BMI status categories based on the Centers for Disease Control and Prevention (CDC) BMI standards (CDC, 2015): normal weight and overweight/obese. In looking at the age of children, the average age of children per household was calculated and recoded into four categories: prekindergarten, elementary (kindergarten – 5^{th} grade), middle (6^{th} – 8^{th} grade), and high school (9^{th} – 12^{th} grade). Due to both school districts having different grade classifications, grade levels were recoded in regards to the national average (U.S. Department of Education, 2002).

Descriptive, chi-square, and multiple regressions statistical tests were conducted on all variables in order to determine correlations between the dependent and independent variables. Due to the use of categorical variables, dummy variables were created for each level of the independent variable in order to run multiple regressions. Chi-squares were performed in order to examine overlaps in data between gender and primary grocery shopper. Due to similarities in results, primary grocery shopper was removed from further analysis. Additionally, chi-squares were also run to determine overlaps in data for parental income and education. Due to the results, it was determined that household income data would not be beneficial to analyze further. In further analysis, eight independent variables were analyzed, thus, the two research questions that were examined are as follows:

- Is there an association between parents feeding their child(ren) functional foods for their health benefits and demographic and socioeconomic variables (age, education level, race/ethnicity, gender, marital status, self-reported overall health, BMI, and age of children)?

- Is there an association between parents feeding their child(ren) functional foods for specific health benefits (digestive, heart, cancer, weight, bone, and other) and demographic and socioeconomic variables (age, education, race, gender, marital status, self-reported overall health, BMI, and age of children in the household?

IV. RESULTS

RESULTS

1. Demographics and Socioeconomic Statuses and All Nutrient Components

A total of 187 parents participated in this research study. Eighty-two percent of respondents were white, while 93% were women. Twenty five percent of respondents were 18-34 years of age, 37% were 35 to 44 years of age, and 37% were 45 years of age or older. The majority of respondents had obtained a college degree (65%), while 50% reported having very good/excellent health. Based on self-reported height and weight, 56% of participants BMI was classified as overweight or obese. Lastly, age of children in the household was fairly evenly spread between the four classifications (preschool, kindergarten/elementary school, middle school, and high school). Descriptive statistics of survey participants can be seen in table 4.1.

Descriptive statistics were examined on the 27 functional food components in order to determine participants' use of specific functional foods in feeding their child(ren). Table 4.2 shows that the most highly used food nutrient components (used by 75% or more of participants) were calcium (95%), vitamin D (87%), protein for weight management (84%), whole grains (78%), fiber for reduced risk of cancer (78%), fiber for a healthy digestive system (77%), and fiber for reduced risk of heart disease (75%). Food nutrient components least used by participants (45% or less) consisted of herbs and spices (44%), protein for optimal health (44%), folate for reduced risk of brain/spinal cord birth defects (43%), plant sterols (43%), folate for reduced risk of heart disease (41%), lycopene (34%), xylitol (34%), soy for reduced risk of cancer (20%), and soy for reduced risk of heart disease (16%).

Table 4.1
Descriptive statistics of demographics and socioeconomic statuses of parents (n = 187)

Category	*# of Participants (%)*
Age	
18 – 34	47 (25.1)
35 – 44	70 (37.4)
45 or Older	70 (37.4)
Education	
Less than High School/High School Graduate	6 (3.2)
Some College or Associate Degree	59 (31.6)
College Degree	122 (65.2)
Race	
White	154 (82.4)
Black	28 (15.0)
Other	5 (2.7)
Gender	
Male	13 (7.0)
Female	174 (93.0)
Marital Status	
Single	44 (23.5)
Married	143 (76.5)
Overall Health	
Poor/Fair	29 (15.5)
Good	65 (34.8)
Very Good/Excellent	93 (49.7)
BMI	
Healthy Weight	82 (43.9)
Overweight	105 (56.1)
Age of Children	
Pre-Kindergarten	45 (24.1)
Elementary School	48 (25.7)
Middle School	33 (17.6)
High School	61 (32.6)

Table 4.2
Descriptive statistics of 27 functional food components when feeding their child(ren) (n =187)

Functional Food Component	*Frequency of Respondent Usage (%)*
Calcium	178 (95.2)
Vitamin D	163 (87.2)
Protein for weight management	158 (84.5)
Whole grains	146 (78.1)
Fiber for reduced risk of cancer	145 (77.5)
Fiber for a healthy digestive system	144 (77.0)
Fiber for reduced risk of heart disease	142 (75.9)
B Vitamins	134 (71.7)
Potassium	134 (71.7)
Monounsaturated fats	133 (71.1)
Probiotics for a healthy digestive system	132 (70.6)
Prebiotic fiber	130 (69.5)
Antioxidants	129 (69.0)
Omega-3 Fatty Acids for reduced heart disease	121 (64.7)
Probiotics for a healthy immune system	112 (59.9)
Carotenoids	98 (52.4)
Fiber for weight management	98 (52.4)
Omega-3 Fatty Acids for cognitive development	97 (51.9)
Herbs and spices	83 (44.4)
Protein for optimal health	83 (44.4)
Folate for reduced risk of brain/spinal cord birth defects	80 (42.8)
Plant sterols	80 (42.8)
Folate for reduced risk of heart disease	76 (40.6)
Lycopene	64 (34.2)
Xylitol	64 (34.2)
Soy for reduced risk of cancer	37 (19.8)
Soy for reduced risk of heart disease	30 (16.0)

Note: Respondents indicated all multiple nutrient components they used.

Prior to categorizing the 27 functional food nutrient components into six health benefit categories, a multiple linear regression (see Table 4.3) was estimated for the dependent variable of these components in order to predict participants' overall use of functional foods in feeding

their child(ren) by the demographic and socioeconomic status categories: age, education level, race/ethnicity, gender, marital status, participant self-reported overall health, BMI, and age of children in the household. The multiple regression revealed that demographic and socioeconomic characteristics of parents accounted for 14.4% of variation in parental feeding of functional foods. Of these variables, participants' race and marital status were statistically significant predictors of the use of functional foods. The race category "other" (American Indian or Alaska Native, Hispanic/Latino/Spanish, Asian, and Native Hawaiian or other Pacific Islander) (Unstandardized B = 2.60, $p < .05$) fed their child(ren) more functional food nutrient components than White or Black participants. Additionally, participants who were married (Unstandardized B = .115, $p < .05$) were more likely to feed their child(ren) functional food components in comparison to participants that were single. Participants' self-reported overall health was a statistically significant predictor of the use of functional foods. Parents of poor/fair overall health (Unstandardized B = -.133, $p < .01$) were less likely to feed their child(ren) functional food nutrient components than participants who categorized themselves as having good or very good/excellent health. Of the children's ages variable, none were significantly significant. These multiple regression estimates are displayed in Table 4.3.

Table 4.3
Multiple regressions of parental demographics and socioeconomic statuses and functional foods (n = 187)

Variable	*Unstandardized Coefficients B (SE_b)*
1 (Constant)	.612 (.099)
Age	
18 – 34	-.048 (.063)
35 – 44	.033 (.051)
45 or older ^	
Education	
≤ High School/	-.144 (.105)
Some College or Associate Degree	-.004 (.041)
College Degree ^	
Race	
White ^	
Black	.099 (.054)
Other	.260 (.114)*
Gender	
Male ^	
Female	-.050 (.072)
Marital Status	
Single ^	
Married	.115 (.046)*
Overall Health	
Poor/Fair	-.133 (.056)*
Good	-.010 (.042)
Very Good/Excellent ^	
BMI	
Health Weight ^	
Overweight or Obese	-.006 (.039)
Age of Children	
Pre-Kindergarten	-.046 (.053)
Elementary School ^ (Kindergarten – 5th Grade)	
Middle School (6th – 8th Grade)	-.065 (.057)
High School (9th – 12th Grade)	-.086 (.058)

Note: * $p < .05$ (2-tailed), ** $p < .01$ (2-tailed); $R^2 = .144$; $F = 2.074$; ^ = Reference

2. Descriptive Statistics of Parents' Use of Functional Foods by Health Benefit Categories

Variables representing use of functional foods for six health benefit categories (digestive, heart, cancer, weight, bone, and "other" health benefits) were created by averaging the responses (1 = Yes, 0 = No) for functional foods by health benefit category in order to determine relationships of participant use of functional foods for specific health benefits in feeding their child(ren). In looking at functional foods with digestive health benefits (prebiotic fiber, fiber, and probiotics), 11% of participants did not feed their child(ren) any functional foods for digestive health benefits, while 89% fed their child(ren) at least one functional food for digestive health benefits. A large majority of participant's were likely to feed their child(ren) functional foods for heart health benefits (monounsaturated fats, plant sterols, potassium, B vitamins, whole grains, fiber, soy/soy protein, folate or folic acid, and omega-3 fatty acids); only 9% participants reported feeding their child(ren) none of the functional foods for heart health benefits, while 91% fed their child(ren) at least one functional food for heart health benefits. In looking at cancer prevention, 11% of participants did not feed their child(ren) functional foods for cancer-related health benefits (antioxidants, lycopene, fiber, soy/soy protein), while 89% fed their child(ren) at least one functional food for this specific health benefit.

In looking at the use of functional foods with weight management health benefits (herbs and spices, fiber, and protein), 10% participants did not feed their child(ren) any functional foods for weight related health benefits, while 90% fed their child(ren) at least one functional food for this specific health benefit. Parents were the most likely to feed their child(ren) functional foods for bone health benefits (calcium and vitamin D). In fact, 86% of participants responded that they fed their child(ren) functional foods for both calcium and vitamin D, while only 4% did not feed their child(ren) functional foods for bone health benefits. Lastly, participants were the least

likely to feed their child(ren) functional foods for "other" health benefits (lutein and other carotenoids, xylitol, folate or folic acid, omega-3 fatty acids, probiotics, and protein); 11% of participants did not feed their child(ren) functional foods for "other" health benefits, while 89% of participants fed their child(ren) at least one functional food for these specific health benefits. Only 10% of participants fed their child(ren) all six nutrient components for "other" health benefits. Descriptive statistics on the six health benefit categories are displayed in Table 4.4.

Table 4.4
Descriptive statistics of parental usage of functional foods by health benefit categories (n = 187)

Health Benefit Category	*# Positive Response per Category*	*n (%)*	*Mean (SD)*
Digestive Health (3 FF)	0/3	20 (10.7)	.724 (.345)
	1/3	26 (13.9)	
	2/3	43 (23.0)	
	3/3	98 (52.4)	
Heart Health (9 FF)	0/9	16 (8.6)	.592 (.297)
	1/9	10 (5.3)	
	2/9	8 (4.3)	
	3/9	12 (6.4)	
	4/9	11 (5.9)	
	5/9	25 (13.4)	
	6/9	29 (15.5)	
	7/9	33 (17.6)	
	8/9	27 (14.4)	
	9/9	16 (8.6)	
Cancer Prevention (4 FF)	0/4	20 (10.7)	.501 (.295)
	1/4	46 (24.6)	
	2/4	57 (30.5)	
	3/4	41 (21.9)	
	4/4	23 (12.3)	
Weight Management (3 FF)	0/3	19 (10.2)	.604 (.328)
	1/3	54 (28.9)	
	2/3	57 (30.5)	
	3/3	57 (30.5)	
Bone Health (2 FF)	0/2	7 (3.7)	.912 (.235)
	1/2	19 (10.2)	
	2/2	161 (86.1)	
"Other" Health (6 FF)	0/6	21 (11.2)	.476 (.300)
	1/6	26 (13.9)	
	2/6	39 (20.9)	
	3/6	31 (16.6)	
	4/6	31 (16.6)	
	5/6	21 (11.2)	
	6/6	18 (9.6)	

Note: 27 nutrient components were examined; participants answered 0 = No and 1 = Yes. FF = Functional Food)

3. Demographics and Socioeconomic Statuses and the Use of Functional Food by Health Benefit Categories

A multiple regression was estimated to predict use of functional foods for specific health benefits based on demographics and socioeconomic statuses of participants. Self-reported overall health, BMI, and age of children accounted for 12% of the variation in parental feeding of functional foods for digestive health benefits, 12% for heart health benefits, 12% for cancer-related health benefits, 12% for weight related health benefits, 16% for bone health benefits, and 14% for "other" health benefits. In looking at the *F*-test of the regression model, demographic and socioeconomic characteristics of participants statistically significantly predicted use of functional foods for bone ($F(14, 95)) = 2.345$, $p < .001$) and "other" ($F(14, 95)) = 1.938$, $p < .05$) health benefits. No significant demographic or socioeconomic predictor was found for digestive, heart, cancer-related, or weight management health benefits.

Education, race, marital status, overall health, and age of children were found to be statistically significant predictors. Parents with a high school education or less were less likely to feed their child(ren) functional foods for bone health benefits (Unstandardized B = -.396, $p < .001$) than participants with higher levels of education. Black participants were more likely to feed their child(ren) functional foods for bone (Unstandardized B = .117, $p < .05$) and "other" (Unstandardized B = .134, $p < .05$) health benefits in comparison to white participants and participants of the race category "other." Parents of the race category "other" were more likely to feed their child(ren) functional foods for cancer-related (Unstandardized B = .285, $p < .05$), weight (B = .350, $p < .05$), and "other" (Unstandardized B = .332, $p < .05$) health benefits in comparison to white and black participants. Married participants were more likely to use functional foods for heart (Unstandardized B = .131, $p < .05$) and "other" (Unstandardized B =

.116, $p < .05$) health benefits when feeding their child(ren) in comparison to participants who were single. Parents with a self-reported health status of poor/fair were less likely to use functional foods for digestive (Unstandardized B = -.225, $p < .005$) and "other" (Unstandardized B = -.168, $p < .05$) health benefits when feeding their child(ren) in comparison to those who reported good or very good/excellent overall health. In looking at the age of children in the household, parents with (a) high school aged child(ren) were less likely to feed their child(ren) functional foods for digestion health benefits (Unstandardized B = -.194, $p < .05$) in comparison to participants with preschool, elementary, or middle school aged child(ren). Additionally, participants with (a) preschool aged child(ren) were less likely to use functional foods for weight related health benefits (Unstandardized B = -.147, $p < .05$) in comparison to participants with elementary, middle or high school aged child(ren).

In looking at non-significant predicators of parental use of functional foods in feeding their child(ren), non-significance was found in all demographic and socioeconomic statuses of parents depending on the functional food health benefit. Parental education was not a significant predictor for parental use of functional foods for digestion, heart, cancer-related, weight, and "other" health benefits. Race was non-significant in parental inclusion of functional foods for digestion and heart health benefits in feeding their child(ren). Parental marital status was not a significant predictor of parental use of functional foods for digestion, cancer-related, weight, and bone health benefits in feeding their child(ren). Self-reported overall health was not a significant predictor for parental use of functional foods for heart, cancer-related, weight, and bone health benefits. Age of children in the household was not a significant predictor of parental use of functional foods for heart, cancer-related, bone, and other health benefits. Lastly, parental age,

gender, and BMI were not significant predictors of parental use of functional foods for all six health benefit categories. Regression estimates are displayed in Table 4.5.

Table 4.5
Demographics and socioeconomic status and functional food health benefit categories (n = 187)

	Digestive Health	Heart Health	Cancer Health	Weight Health	Bone Health	"Other" Health
Unstandardized Coefficient	B (SE_B)	B (SE_B)	B (SE_B)	B (SE_B)	B (SE_B)	B (SE_B)
Constant	.880 (.139)	.622 (.120)	.570 (.119)	.538 (.133)	.919 (.093)	.428 (.121)
Age						
18 – 34	- .012 (.088)	- .102 (.076)	- .028 (.075)	.011 (.084)	- .088 (.059)	- .014 (.076)
35 – 44	- .028 (.071)	.022 (.061)	.053 (.061)	.066 (.068)	- .013 (.047)	.065 (.061)
45 or Older ^						
Education						
≤ High School	.089 (.147)	- .181 (.127)	- .031 (.126)	- .206 (.140)	- .396 (.098)***	- .166 (.127)
Some College or Associate Degree	.037 (.058)	.008 (.050)	- .034 (.049)	.033 (.055)	- .050 (.039)	- .024 (.050)
College Degree ^						
Race						
White ^						
Black	.018 (.076)	.112 (.066)	.115 (.065)	.034 (.073)	.117 (.051)*	.134 (.066)*
Other	.067 (.159)	.246 (.138)	.285 (.136)*	.350 (.152)*	.209 (.106)	.332 (.138)*
Gender						
Male ^						
Female	- .067 (.101)	- .073 (.087)	- .146 (.086)	.006 (.096)	- .007 (.067)	.016 (.087)

Table 4.5 *Continued*

Unstandardized Coefficient	Digestive Health B (SE_B)	Heart Health B (SE_B)	Cancer Health B (SE_B)	Weight Health B (SE_B)	Bone Health B (SE_B)	"Other" Health B (SE_B)
1 (Constant)						
Marital Status						
Single ^						
Married	.118 (.064)	.131 (.055)*	.114 (.055)	.100 (.061)	.064 (.043)	.116 (.055)*
Overall Health						
Poor/Fair	- .225 (.079)**	- .110 (.068)	- .097 (.067)	- .122 (.075)	- .080 (.053)	- .168 (.068)*
Good	- .067 (.058)	.010 (.050)	.047 (.050)	- .006 (.096)	- .012 (.039)	- .053 (.051)
Very Good / Excellent ^						
BMI						
Healthy Weight ^						
Overweight or Obese	- .048 (.055)	- .011 (.048)	- .033 (.047)	.070 (.053)	.031 (.037)	- .009 (.048)
Age of Children						
Preschool	- .105 (.074)	- .027 (.064)	- .011 (.064)	- .147 (.071)*	.001 (.050)	- .033 (.064)
Elementary ^						
Middle School	- .092 (.079)	- .060 (.068)	- .077 (.068)	- .133 (.076)	- .002 (.053)	- .037 (.069)
High School	- .194 (.082)*	- .085 (.071)	- .037 (.070)	- .067 (.078)	- .054 (.055)	- .087 (.071)
R^2	.120	.119	.123	.117	.160	.136
F	1.678	1.665	1.726	1.635	2.345	1.938

V. DISCUSSION

DISCUSSION

The purpose of this study was to examine relationships between demographics and socioeconomic statuses of parents and the use of functional foods in feeding their child(ren). In the analysis of parental use of functional foods in feeding their child(ren), eight variables were examined for possible associations: parental age, education, race/ethnicity, gender, marital status, self-reported overall health, BMI (based on self-reported height and weight), and the average age of children in the household. This study found that several demographic variables significantly predicted parental feeding of functional foods to their child(ren). In summary, associations between parental education, race/ethnicity, marital status, self-reported overall health, and the age of children in their household were found to be associated with use of functional food.

In comparing demographic characteristics, parental race/ethnicity displayed the most relationships with functional food. In this study, participants classified as black reported feeding their child(ren) functional foods for two of the six health benefits while participants categorized in the race category "other" reported feeding their child(ren) functional foods for three of the six health benefits. Similar to this study, previous research has found that ethnic groups have differing dietary habits and practices (Kirkpatrick et al., 2012). Since food preferences and dietary habits are heavily influenced by parental figures, low adult dairy intake may have an affect on child(ren)'s dairy intake and overall food partialities (Ford et al., 2013; Laster et al., 2013; Ohly et al., 2013; Riediger et al., 2007; Skala et al., 2012; Story et al., 2002; Xie et al., 2002). In this study, participants classified as black were more likely to feed their child(ren) functional foods with bone and "other" health benefits. Similar research has found

that non-Hispanic black adults are more likely to meet minimum recommendations for dairy products in comparison to other ethnicities (Kirkpatrick et al., 2012).

Additionally, this study also found that parents classified in the race category "other" (American Indian or Alaska Native, Hispanic/Latino/Spanish, Asian, and Native Hawaiian or other Pacific Islander) were more likely to feed their child(ren) functional foods as a whole in addition to being more likely to use functional foods for cancer-related, weight, and "other" health benefits. Similar research has found that Hispanic adults were twice as likely to consume fresh fruit and three times as likely to consume fresh vegetables in comparison to black individuals, which could positively influence them providing fresh fruit and vegetables to their child(ren) (Skala et al., 2012). Although this study did not find a significant relationship between parents classified in the race category "other" and use of functional foods with bone health benefits, another study (Xie et al., 2002) found that Asian Americans had significantly lower intakes of calcium and were less likely to meet calcium recommendations in comparison to non-Hispanic white adults. Furthermore, Auld et al. (2002) reported that Asian and Hispanic adolescents disliked the taste of milk and were less likely to consume milk if other options were provided. This may be due to a lack of dairy products within the household, lessening availability and the child(ren)'s overall exposure to dairy products (Auld et al., 2002).

In addition, marital status displayed multiple relationships with functional food. Married participants were more likely to include functional foods into their familial dietary practices; specifically, functional foods providing heart and "other" health benefits. Although there is minimum research that has been conducted on the associations between parental marital statuses and feeding their children functional foods, current research has concluded that home environment, including marital status, has an impact on children's diet, weight status, and overall

health (Biehl et al., 2014; Byrne, Cook, Skouteris, & Do, 2011; Chen & Escarce, 2010; Gibson et al., 2007; Huffman, Kanikireddy, & Patel, 2010).

In a study conducted by Biehl et al. (2014), researchers examined 3,137 third graders by utilizing cross-sectional data from the Norwegian Child Growth Study (NCG) and found that obesity was more prevalent among children of divorced parents. Similarly, Byrne et al. (2011) conducted a study analyzing 8,717 children's (4 to 9 years of age) dietary intake, BMI, and activity levels based on parental marital status and the likelihood of childhood overweight and obesity within single and dual parent households. By utilizing Longitudinal Study of Australian Children (LSAC) methodology along with measured child BMI, Byrne et al. (2011) found that girls belonging to single parent households displayed higher BMIs in comparison to those from dual parent households. Additionally, children in single parent households have been found to have fewer servings of fruits and vegetables and more servings of high fat foods. Results of this study are consistent with current research (Chen & Escarse, 2010; Huffman et al., 2010), which concluded that children belonging to single parent households were more likely to become overweight or obese, possibly due to single parents being under more stress, and having less education and lower income (Gable & Lutz, 2000).

Another demographic characteristic that displayed positive relations with functional food was the average age of children in the household. Specifically, this demographic category significantly predicted the use of functional foods in familial dietary practices in two specific areas. Participants with (a) pre-kindergarten child(ren) were less likely to feed their child(ren) functional foods with weight health benefits, while participants with (a) high school aged child(ren) were less likely to feed their children functional foods with digestion health benefits. Although minimum research has been conducted on the age of children in a household and

whether or not their parents incorporate functional foods into the family's dietary practices, existing research has been conducted on the factors that may influence dietary habits of children and adolescence. For example, researchers have found that there is a correlation between the healthfulness of the dietary choices of children who consume meals with their families everyday in comparison to those who eat with their families less frequently (Gillman et al., 2000). Additionally, researchers reported that children who ate meals with their families on a daily basis consumed less fried foods and soda, and consumed an average of 0.8 more servings of fruits and vegetables (Gillman et al., 2000). In support of the research findings of this study, Gillman et al. (2000) found that the proportion of children who eat meals with their families declines as the children age, possibly explaining the lowered likeliness of parents with (a) high school aged child(ren) to use functional foods with digestion health benefits in feeding their child(ren).

It appears to be a positive finding that parents of pre-Kindergarten children did not feed their child(ren) functional foods with weight health benefits. Previous research has shown that food-related parenting practices and the restriction of palatable foods may limit their child(ren)'s ability to regulate their own food choices. These parenting practices and their child(ren)'s inability to form their own dietary judgments has been associated with harmful eating patterns and disordered eating in their children (Loth, MacLehose, Fulkerson, Crow, & Neumark-Sztainer, 2014). In a study conducted by Loth et al. (2014), researchers found that as the extremity of the food restriction increased the child was more likely to involve themselves in dangerous weight control behaviors. Other research has found that restricting access to palatable foods is associated with the child's intake of the restricted foods followed by negative self-evaluation post consumption (Orlet Fisher & Lipps Birch, 2000).

In examining parental education level, this study found that parents who had completed high school or had some high school education were less likely to feed their child(ren) functional foods with bone health benefits, which is similar to previous research of children of parents with high school education or less who had lower consumption of calcium in comparison to children whose parents had completed four or more years of college (Crawford et al., 1995). Additionally, Xie et al. (2002) reported that children of parents who have education levels of a high school diploma or less consumed only 33.6% of the Recommended Daily Allowance (RDA) for calcium in comparison to a higher percent by children of parents who have completed higher levels of education. Similarly, Salamoun et al. (2004) found that children of parents who had completed higher levels of education were more likely to meet the Adequate Intake guidelines as issued by the Food and Nutrition Board of the Institute of Medicine for both calcium and vitamin D.

Although results from this study show that parental education levels only affect their child(ren)'s intake of functional foods with bone health benefits, this finding may be explained by other research showing strong associations between parental education and their child(ren)'s diet as a whole. In looking at diet quality, lower quality diets were more highly associated with children of parents with less than a high school education. Specifically, adolescents residing in households with parents with less than a high school education were 67% more likely to have a lower quality diet than those with higher education (Goodwin et al., 2006). Overall, multiple studies support the conclusion that children of higher educated parents have better quality diets (Crawford et al., 1995; Cutler et al., 2011; Goodwin et al., 2006; Johnson et al., 2010; Mullie et al., 2009; North & Emmett, 2000; Ohly et al., 2013; Patrick & Nicklas, 2005; Xie et al., 2002).

An additional demographic characteristic that was a significant predictor of functional food usage was parental health. Specifically, participants who self-reported poor/fair overall

health were less likely to include functional foods in their familial dietary practices. In looking at specific health benefits, this group was less likely to feed their child(ren) functional foods with digestion and "other" health benefits. Although this study found that poor/fair overall health was significant, parental BMI was not a significant predictor of the use of functional foods for specific health benefits when feeding their child(ren). Interestingly, researchers have found that disbelief of current weight status among overweight and obese men and women can be classified as a health risk associated with underestimating weight (Gregory, Blanck, Gillespie, Maynard, & Serdula, 2008). Researchers that have conducted comparable studies have found similar results, however, others have found self-reported height and weight to be a valid research measurement (Bolton-Smith, Woodward, Tunstall-Pedoe, & Morrison, 1999; Dekkers, van Wier, Hendriksen, Twisk, & van Mechelen, 2008; Gregory et al., 2008; Kuchler & Variyam, 2003; Nieto-Garcia, Bush, & Keyl, 1990; Paeratakul, White, Williamson, Ryan, & Bray, 2002; Spencer, Appleby, Davey, & Key, 2001). Studies have found that parental overall health status and BMI greatly affect their children's dietary intake; in fact, similar dietary practices have been examined between children and their parents (Acran et al., 2007; Birbilis, Moschonis, Mougios, & Manios, 2013; Kirkpatrick, Dodd, Reedy, & Krebs-Smith, 2012).

In looking at parental diet quality, Laster et al. (2013) found that parental dietary habits have a significant impact on their child's diet quality as well as their overall health status. Gallant et al. (2013) reported that unhealthy familial diet practices strongly impact the dietary habits of children. Thus, if children are being exposed to an ample amount of unhealthy food items, their likeliness of becoming overweight or obese is greatly increased. Similar to the findings of this study, others have found that children of obese parents or those of poor overall health are more likely to become overweight or obese due to shared environments and learned

behaviors such as portion size, eating outside the home, and snacking (Abu-Rmeileh et al., 2008).

Contrary to previous studies that have found that age predicts consumer support for nutrition healthfulness claims and health benefits, increasing consumer likeliness to buy and consume function foods, this study established that parental age is not a significant predictor of parental use of functional foods (Dean et al., 2012). In a study conducted by Mullie et al. (2009), researchers found that there was a significant relationship between functional food consumption and age; however, this relationship was dependent on the type of functional food or functional food nutrient component being discussed. For example, older individuals who were 55 years of age or older were more likely to consume cholesterol-lowering margarines in comparison to individuals of younger age groups (de Jong, Ocke, Branderhorst, & Friele, 2002; Mullie et al., 2009). Due to the rise in disease as people age, older individuals tend to be more receptive to and consume more functional foods in comparison to younger individuals (Herath et al., 2008; Verbeke, 2004). In fact, older individuals place a greater value on the healthfulness of the foods they consume and are more likely to adopt disease preventative dietary habits (Brecic et al., 2014; Childs, 1997; Steptoe, Pollard, & Wardle, 1995).

In this study, parental gender was not a significant predictor in parental use of functional foods in feeding their child(ren), possibly due to the low participation rate of males (7%). This may be due to females conducting a majority of the cooking within the household (Starrels, 1994). Although there was no significance found in parental gender in this study, many know that men and women perceive things differently, in fact, many differences in food preferences have been observed between men and women (Ares & Gambaro, 2007). In a study conducted by Wardle et al. (2004), examining food choice behaviors within a sample of young adults,

researchers concluded that women had significantly stronger beliefs in the importance of a healthful diet in comparison to men. For example, in a research review conducted by Paquette (2005), researchers found that women were more likely than men to include fruit and vegetables into their dietary habits. Similarly, Verbeke (2004) found that women were the main users of functional foods in comparison to men, possibly due to reports of women being increasingly self-conscious about weight (Wardle et al., 2004).

1. Limitations

As with most research studies, there were factors that affected the quality of this study, including miscommunication with school superintendents, duration of the research collection period, inclement weather, and the time taken to complete the survey. In beginning this study, researchers believed that school emails with an embedded survey link would be sent out to parents every Monday throughout the month of February. Unfortunately, the school later communicated that emails could only be sent on February 2, 2015 in the Tupelo Public School District, which may have affected overall participation.

Other limitations included a short collective period and inclement weather. This study was conducted over a one-month period, as agreed upon by the schools. During this time, the state of Mississippi faced inclement weather that affected schedules of both school districts and the timing of research emails being sent to parents. Lastly, the length and time it took the participants to complete the survey appears to have deterred some of the participants from completing the entire survey.

An additional limitation to consider is the utilization of self-reported overall health as well as self-reported height and weight. Researchers conclude that there are many aspects

affecting the accuracy of self-reported height and weight such as unawareness of one's weight, cultural diversity and race, age, gender, education level, and income (Bolton-Smith et al.,1999; Madrigal et al., 2000; Ziebland, Thorogood, Fuller, & Muir, 1996). However, other researchers have proven self-reported health status to be a valid measurement in studies involving anthropometric data (Bowman & Delucia, 1992; Spencer et al., 2001).

2. Conclusion

The current study found that parents' demographics and socioeconomic status affect the likeliness of parental use of functional foods in feeding their child(ren). Although specific trends were not found in the data, isolated variables including parental education, race, marital status, self-reported overall health, and the age of children in their household significantly predicted use of specific functional food benefit categories in feeding their child(ren). Although the findings from this study warrant further investigation into the affects of parental age, gender, and self-reported BMI on the use of functional foods, previous literature has found that parental age and gender affect the use of functional foods in dietary practices. By identifying the affects of these variables, the understanding of parental use of functional foods in familial dietary practices will progress.

In looking at the functional food health benefit categories, parents were likely to feed their child(ren) at least one functional food with heart health benefits (monounsaturated fats, plant sterols, potassium, B vitamins, whole grains, fiber, soy/soy protein, folate or folic acid, and omega-3 fatty acids). However, three of these nutrient components (plant sterols, folate, and soy/soy protein) were among the list of those that were least likely to be consumed. Due to heart disease representing a leading cause of death in the United States, this is of major concern (CDC,

2015). Since food preferences and dietary habits are formed during early childhood and are heavily influenced by parental figures (Ford et al., 2013; Laster et al., 2013; Ohly et al., 2013; Riediger et al., 2007; Skala et al., 2012; Story et al., 2002; Xie et al., 2002), the implementation of school-based nutrition and healthy lifestyle education classes may aid in the reduction of heart disease and other diet-related chronic diseases in the future. With the inclusion of the child(ren)'s parent in the nutrition education classes, healthful familial dietary practices may be adopted.

Research has shown that school-based nutrition education has proven to improve student knowledge and preference for healthful foods (Liquori et al., 1998; Morris & Zidenberg-Cherr, 2002). Some researchers have concluded that the application of nutrition education that implements actual cooking experiences paired with cognitive learning and multiple exposures of healthful food at school and in the home is a favorable approach to nutrition education, especially benefiting younger children (Liquori, Koch, Contento, & Castle, 1998). To further enhance the school-based nutrition education classes, the school could reach out to local registered dietitians to assist in the learning experience of both children and their parents/guardians. By learning about functional foods straight from nutrition experts, children and their parents could gain a better understanding and increase their likeliness to adopt healthful dietary practices for optimal health and the prevention of diet-related chronic disease.

Although this study has filled particular gaps within existing research, additional investigation into parental demographics and socioeconomic status must occur in order to determine further significance. Additionally, the implementation of school-based nutrition education must further be analyzed to determine the likeliness of children to adopt healthful dietary practices that may be observed in the classroom.

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VII. APPENDICES

APPENDIX A: SCHOOL DISTRICT PERMISSION EMAILS

THE UNIVERSITY OF MISSISSIPPI

Lauren Guy <leguy@go.olemiss.edu>

Permissions to conduct research at TPSD

Bishop, Kay M <kmbishop@tupeloschools.com> Mon, Nov 3, 2014 at 3:27 PM
To: Lauren Guy <leguy@go.olemiss.edu>

November 3, 2014

The Tupelo Public School Districts grants Lauren Guy, Peter Weiss, Jordyn Thornton, and Olivia DeLeon to conduct research to our TPSD parents for their thesis.

Kay Bishop, MS

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THE UNIVERSITY OF MISSISSIPPI

Lauren Guy <leguy@go.olemiss.edu>

Permissions to conduct research at TPSD

Bishop, Kay M <kmbishop@tupeloschools.com> Mon, Nov 3, 2014 at 3:27 PM
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APPEDIX B: SURVEY QUESTIONS

1. Do you currently feed your children **this food for that health condition?**

    a. **Antioxidants** (found, for example, in fruits and vegetables, whole grains, dark chocolate, and certain teas and spices) **for protection against free radical damage associated with aging and various chronic diseases.**

    b. **Lycopene** (found, for example, in processed tomato products, such as tomato sauce) **for reduced risk of prostate cancer.**

    c. **Lutein and other carotenoids** (found, for example, in spinach and fortified foods and beverages) **for maintaining eye health.**

    d. **Calcium** (found, for example, in dairy foods such as milk, cheese, yogurt, or in calcium-fortified foods or beverages) **for the promotion of bone health (and for reduced risk of osteoporosis).**

    e. **Monounsaturated fats** (found, for example, in olive oil and nuts) **for reduced risk of heart disease.**

    f. **Plant sterols** (found, for example, in fortified foods and beverages, including table spreads, juices, and yogurt) **for reduced risk of heart disease.**

    g. **Potassium** (found, for example, in fruits, vegetables, and juices) **for reduced risk of high blood pressure and stroke.**

    h. **Prebiotic fiber** (found, for example, in certain fruits, vegetables, and fortified foods) **for maintaining a healthy digestive system.**

    i. **Vitamin D** (found, for example, in fortified foods and beverages, such as dairy products, cereals, and juices) **for the promotion of bone health (and for reduced risk of osteoporosis).**

    j. **Xylitol** (found, for example, in sugar-free chewing gums) **for maintaining oral health.**

    k. **Herbs and spices used to season foods** (for example, cinnamon, red pepper, and oregano) **for reduced risk of chronic diseases and/or weight management.**

l. **B vitamins** (found, for example, in meats, whole grains, vegetables, and nuts) **for reduced risk of heart disease.**

m. **Whole grains** (found, for example, in whole-grain cereals, breads, rice, or pasta) **for reduced risk of heart disease.**

n. **Fiber** (found, for example, in vegetables, fruits, some breads, cereals, and fortified foods and beverages).

i. **Fiber for reduced risk of heart disease.**
ii. **Fiber for weight management and to provide a feeling of fullness.**
iii. **Fiber for maintaining a healthy digestive system.**
iv. **Fiber for reduced risk of cancer.**

o. **Protein** (found, for example, in meat, dairy, beans, nuts, soy, and some fortified foods and beverages).

i. **Protein for weight management and to provide a feeling of fullness.**
ii. **Protein for maintaining optimal health.**

p. **Soy/soy protein** (found, for example, in soy-based products such as meat alternatives, nutritional bars, and beverages, such as soymilk).

i. **Soy/soy protein for reduced risk of cancer.**
ii. **Soy/soy protein for reduced risk of heart disease.**

q. **Folate or folic acid** (found, for example, in fortified grain products and citrus juices).

i. **Folate for reduced risk of brain or spinal cord (neural tube) birth defects.**
ii. **Folate for reduced risk of heart disease.**

r. **Omega-3 fatty acids** (found, for example, in seafood, fish oil, or fortified foods).

i. **Omega-3 fatty acids for reduced risk of heart disease.**
ii. **Omega-3 fatty acids for cognitive development, especially in children.**

s. **Probiotics** (found, for example, in yogurt and other products with beneficial cultures).

i. **Probiotics for maintaining a healthy digestive system.**
ii. **Probiotics for maintaining a healthy immune system.**

2. Which of the following categories includes your age?
    a. 18-24
    b. 25-34
    c. 35-44
    d. 45-54
    e. 55-64
    f. 65-74
    g. 75 +

3. What is the highest level of education you have completed?
    a. Less than high school
    b. Graduated from high school
    c. Some college (no degree)
    d. Associate degree (technical/vocational)
    e. Bachelor degree
    f. Graduate/professional degree

4. Which of the following best describes your race?
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Hispanic/Latino/Spanish
    e. Asian
    f. Native Hawaiian or other Pacific Islander
    g. Other (please specify) _____
    h. Don't know

5. What is your gender?
    a. Male
    b. Female

6. In general, would you say your overall health is …
    a. Poor
    b. Fair
    c. Good
    d. Very good
    e. Excellent
    f. Don't know

7. How much do you weigh? _____ pounds

8. How tall are you? _____ feet _____ inches

9. Which parent or guardian in the household is the main grocery shopper?
    a. Mother/Female Guardian
    b. Father/Male Guardian
    c. Other (please specify) _____

10. What is your marital status?
    a. Single
    b. Married
    c. Divorced
    d. Widowed
    e. Other (please specify) _____

11. Please list the age(s) of the child(ren) 18 years of age or younger currently living in your home.

    _____ _____ _____
    _____ _____ _____

12. Which of the following categories includes your total annual household income?
    a. Less than $35,000
    b. $35,000 to less than $50,000
    c. $50,000 to less than $75,000
    d. $75,000 to less than $100,000
    e. $100,000 to less than $150,000
    f. $150,000 and above
    g. Don’t know

APPENDIX C: FUNCTIONAL FOODS SURVEY FLYER

Parents – we need your help!

The nutritional health of children *today* will impact *the rest of their lives*. With just a few minutes of your time, you can **help us with a graduate study** that may make a difference in improving the health and well being of children in Northern Mississippi and nationwide.

The study focuses on foods that provide health benefits beyond basic nutrition to children in hopes of understanding the affect they have on the health of children in Northern Mississippi.

If you are a parent of a child 18 years of age or younger, please go to the website www.kidsfood.us to participate in our survey. It will only take about 10 minutes to complete.

If you do not have access to a computer or would prefer to complete a paper copy of the survey, please call or text Lauren at (662) 397-5385 with your name and mailing address.

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or irb@olmiss.edu.

In advance, we thank you for your time and participation in our study!

VITA

Olivia DeLeon

Education

B.A. Food, Nutrition, and Dietetics (2009) Concordia College, Moorhead, MN
M.S. Food and Nutrition Services (2015) University of Mississippi, Oxford, MS

Academic/Professional Employment

Graduate assistantship at the National Food Service Management Institute

Honors and Awards

Outstanding Dietetics Student of North Dakota presented by the North Dakota Academy of Nutrition and dietetics

Association Memberships

Academy of Nutrition and Dietetics (2011 – Present)
College and Professional Sports Dietitians Association (2014 – Present)