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Parental Awareness, Consumption And Feeding Practices Of Functional Foods

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PARENTAL AWARENESS, CONSUMPTION, AND FEEDING PRACTICES OF FUNCTIONAL FOODS

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ABSTRACT

Functional foods are believed to improve overall health and well-being and reduce the risk of specific diseases. Research has examined adult awareness and consumption of functional foods. However, research on whether parental awareness and consumption of functional foods results in feeding their children functional foods is lacking. Therefore, this study's objective was to examine relationships between parental awareness and consumption of functional foods, and feeding their children functional foods. Parents of children in two school districts in Mississippi were surveyed (n=202). The section on parental awareness, consumption, and feeding their children consisted of 27 questions featuring 19 functional food components, which were categorized into 6 health benefit categories: heart health, weight health, cancer prevention, digestion health, bone health, and other health. During analysis, parental consumption of functional foods correlated with feeding all functional foods from the six health benefit categories to their children (p<.01). The only health benefit category in which parental awareness was correlated to child feeding was bone health (p<.01). Regarding relationships between consumption and feeding their children specific health benefit categories, heart health (r=.910), other health (r=.898), and cancer prevention (r=.880) had the highest, positive correlations. Findings show that parental consumption of functional foods has a larger effect on feeding children functional foods than awareness of functional foods (awareness, consumption heart β=.076, β=.857, digestion β=.082, β=.743, weight β=.011, β=.783, bone β=.319, β=.545, other β=.027, β=.880, cancer β=.001, β=.880). Dietetic practice should encourage parents to create a family food environment that promotes awareness and consumption of functional foods.

LIST OF ABBREVIATIONS AND SYMBOLS

AAP	American Academy of Pediatrics
DHHS	Department of Health and Human Services
FOP	Front of Package
IFIC	International Food Information Council
SPSS	Statistical Package for the Social Sciences
USDA	United States Department of Agriculture

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CHAPTER I INTRODUCTION

Functional foods are a relatively new term used to describe foods and food components that are believed to improve overall health and well being, reduce the risk of specific diseases, or minimize the effects of other health concerns (Hasler, 2002). Functional foods can be consumed for the prevention of cancer, heart disease, and osteoporosis as well as for the improvement or maintenance of bone health, digestive health, weight management, immunity, and cognitive function (Hasler, 2002; Shahidi, 2004).

In recent decades, it has become increasingly difficult for parents to feed their children healthy. Portion sizes in some ready-to-eat foods have doubled and tripled in size (Young & Nestle, 2002). Additionally, children are consuming between 282 (for girls) and 362 (for boys) average calories from added sugars (Ervin, 2012), which have been associated with cardiovascular disease risk among adolescents (J. A. Welsh, Sharma, Cunningham, & Vos, 2011). There are several other challenges facing families in eating healthy such as busy schedules, socioeconomic factors, and lack of education in cooking and eating healthy foods (Fruh et al., 2013).

However, there are dietary strategies that families can use to improve the health of their family. Some family feeding practices associated with healthy weight children have included eating meals together (Larson et al., 2013) and role modeling of healthy eating by parents (Vanhala, Laitinen, Kaikkonen, Keinänen-Kiukaanniemi, & Korpelainen, 2011), along with providing a healthy food environment such as having fruits and vegetables available at home

(Boles, Scharf, Filigno, Saelens, & Stark, 2013). Parents should also help their children reduce consumption of sugar-sweetened beverages, avoid oversized food portions, make half of every plate fruits and vegetables, choose foods with less sodium, and make half of all grains consumed whole grain (U.S. Department of Agriculture, 2010). Additionally, functional foods may provide a beneficial effect on the health of children and adolescents when consumed along with a varied diet on a regular basis(Academy of Nutrition and Dietetics, 2013).

The health of children is becoming an increasingly important issue in the United States (U.S. Department of Health and Human Services, 2014). Childhood overweight and obesity have increased significantly in the past thirty years. Since 1980, childhood obesity has more than doubled and adolescent obesity has quadrupled (National Center for Health Statistics, 2011). In 2012, more than one third of children and adolescents were overweight or obese (National Center for Health Statistics, 2011), which has a direct impact on children's health. Obese children and adolescents are more likely to be at increased risk for at least one risk factor for cardiovascular disease (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007), type 2 diabetes mellitus(Li, Ford, Zhao, & Mokdad, 2009), and bone problems (Daniels et al., 2005). In the long term, obese children are also likely to become obese adults and thus are at a higher risk of adult health problems related to obesity such as type 2 diabetes mellitus, cardiovascular disease, stroke, and many types of cancer (U.S. Department of Health and Human Services, 2010). The use of functional foods may provide additional support for parents in improving the health of their children.

Therefore, the purpose of this study was to examine parental awareness, consumption, and feeding of functional foods to their children. Another purpose of this study is to identify correlations between parental awareness and consumption of functional foods, and feeding their children functional foods.

CHAPTER II REVIEW OF LITERATURE

Adult Awareness of Functional Foods

Previous research has identified a significant correlation between adult awareness of functional foods and personally eating functional foods (Hoefkens, Verbeke, & Van Camp, 2011; International Food Information Council, 2013). Additionally, more consumers are becoming aware of functional foods and the benefits they provide (Hoefkens et al., 2011). There are various factors that appear to affect an individual's awareness of functional foods with education and health motivation being the most important determinants. Researchers find that consumers with higher levels of education and health motivation are more likely to be aware of functional foods, while persons with low or high health status tend to be less aware of functional foods than persons with an average health status(Bornkessel, Bröring, Omta, & van Trijp, 2014). The use of functional foods is directly linked with a person's awareness of the benefits of the food as well as their perception of their own health status (Cranfield, Henson, & Masakure, 2011); persons that perceive their health as relatively good, but also have concerns about diseases, tend to show a greater tendency towards functional food purchases. Increased awareness has also been shown to affect food-purchasing behavior (Barreiro-Hurlé, Gracia, & de-Magistris, 2010). Additionally, consumers who are more aware of the nutrition benefits of foods are more likely to consume foods that improve their health status (Petrovici & Ritson, 2006).

When consumers are presented with claims about the health benefits on the label of a food, they are more likely to purchase that food over other foods that appear to offer less health benefits (Barreiro-Hurlé et al., 2010). Additionally, consumers that are not nutritionally health aware and do not read nutrition facts labels are still likely to purchase a food after reading a health claim on the nutrition packaging and use that as a means of choosing which foods to purchase. Inversely, consumers that are already health aware are less likely to use health claims as a reason to purchase a particular food over another, but instead tend to follow the nutrition facts label (Barreiro-Hurlé et al., 2010).

Parental Awareness of the Importance of Feeding Their Children Healthy Foods

There is supporting research that links parent's healthy eating behavior with child food intake. For instance, children of parents that use fat substitutions, fruit juice, vegetables, and low fat foods tend to also have lower fat food consumption (Cullen, Lara, & de Moor, 2002). Previous studies note children with higher preferences for fruits and vegetables (FV) ate more FV (Vanhala et al., 2011). Specifically, parents who serve FV for lunch and dinner at home are positively associated with their child's intake of FV (Vanhala et al., 2011). Similarly, in families where vegetables are served at meals at home, almost 90% of children consume vegetables, while only 50% of children in families not serving vegetables consume vegetables (Vanhala et al., 2011). Additional research has found that parental awareness of healthy foods correlates to healthy child feeding practices (Gibson, Wardle, & Watts, 1998). For instance, mothers' nutrition awareness positively and directly correlates with children's consumption of fruit (Gibson et al., 1998).

Previous research has analyzed parental goals of feeding their children healthy foods and whether it relates to actually purchasing healthy foods for their children. Research indicates that parents are more concerned by nutrition issues, are more interested in nutrition information, and tend to have a higher level of nutrition knowledge than non-parents (Barreiro-Hurlé et al., 2010). Other studies show similar results of parents placing importance on healthy feeding of their children (Peters, Parletta, Lynch, & Campbell, 2014; Marquis & Shatenstein, 2005; Gibson et al., 1998). Additionally, parents prioritize feeding their children healthy even when they do not consider feeding themselves healthy food as the most important aspect (Gibson et al., 1998). Inversely, lack of knowledge can be a factor in causing parents to not purchase healthy foods for their children. Hugner and Maher (2006) find that even though parents rated nutrition to be the most important attribute of food for their children, they still purchase unhealthy foods (Hughner & Maher, 2006), and while parents want to feed their children healthy foods, they may be unaware of what makes food healthy or unhealthy (Cranfield et al., 2011).

In light of this, it would seem that it is not only important that parents want to feed their children healthy, but that they also are aware of what makes food healthy. A study by Campbell et al. (2011) found a direct correlation between maternal knowledge of healthy foods and feeding their children those foods, along with making these foods available in their home. Not only does maternal awareness of healthy foods result in feeding children healthy foods, it also fosters a supportive environment to assist the child in being able to consume healthy foods. Along those same lines, Campbell et al. (2013) also found an inverse relationship between maternal knowledge and feeding children salty snacks and soft drinks. Thus, while awareness encourages the benefit of feeding children healthy foods, lack of awareness can promote the feeding of unhealthy foods, being counterproductive to the well being of the child (Campbell et al., 2013).

Parental Awareness of the Importance of Feeding Their Children Functional Foods

Research is rare on parents' awareness of the importance of feeding their children functional foods. For example, a study by Rahmawaty, Charlton, Lyons-Wall, and Meyer (2013) that surveyed parents of young children finds that health benefit is the strongest factor positively associated with parents feeding their children foods containing omega-3 fatty acids. The researchers also find that the influence of family members is a major determinant in whether the family consumes fish products, finding that a parent may be more inclined to consume fish if they are aware of the health benefits.

Another functional food that parents are aware of is calcium. Increased parental awareness of the benefits of calcium is associated with increased parental consumption of calcium (Reicks et al., 2011). Parents aware of the health benefits of calcium tend to make calcium rich foods available for their child and feed their child calcium rich foods in order to improve their child's short and long term health (Richards et al., 2014). Alternatively, personal concern over adequacy of calcium intake is associated with a lower consumption by parents. This may be due to not consuming enough calcium, thus being concerned about calcium intake (Reicks et al., 2011).

However the literature does not show that parents are aware of the term "functional foods" or aware of which foods have specific functional attributes, as well as the role functional foods play in benefiting a child's nutritional status. While, awareness of healthy foods as well as the role of healthy foods in preventing diseases correlates to feeding children healthy foods. One study (Gibson et al., 1998) identifies a lack of maternal knowledge about the consumption of fruits and vegetables for preventing heart disease, tooth decay, cancer, and acne. Mothers participating in the study identify the importance of eating healthy, but were unaware of the

connection between eating healthy and disease prevention. Thus, they did not purposely feed their children specific foods in preventing future diseases (Gibson et al., 1998). However, when mothers were concerned about their child's risk of heart disease or cancer, the child tended to eat more fruit, but not vegetables, due to a lack of awareness that vegetables could decrease the risk of cancer and heart disease (Gibson et al., 1998). One study found a direct correlation between parent's education level and child's fat intake (Cullen et al., 2002).

Relationship Between Parental Consumption and Child Consumption

While parental awareness of healthy foods may increase feeding their children healthy foods, parents' consumption of healthy foods also affects feeding children healthy foods like fruits and vegetables. Research supports the notion that parental role modeling is an effective strategy to help children maintain a healthy weight; parents with healthy eating and exercise practices as well as being able to implement changes to their diet are more likely to have children with healthy weight (Stevens, 2010). Researchers find a direct correlation between parental consumption of fruits and vegetables and child consumption of fruits and vegetables (Gibson et al., 1998; Orlet Fisher, Mitchell, Wright, & Birch, 2002; Rodenburg, Oenema, Kremers, & van de Mheen, 2012). Additionally, the preference of food by the parent tends to affect the contents of the dinner meal for families that eat meals together (Lv & Brown, 2010).

Therefore, the purpose of this study is to examine parental awareness and consumption of functional foods and their relationship to feeding their children functional foods. Specific research questions are: 1. What functional foods are parents aware of? 2. What functional foods are parents consuming? 3. What functional foods are parents feeding their children?

In addition, the study seeks to understand if there are relationships between parental awareness and consumption of functional foods, and feeding their children functional foods.

CHAPTER III METHODS

Research Design

A quantitative analytical cross-sectional study design was used to conduct research on the relationship of parents' awareness, consumption and feeding habits to their children of functional foods. The Institutional Review Board (IRB) from the University of Mississippi approved the research protocol.

Study Participants

Participants in this study were at least 18 years of age and a parent or guardian of (a) child(ren) 18 years of age or younger attending school at one of two school districts in Mississippi. The names of the schools or school districts are not provided in order to ensure anonymity. Based on the school districts' internal records, parents of 6,306 students were available to participate in the study.

Procedures

To recruit participants into the study, a flyer (Appendix A) was created to solicit parents. The flyer included the purpose of the survey, the names of the researchers, and the approval information from the Institutional Review Board. The flyer also contained the web address (http://www.kidsfood.us) for parents to be able to take the online survey through Qualtrics (Qualtrics Survey Solutions, 2015). Students at one school were asked to take the flyer home to their parents due to specific school requirements. All other schools were sent an email

solicitation by the school directly to the parent's email address. The flyer encouraged participants that lacked Internet access to use a local library. It also gave the option to have a paper survey mailed to them. Additionally, the flyer contained a statement asking that only one survey per household be completed.

Additionally, the research team attended school sporting events and parent teacher organization events and handed out flyers encouraging parents to complete paper surveys at the events. The research team sat at a table and chairs at the events near the entrance to the building were able to solicit to parents attending the events. The research team members solicited parents by saying "Hi, my name is _____, do you have 10 to 15 minutes available to take a survey helping graduate students from the University of Mississippi conduct research for a thesis on Functional Foods." The participants had the option of choosing a paper survey (Appendix B) or a flyer with the link to the web address for the online survey. At the end of taking the survey, the participant was thanked for their participation. Participant confidentiality was maintained throughout the study. Any incomplete surveys were discarded and eliminated from the study.

Survey Instrument

The instrument chosen for conducting the research study was a quantitative survey composed of questions from the 2009 and 2013 International Food Information Council surveys (IFIC, 2009, 2013). The survey was composed of four main sections: attitude, concern, and knowledge of nutrition and functional foods; awareness and usage of functional foods; barriers toward functional foods; and demographic questions. This study utilized the section on awareness, consumption and feeding practices of functional foods. At the beginning of the survey, two "yes" or "no" screener questions were asked: "I am 18 years of age or older" and "I

am a parent/guardian of child(ren) 18 years of age or younger currently living in my home." If the person answered "yes" to both screener questions, they were directed to continue the survey. If they answered "no" to either question, they were asked to discontinue the survey.

A pilot study using 12 participants was conducted from July 2 to August 28, 2014 in order to determine any issues in the instrument and the average time it took to complete the survey. Based on the pilot test, small corrections in some questions for improved readability were identified and corrected.

Study Variables

The functional food variables pertinent to this study were contained in Question 4 of the survey (see Appendix B), which included three parts regarding awareness and usage of functional foods: 1) Are you aware of the relationship between this food and this health condition? 2) Do you already eat this food for that health condition? 3) Do you currently feed your children this food for that health condition? Within Question 4, for each of the 3 questions, there was a list of 19 functional food components for the participant's response: antioxidants, lycopene, lutein and carotenoids, calcium, monounsaturated fats, plant sterols, potassium, prebiotic fiber, vitamin D, xylitol, herbs and spices, B vitamins, whole grains, fiber, protein, soy, folate or folic acid, Omega-3 fatty acids, and prebiotics. Some of the functional food components provided multiple health benefits (i.e. protein for weight management and for optimal health); therefore, the 19 functional foods comprised a total of 27 questions. The variables for awareness, consumption, and feeding were all dichotomous scale. The grouped variables according to health benefit category were continuous scale.

Analysis

The data was downloaded from Qualtrics and entered for statistical analysis into the Statistical Package for the Social Sciences (SPSS) version 22(IBM, 2013). Data from the 27 functional food components was sorted into six health benefit categories: digestion health, heart health, cancer, weight health, bone health, and other health (*see* Table 1). In order to sort the 27 functional food components into the health benefit categories, participant responses for each functional food components were added together according to the health benefit category that they pertained to (i.e. fiber for heart health). The combined responses were then divided by the number of components in the category and then multiplied by 100 to give a percentage. Descriptive analysis was conducted on the 27 functional food components and the six health benefit categories. Percentages for parental awareness, consumption, and feeding their children functional food components were determined according to the number of "yes" responses from columns A, B, and C of Question 4 (*see* tables 3 and 4). Simple linear regressions were used to analyze the affect of respondents' awareness on consumption of functional foods across each of the six health benefit categories. Parental awareness of functional foods according to health benefit category was the independent variable and parental consumption of functional foods was the dependent variable for the simple linear regressions. Multiple linear regressions were then used to analyze how parental awareness and consumption of functional foods affects feeding their children across each of the health benefit categories. Parental awareness and consumption of functional foods according to health benefit category were the independent variables, and parental feeding of functional foods to their children was the dependent variable for the multiple linear regressions.

Table 1
Health Benefit Categories by Functional Food Components

Health Benefit Categories	Functional Food Components
Digestion Health	• Prebiotic fiber • Fiber • Probiotics
Heart Health	• 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 Health	• Herbs and spices • Fiber • Protein
Bone Health	• Calcium • Vitamin D
Other Health	• Lutein and other carotenoids • Xylitol • Folate or folic acid • Omega-3 fatty acids • Probiotics • Herbs and spices • Protein

CHAPTER IV RESULTS

Data Screening

A total of 394 participants either partially or completely filled out the survey. After cleaning the data for incomplete answers and unusable surveys, 202 respondents were usable for analysis. Many (48.73%) of the surveys were eliminated from the analysis because they did not complete the entire question on awareness, consumption or use of functional foods, which required responding to 27 functions of foods.

Sample Profile

Table 2 lists the demographics of the participants based on those who responded to all three parts of question 4. The largest age group was 45 years of age or older (35.6%); over 61% of participants reported having a college degree, and 85.7% were female. Additionally, over 78% of participants were married. Nearly half (49.2%) of participants reported their health as being very good or excellent. A small number of respondents ($\leq$ 6.9%) who completed questions 4 chose not to answer some of the demographic questions but were included in the study.

Table 2 Characteristics of Survey Respondents (N=202)

Variable	N	%
Age		
18-34	48	23.8
35-44	69	34.2
45 or older	72	35.6
Incomplete responses	13	6.4
Education		
≤ High School	7	3.5
Some College or Associates Degree	57	28.2
College Degree	125	61.9
Incomplete responses	13	6.4
Race		
White	157	77.7
Black	26	12.9
Other	5	2.5
Incomplete responses	14	6.9
Gender		
Male	15	7.4
Female	173	85.7
Incomplete responses	14	6.9
Marital Status		
Single	38	18.8
Married	151	74.8
Incomplete responses	13	6.4
Overall Health		
Poor/Fair	30	14.9
Good	66	32.7
Very Good/Excellent	93	46.0
Incomplete responses	13	6.4
School District		
School District A	71	35.2
School District B	118	58.4
Incomplete responses	13	6.4

Functional Food Components

A descriptive analysis of parental awareness and consumption of functional food components, and parents feeding their children functional food components are listed in Table 3. The functional food components parents were most aware of were calcium for bone health, fiber for digestive health, probiotics for digestive health, protein for weight health, whole grains for

heart health, and omega-3 fatty acids for heart health. The functional food components that parents consumed the most were calcium for bone health, protein for maintaining optimal health (other health), protein for weight health, fiber for digestive health, vitamin D for bone health, and monounsaturated fats for heart health. The functional food components that parents fed their children the most were calcium for bone health, vitamin D for bone health, protein for maintaining optimal health (other health), whole grains for heart health, fiber for digestive health, and fiber for heart health.

Table 3
Comparison by Percentages of Highest Levels of Functional Food Components by Parental Awareness, Parental Consumption, and Feeding Their Children

Parental Awareness		**Parental Consumption**		**Parental Feeding to Their Children**	
Calcium Bone Health	98%	Calcium Bone Health	91 %	Calcium Bone Health	95%
Fiber Digestion Health	91%	Protein Optimal Health (Other Health)	85%	Vitamin D Bone Health	86%
Probiotics Digestion Health	90%	Protein Weight Health	84%	Protein Optimal Health (Other Health)	83%
Protein Weight Health	89%	Fiber Digestion Health	84%	Whole Grains Heart Health	78%
Whole Grains Heart Health	88%	Vitamin D Bone Health	84%	Fiber Digestion Health	77%
Omega-3 Heart Health	88%	Monounsaturated Fats Heart Health	80 %	Fiber Heart Health	76%

A descriptive analysis featuring functional food components parents were least aware of and consumed the least, along with functional foods parents fed the least to their children are listed in Table 4. The functional food components that parents were least aware of were lycopene for prostate cancer, plant sterols for heart health, soy/soy protein for heart health, soy/soy protein for cancer, folate for heart health, and xylitol for oral health (other health). The functional foods that parents least consumed were soy/soy protein for heart health, soy/soy protein for cancer, xylitol for oral health (other health), lycopene for prostate cancer, and folate for heart health. The functional foods that parents fed to their children the least were for health benefits for soy/soy

protein for heart health, soy/soy protein for cancer, xylitol for oral health (other health), plant sterols for heart health, and folate for birth defects (other health).

Table 4
Comparison by Percentages of Lowest Levels of Functional Food Components by Parental Awareness, Parental Consumption, and Feeding to Their Children Functional Food Components

Parental Awareness		**Parental Consumption**		**Parental Feeding to Their Children**	
Lycopene Prostate Cancer	38%	Soy Heart Health	25 %	Soy Heart Health	19%
Plant Sterols Heart Health	39%	Soy Cancer Prevention	26%	Soy Cancer Prevention	23%
Soy Heart Health	40%	Xylitol Oral Health (Other)	38%	Xylitol Oral Health (Other Health)	34%
Soy Cancer Prevention	40%	Lycopene Prostate Cancer	38%	Lycopene Prostate Cancer	36%
Folate Heart Health	45%	Plant Sterols Heart Health	44%	Plant Sterols Heart Health	43%
Xylitol Oral Health (Other)	49%	Folate Heart Health	45 %	Folate Birth Defects (Other Health)	43%

A descriptive analysis of the health benefit categories (*see* Table 5) shows the dispersion of responses by parents regarding feeding their children functional foods. The responses ranged from 0, indicating not feeding that functional food component, to 1, indicating awareness of the functional food component based on its health benefit category. The health benefit category that most parents were aware of its functional food components was Bone Health (184 parents, 91.1%). The health benefit category with the second highest response of parental awareness of its functional food components was digestion health (149 parents, 73.8%). The lowest response for parental awareness of a health benefit category based on its functional food components was the heart health category with 35 parents (17.3%). Health benefit categories in which the most parents were not aware of any of its food components were cancer (25 parents, 12.4%) and weight health (11 parents, 5.4%).

Table 5
Descriptive Statistics of Parental Awareness Based on Functional Food Health Benefit Category (0=No, 1=Yes)

Health Benefit Category	*Number of Food Components in Category*	*Frequency*	*(%)*	*Mean*
Bone Health	0	4	2.0	.946
	1	14	6.9	
	2	184	91.1	
Digestion Health	0	10	5.0	.865
	1	9	4.5	
	2	34	16.8	
	3	149	73.8	
Heart Health	0	5	2.5	.690
	1-4	32	15.9	
	5-8	130	64.4	
	9	35	17.3	
Weight Health	0	11	5.4	.759
	1	23	11.4	
	2	67	33.2	
	3	101	50.0	
Other Health	0	5	2.5	.679
	1-2	31	15.3	
	3-4	34	16.8	
	5-6	92	45.6	
	7	40	19.8	
Cancer	0	25	12.4	.522
	1	48	23.8	
	2	52	25.7	
	3	38	18.8	
	4	39	19.3	

Note: Health Benefit Categories Other and Heart use averaged results from grouped answers. Heart Health consists of 9 functional food components and Other consists of 7 functional food components.

A descriptive analysis of the health benefit categories (*see* Table 6) shows the dispersion of responses by parents regarding parental consumption of functional foods. Categorized by health benefit category, the responses ranged from 0, indicating no consumption of the functional food component, to 1, indicating consuming that functional food component. The health benefit category in which most parents consumed all functional food components for their benefits was bone health (165 parents, 81.7%), followed by digestion health (122 parents, 60.4%).

The health benefit categories in which the most parents did not consume any of the food components were cancer (38 parents, 18.8%) and Weight (23 parents, 11.4%).

Table 6
Descriptive Statistics of Parental Consumption Based on Functional Food Health Benefit Category (0=No, 1=Yes)

Health Benefit Category	*Number of Food Components in Category*	*Frequency*	*(%)*	*Mean*
Bone Health	0	14	6.9	.874
	1	23	11.4	
	2	165	81.7	
Digestion Health	0	16	7.9	.786
	1	18	8.9	
	2	46	22.8	
	3	122	60.4	
Heart Health	0	16	7.9	.634
	1-4	37	18.3	
	5-8	122	60.4	
	9	27	13.4	
Weight Health	0	23	11.4	.690
	1	30	14.9	
	2	59	29.2	
	3	90	44.6	
Other Health	0	11	5.4	.585
	1-2	53	26.2	
	3-4	34	16.8	
	5-6	76	37.7	
	7	28	19.8	
Cancer	0	38	18.8	.472
	1	45	22.3	
	2	47	23.3	
	3	46	22.8	
	4	26	12.9	

Note: Health Benefit Categories Other and Heart use averaged results from grouped answers. Heart Health consists of 9 functional food components and Other consists of 7 functional food components.

A descriptive analysis of the health benefit categories (displayed in Table 7) shows the dispersion of responses by parents regarding feeding their children functional foods. The responses ranged from 0, indicating feeding no functional foods to their children, to 1, indicating feeding all functional food components of that health benefit category to their children. The health benefit category the largest majority of parents fed all functional food components to their children was bone health (171 parents, 84.7%), followed by the second highest health benefit category, digestion health (105 parents, 52%). The lowest response for a health benefit category for parents feeding their children functional food components to their children was both the heart health and other health categories with 10.4% of the parents each.

The health benefit categories in which the most parents did not feed any of the food components to their children were cancer (47 parents, 23.3%) and weight health (34 parents, 16.8%).

Table 7
Descriptive Statistics of Parental Feeding Based on Functional Food Health Benefit Category (0=No, 1=Yes)

Health Benefit Category	*Number of Food Components in Category*	*Frequency*	*(%)*	*Mean*
Bone Health	0	8	4.0	.904
	1	23	11.4	
	2	171	84.7	
Digestion Health	0	23	11.4	.720
	1	27	13.4	
	2	47	23.3	
	3	105	52.0	
Heart Health	0	17	8.4	.594
	1-4	47	23.2	
	5-8	117	58.0	
	9	21	10.4	
Weight Health	0	34	16.8	.586
	1	47	23.3	
	2	55	27.2	
	3	66	32.7	
Other Health	0	14	6.9	.540
	1-2	57	28.2	
	3-4	41	20.3	
	5-6	69	34.2	
	7	21	10.4	
Cancer Health	0	47	23.3	.434
	1	46	22.8	
	2	48	23.8	
	3	46	22.8	
	4	26	12.9	

Note: Health Benefit Categories Other and Heart use averaged results from grouped answers. Heart Health consists of 9 functional food components and Other consists of 7 functional food components.

Parental Awareness and Consumption of Functional Foods by Health Benefit Categories

A linear regression analysis was conducted with awareness of functional foods categorized by health benefit category as the independent variable and parental consumption of functional foods categorized by the health benefit categories as the dependent variable. The results are provided in Table 8. The regression found that parental awareness of functional foods benefiting heart health, other health, cancer, digestion health, weight health, and bone health was

a statistically significant predictor of parents consuming functional foods related to those food groups. The consumption of functional food health benefit categories that had the highest strength of relationship with parental functional food awareness (from strongest to least) were heart health, weight health, other health, cancer, digestion health, and bone health. Regarding correlation of parental awareness to parental consumption of functional foods based on the food categories, bone health had the lowest positive correlation while heart health, other health, cancer, digestion health, and weight health had moderately positive correlations.

Table 8

Linear Regression of Parental Awareness and Consumption of Functional Foods by Health Benefit Categories

		Heart Consumption	Digestion Consumption	Weight Consumption	Bone Consumption	Other Consumption	Cancer Consumption
Heart Awareness	*B*	0.792	-	-	-	-	-
	SE	(0.061)***					
	β	0.679					
Digestion Awareness	*B*	-	0.712	-	-	-	-
	SE		(0.067)***				
	β		0.604				
Weight Awareness	*B*	-	-	0.765	-	-	-
	SE			(0.062)***			
	β			0.657			
Bone Awareness	*B*	-	-	-	0.486	-	-
	SE				(0.104)***		
	β				0.314		
Other Awareness	*B*	-	-	-	-	0.697	-
	SE					(0.060)***	
	β					0.636	
Cancer Awareness	*B*	-	-	-	-	-	0.631
	SE						(0.055)***
	β						0.629
Constant		9.062	17.149	11.237	41.345***	11.373	14.355***
R^2		0.461	0.365	0.431	0.099	0.405	0.396
F(***)		170.208***	114.269***	150.806***	21.811***	135.303***	130.522***

Note: * p < .05, ** p < .01, *** p < .001

Parental Awareness and Consumption to Feeding Their Children Functional Foods by Health Benefit Category

A multiple regression analysis was conducted with parental awareness and consumption as the independent variables and parents feeding their children functional foods components according to its health benefit category as the dependent variable. The results are provided in Table 9. The regression established that parental awareness of functional foods benefiting heart health, other health, cancer, digestion health, and weight health had no statistically significant correlation with feeding their children those foods when parental consumption was controlled for. However, in the bone health category, parental awareness of functional foods was a significant determinant of feeding children those foods even when parental consumption was controlled for. For bone health, parental awareness (β=0.319) contributed less than parental consumption (β=0.545) to feeding children functional foods.

The regression established that parental consumption of functional foods benefiting heart health, other health, cancer, digestion health, weight health, and bone health was a statistically significant predictor of parents feeding their children functional foods related to those food groups. The functional food health benefit categories that had the highest strength of relationship with parental functional food awareness/consumption and feeding their children functional foods (from strongest to weakest) were heart health, other health, cancer, digestion health, weight health, and lastly bone health. Regarding correlations of parental awareness/consumption to feeding their children functional foods by health benefit categories, heart health had the highest positive correlation (r=0.910), and digestion health, cancer, weight health, other health, and bone health had high positive correlations.

Lastly, parental consumption was the major influence of feeding their children in all health benefit categories, except for bone health, for which both parental awareness and consumption mattered.

Table 9

Multiple Regression of Parental Awareness and Consumption to Feeding Functional Foods by Health Benefit Categories

	B	*SE*	*β*	Constant	R^2	*F*
Heart						
Awareness	0.093	0.049	0.076	-3.9523	0.828	475.882
Consumption	0.899	0.042***	0.857			
Digestion						
Awareness	0.107	0.071	0.082	-2.338	0.632	170.330
Consumption	0.828	0.060***	0.743			
Weight						
Awareness	0.013	0.072	0.011	0.125	0.624	164.335
Consumption	0.833	0.061***	0.783			
Bone						
Awareness	0.418	0.069***	0.319	10.468	0.508	102.087
Consumption	0.462	0.045***	0.545			
Other						
Awareness	0.029	0.044	0.027	1.608	0.806	410.908
Consumption	0.861	0.040***	0.880			
Cancer						
Awareness	0.001	0.044	0.001	0.985	0.775	341.056
Consumption	0.899	0.044***	0.880			

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

CHAPTER V DISCUSSION

The purpose of this study was to identify parental awareness and consumption of functional foods and their effect on feeding their children those foods. Functional foods is a term used to describe foods and food components that are believed to improve overall health and well-being, reduce the risk of specific diseases, or minimize the effects of other health concerns(Hasler, 2002). This study examined parents' awareness, consumption, and feeding their children functional food components. During the analysis, the functional food components were grouped into six health benefit categories according to the benefits provided by consuming those functional foods. These categories were cancer prevention, bone health, heart health, weight health, digestion health, and other health.

Parental Awareness

Previous studies have found correlations between adult awareness and personal consumption of functional foods (Bornkessel et al., 2014; Chen, 2011; International Food Information Council, 2013). This study appears to be unique in identifying and analyzing parental awareness and consumption of functional foods, and whether they are related to parents feeding their children functional foods. Understanding how parents feed their children is important in understanding ways they can impact healthy eating in their children, along with behaviors related to their children's unhealthy eating.

There are many possible factors that may affect a parent's awareness of the health benefits of individual food components. In this study, when examining functional foods based on their health benefits, it was found that most parents were aware of foods related to bone health,

followed by digestion health, weight health, heart health, other health, and cancer prevention; however, awareness varied depending upon the health benefit category. The higher awareness by parents of functional foods related to bone health might be due to the importance placed on the healthy growth of children by pediatricians, government health agencies, and food manufacturers as well as the broad understanding of the important role bone health plays in children's growth.

The results from this study suggest a positive relationship between parental awareness of bone health and feeding functional foods that provide bone health to their children, most likely due to a strong concern by parents for the development of healthy bones in their children. Bone health directly involves calcium-rich foods and vitamin D, which was found to have high parental awareness. While the research literature is lacking regarding parent's awareness of calcium and vitamin D specifically, $23 million dollars per year have been spent in advertising (Holt, 2002) featuring the benefits of calcium and vitamin D through the "Got Milk" campaign, which is now the "Milk Life" campaign ("Milk Life," n.d.). These campaigns have continuously promoted milk and the health benefits associated with calcium and vitamin D intake for 23 years(Holt, 2002). Another notable campaign to increase consumer awareness of functional foods has been the "Pork, the other white meat" campaign, which started in 1997 to advertise pork as a lean healthy alternative to chicken and beef (Resurreccion, 2004). Parental awareness regarding the healthy growth of their children can be seen in initiatives by leading governmental organizations, such as the United States Department of Agriculture (USDA), Department of Health and Human Services, and Department of Food and Nutrition Services ("Home | Nutrition.gov," n.d.; United States Department of Agriculture, 2015; U.S. Department of Health and Human Services, 2014), to promote healthy eating to the public. Other forms of health promotion can be educational handouts and pamphlets for programs such as the Supplemental

Nutrition Assistance Program or the Women Infants and Children program. The USDA has also been a source of healthy nutrition information using the food pyramid and more recently "MyPlate" (United States Department of Agriculture, 2015). Recent research has found that nearly two in three Americans recognize the "MyPlate" infographic, with four in ten Americans knowing something about it("The 2015 Food & Health Survey: Consumer Attitudes toward Food Safety, Nutrition & Health," n.d.).

While food manufacturers and United States governmental organizations have played an active role in parental awareness of healthy foods, another source of information has been from pediatricians and the American Academy of Pediatrics, which enacted dietary recommendations that encouraged educating parents and children on eating healthy(Gidding et al., 2006). Such recommendations include guidelines for low-fat dairy consumption, and pediatricians discussing the health benefits of calcium to parents during checkups. The initiatives by the American Academy of Pediatrics are important because recent research has found that most consumers trust nutritional advice from medical professionals, followed by friends and family and government agencies. While, it is important to note that food manufacturers are the least trusted source of nutritional information ("The 2015 Food & Health Survey: Consumer Attitudes toward Food Safety, Nutrition & Health," n.d.).

Food manufacturers have several strategies that may influence parents' awareness of healthy foods. One such strategy is the use of health claims on food packages, which has been shown to drive consumers' awareness of foods' health benefits (Barreiro-Hurlé et al., 2010). Parents pay attention to front-of-package advertisements of health claims and purchase food accordingly (Dixon et al., 2014). However, this research found that while parents are aware of the health benefits of many functional foods, awareness did not correlate to feeding children

those foods. One possible explanation is that parents believe FOP labeling is misleading and/or confusing. Symbols and pictures used in FOP labeling can be misleading in making a food appear as if it is healthier than it is. Research has shown that there is no connection between FOP symbols and the health content of the food (Emrich, Qi, Cohen, Lou, & L'Abbe, 2015). Additionally, research has found that parents can be influenced by FOP pictures such as pictures of fruit and/or vegetables and associate them with healthy food even though the food is not healthy (Abrams, Evans, & Duff, 2015). For example, a box of gummy snacks may have a picture of fruits on the FOP while having no fruit in the food. Foods manufacturers also tend to include "health benefit" messaging like "Now helps support your child's immunity" on the front label of the food item to help influence consumers to purchase those foods(Barreiro-Hurlé et al., 2010; Harris, Thompson, Schwartz, & Brownell, 2011). The Food and Drug Administration provides regulation on the inclusion of health claims on food packages (Nutrition, n.d.). Research has shown that while FOPs may advertise the health benefits of children's cereals, those cereals typically contain 85% more sugar and 65% less fiber than cereals marketed to adults, misleading parents to purchase those cereals for their children (Harris et al., 2011). Alternatively, where there have been claims of unhealthiness of a food, parents were more likely to look at the nutrition facts panel to gather information and choose an alternate food that was healthier (Dixon et al., 2014). An additional challenge when purchasing foods is that parents can become overwhelmed when trying to determine which foods are healthy because of information overload in which there is too much information for the parent to process to determine if the product is healthy(Nørgaard & Brunsø, 2009). This may be a barrier of parents that are aware of functional food benefits, but have a hard time determining which foods provide those benefits.

When it comes to parental awareness of individual functional food components, there were no statistically significant correlations between awareness of functional food components and feeding functional foods to their children, except for calcium and vitamin D for bone health. Soy was consistently the functional food least fed to children for health benefits, which compares with studies on adults reporting they are not aware of the health benefits of soy/soy protein, and state it is the functional food component they least consume ("2009 Functional Foods/Foods For Health Consumer Trending Survey Executive Summary," n.d.).

Parental Consumption to Feeding Their Children Functional Foods

The results from this research suggest that parental consumption of functional foods is a strong predictor of feeding children functional foods; stronger than parental awareness. A strong correlation was found across the six health benefit categories. This is supported by previous studies that have found several factors that affect how parents feed their children through their own consumption, which includes parental role modeling, family meal frequency, home food environment, parental cooking self-efficacy, and food purchasing behavior (Boutelle, Cafri, & Crow, 2012; Dickens & Ogden, 2014; Draxten, Fulkerson, Friend, Flattum, & Schow; Hughner & Maher, 2006; James, Matsangas, & Connelly, 2013; Kegler et al., 2016; Kiefner-Burmeister, Hoffmann, Meers, Koball, & Musher-Eizenman, 2014; Loth, MacLehose, Larson, Berge, & Neumark-Sztainer, 2016; Militello, Melnyk, Hekler, Small, & Jacobson, 2015; Moreira, Moreira, & Fiates, 2015; Morin, Demers, Turcotte, & Mongeau, 2013; Nansel et al., 2013; Pedersen, Grønhøj, & Thøgersen, 2015; Trofholz, Tate, Draxten, Neumark-Sztainer, & Berge, 2016; Wellard et al., 2014; E. M. Welsh, French, & Wall, 2011; Wingert, Zachary, Fox, Gittelsohn, & Surkan, 2014).

One of the most direct factors affecting how parents feed their children is parental role modeling, which involves feeding children the same foods the parents eat (Draxten et al.; Loth et al., 2016; Nansel et al., 2013b). Parental role modeling of healthy foods consists of parents consuming healthy foods and emphasizing the importance of those foods to their children. Along with parental role modeling, research has also shown that higher family meal frequency was associated with increased feeding fruits and vegetables to children (E. M. Welsh et al., 2011). Thus, if parents eat healthy foods in front of their children and place importance on eating healthy, they will also feed their children those foods, playing such an important role in child feeding that it even impacts children's food choices into adulthood (Dickens & Ogden, 2014). In contrast, studies have found that children whose parents follow unhealthy eating practices are more likely to be fed unhealthy foods, even though their parents reported healthy feeding goals (Hughner & Maher, 2006; Kiefner-Burmeister et al., 2014). The results from this study emphasize that parents consuming functional foods themselves are more likely to feed functional foods to their children than parents just aware of the benefits of functional foods. Hughner et al realized the same implications that awareness does not result in feeding practices. This appears to be due to the fact that parents control the home food environment, which determines the foods that are readily available for meals and snacks (Kegler et al., 2014).

The home food environment can be considered a major factor affecting parental feeding practices. The home food environment involves all types of foods that are both readily available to eat as well as available to cook (Loth et al., 2016). Additionally, parents offering and feeding children healthy meals and snacks throughout the day is a mediator of the home environment that influences child consumption of those foods (Wyse, Wolfenden, & Bisquera, 2015). If healthy foods are readily available at home, parents are more likely to feed their children those foods and

less likely to feed unhealthy foods (Loth et al., 2016; Trofholz et al., 2016). The home food environment also supports positive parental role modeling with parents eating functional foods in front of their children. If a parent is consistently consuming and emphasizing healthy foods during meals and snack time, then the home food environment becomes one consisting of readily available healthy foods (Kegler et al., 2016).

There are other factors that play a role in creating a healthy food home environment. One such factor is parents' self-efficacy in cooking healthy foods so that they purchase those foods to begin with (Morin et al., 2013). Research has shown that parents' who feel confident in their cooking skills are more likely to purchase healthy foods at grocery stores and cook at home as opposed to purchasing fast food or home-style meals away from home (Morin et al., 2013). Additionally, parents' cooking self-efficacy is directly related to the number of meals cooked at home, having a direct impact on family meal frequency and opportunities for the parent to be a role model for eating healthy meals. This reiterates the importance of parental functional food consumption affecting feeding their children functional foods, as was found in this study. Cooking self-efficacy also affects parents' food purchasing behavior, which can have a major impact on parental feeding of children as well. This is another factor that supports this study's finding that parental consumption of functional foods is a better predictor of feeding children those foods than parental awareness of functional foods.

Grocery store food purchases have an affect on home food environment, parental role modeling, and frequency of meals consumed at home. In order to create a healthy home food environment with available functional foods, those foods must first be purchased at the grocery store. Research has shown a direct positive correlation between healthy food purchases from grocery stores and fruit and vegetable consumption by parents(Moreira, Moreira, & Fiates,

2015b). Therefore, purchasing functional foods should increase the consumption of those foods by parents, which was shown in this study to increase feeding their children functional foods. When parents allow their children to make decision on foods to purchase at grocery stores, the food is less likely to be healthy (Wingert et al., 2014). Research has also shown that when children are allowed to choose for themselves which food they eat at fast food restaurants, the energy density of the food is higher than when the parents choose for them(Wellard et al., 2014). If parents are purchasing healthy foods and cooking them at home, then the family is also increasing family meal frequency and opportunities for parental role modeling of healthy foods. Therefore, when the home food environment, family meal frequency, and parental role modeling are supported by parents purchasing and consuming healthy food for their family, then most likely their children are fed those foods. This is supported by findings from this study; parents' consumption of functional foods is related to feeding children those foods. Each of the factors of parental role modeling, family meal frequency, cooking self-efficacy, food purchases, and home food environment affect parental consumption of foods, which also affects their child being fed those foods. It is important to note that each factor is related to the other factors and they can each have a positive or negative effect on one another. And, this study found that functional food awareness is not correlated with feeding children functional foods except for foods related to bone health. The key to increasing parental feeding of functional foods to their children is to increase parental consumption of functional foods.

This study found a strong association between parental consumption and feeding their children function food components among all six of the health benefit categories. The strongest relationship in the six health benefit categories was heart health, followed in order by other health, cancer, digestion health, weight health, and bone health. Bone health was the only health

benefit category in which parents fed their children those functional foods more than they personally consumed them. Parents appear to be more motivated to feed their children foods that provide health benefits for bone health, while not being as concerned about the function of those foods for themselves.

Lastly, parents' involvement in the type of food they feed their children cannot be overstated. Research has shown that weight loss interventions that involve parents' behavior change have a direct impact on feeding children and weight change (Boutelle et al., 2012). Research has also shown that parents are a stronger influence compared to friends when it comes to determining what children eat (Pedersen et al., 2015). This studies parental consumption findings would support research that has found that children are more affected by parents' actions of eating healthy foods than parents' verbal recommendations to eat healthy foods (Pedersen et al., 2015). Research has also shown a direct relationship between parental weight status and child weight status, supporting the notion that parent food consumption directly affects what parents feed their children (James et al., 2013). Lastly, parents' self-efficacy in their ability to make healthy choices was related to making healthier food choices(Militello et al., 2015). Parental self-efficacy affects food-purchasing behavior, which affects the home food environment. The home food environment supports family meal frequency allowing for increased parental role modeling concluding with parents increased feeding of functional foods to their children.

Limitations

While the results from this study are beneficial in increasing mindfulness of the importance of parents' awareness and consumption of functional foods, and their affect on

children being fed functional foods, there are limitations that should be noted. There was a gradual decrease in participants answering the main question on awareness, consumption, and feeding their children functional foods as they progressed through the 19 different functional food components. Future research may be able to improve this limitation by creating questions that give examples of functional food components categorized by the six health benefit categories created specifically in this study's analysis (bone health, heart health, cancer prevention, digestion health, weight health, and other health), thus eliminating listing the 19 different functional food components.

Additionally, sampling found mostly college educated parents, thus limiting the generalizability of this study to other areas of the United States. Biasing may have also occurred due to the locations of the schools in which the surveys were conducted. This could have been mitigated by gather samples from additional cities throughout Mississippi.

Another limitation of this study was the use of dichotomous respondent answers to the main question discussed above. Dichotomous answers of yes or no are more difficult in gauging the degree in which the participant was aware of and consumed a functional food; along with the level they fed their children that food. Future research should use Likert-type response choices to more accurately determine the degree of awareness, consumption, and feeding children functional foods.

Lastly, this study only analyzed the relationship between parental awareness, consumption, and feeding children functional foods without taking into consideration other factors that affect parental feeding practices of their children, such as home food environment, family meal frequency, parent role modeling, purchasing behavior, and perceived cooking and

food choice self-efficacy. Further research is needed to identify how those factors relate to functional food feeding in the family.

Conclusion

The results of this study indicate that parents' feeding their children functional foods is significantly correlated to parents' functional food consumption. However, this study found that parental awareness of functional foods does not correlate to feeding children functional foods, except for bone health. Understanding what motivates parent-feeding habits of foods related to bone health might help in discovering the barriers that prevent feeding children other functional foods. The stronger correlation between parental consumption of functional foods and feeding children those foods suggest that one way to increase feeding functional foods to children is to determine what motivates parents to consume functional foods. Parents' awareness of the benefits of functional foods does not necessarily translate into parents feeding their children those foods. The awareness has to be used as a stepping-stone towards parental action. Previous research supports this notion of parental role modeling of functional foods (Draxten et al.; Nansel et al., 2013b; Raynor et al., 2011) to influence children being fed those foods. Additionally, parents can increase the number of meals eaten together as a family to increase opportunities to feed functional foods to their children both through parental role modeling and creating a supportive home food environment.

There are other steps that parents can take to increase feeding children functional foods such as taking an active role in food purchasing decisions when at the grocery store or eating out. Parents can also create an environment at home that is conducive to children eating functional foods by increasing the ease and availability of these foods, while lessening less healthy

alternatives in the home. Additionally, taking steps to increase self-efficacy in healthy cooking can help parents in creating a supportive home environment that encourages healthy family meals. It is important to note that parents may not be concerned about consuming certain functional foods, but may be interested in feeding their children those foods. This was shown in the results of this study that more parents fed their children functional foods related to bone health than those parents consumed themselves. This may cause difficulty within the home environment, as well as role modeling, to influence feeding children functional foods if parents are not eating certain health promoting foods, but trying to feed their children those foods.

It is not enough to just educate parents about the benefits of consuming functional foods. Further research is needed to better understand why awareness does not correlate stronger with parents' own consumption of functional foods. Lastly, this study also identified the need for further research to identify ways to influence both parental consumption of functional foods and feeding children those foods.

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APPENDICES

APPENDIX A: 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!

APPENDIX B: FUNCTIONAL FOODS SURVEY

Survey Regarding Functional Foods in Families with Children 18 Years of Age or Younger

Functional foods include a wide variety of food and food components believed to improve overall health and well-being, reduce the risk of specific diseases, or minimize the effects of other health concerns. The purpose for conducting the following study is to determine a participant's awareness, attitudes, and consumption of functional foods in their family's meals and eating patterns.

For this survey, each time we use the word "food," we are referring to everything people eat or drink.

This includes fruits, vegetables, grains, meats, and dairy, as well as beverages, herbs, and spices.

For the following question, please circle YES or NO.

I am 18 years of age or older.

YES NO

I am the parent/guardian of child(ren) 18 years of age or younger currently living in my home.

YES NO

If you answered NO to the previous question, we thank you for your time and interest in our research, however, we ask you to stop the survey at this point. If you answered YES, please continue to answer the following questions to the best of your ability.

1. Please indicate your agreement or disagreement with this statement:
   "Certain foods have health benefits beyond basic nutrition."
   a. Strongly disagree
   b. Somewhat disagree
   c. Somewhat agree
   d. Strongly agree
   e. Don't know

2. How concerned are you by the possibility that your children are not getting enough of the nutrients and food components that are needed for good health?
   a. Not at all concerned
   b. Slightly concerned
   c. Somewhat concerned
   d. Very concerned

3. How knowledgeable do you consider yourself in the area of nutrition?
   a. Extremely knowledgeable
   b. Very knowledgeable
   c. Somewhat knowledgeable
   d. A little knowledgeable
   e. Not knowledgeable

4. For each of the food components or nutrients listed below, please answer yes/no for each of the following questions:
   A. Are you aware of the relationship between **this food and this health condition**?
   B. Do you already eat **this food for that health condition**?

Food Components or Nutrients	A. Are you aware of the relationship between **this food and this health condition?**		B. Do you already eat **this food for that health condition?**		C. Do you currently feed your children **this food for that health condition?**	
1. **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.**	Yes	No	Yes	No	Yes	No
2. **Lycopene** (found, for example, in processed tomato products, such as tomato sauce) **for reduced risk of prostate cancer.**	Yes	No	Yes	No	Yes	No
3. **Lutein and other carotenoids** (found, for example, in spinach and fortified foods and beverages) **for maintaining eye health.**	Yes	No	Yes	No	Yes	No
4. **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).**	Yes	No	Yes	No	Yes	No
5. **Monounsaturated fats** (found, for example, in olive oil and nuts) **for reduced risk of heart disease.**	Yes	No	Yes	No	Yes	No
6. **Plant sterols** (found, for example, in fortified foods and beverages, including table spreads, juices, and yogurt) **for reduced risk of heart disease.**	Yes	No	Yes	No	Yes	No
7. **Potassium** (found, for example, in fruits, vegetables, and juices) **for reduced risk of high blood pressure and stroke.**	Yes	No	Yes	No	Yes	No

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

Food Components or Nutrients	A. Are you aware of the relationship between **this food and this health condition?**		B. Do you already eat **this food for that health condition?**		C. Do you currently feed your children **this food for that health condition?**	
8. **Prebiotic fiber** (found, for example, in certain fruits, vegetables, and fortified foods) **for maintaining a healthy digestive system.**	Yes	No	Yes	No	Yes	No
9. **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).**	Yes	No	Yes	No	Yes	No
10. **Xylitol** (found, for example, in sugar-free chewing gums) **for maintaining oral health.**	Yes	No	Yes	No	Yes	No
11. **Herbs and spices used to season foods** (for example, cinnamon, red pepper, and oregano) **for reduced risk of chronic diseases and/or weight**	Yes	No	Yes	No	Yes	No
12. **B vitamins** (found, for example, in meats, whole grains, vegetables, and nuts) **for reduced risk of heart disease.**	Yes	No	Yes	No	Yes	No
13. **Whole grains** (found, for example, in whole-grain cereals, breads, rice, or pasta) **for reduced risk of heart disease.**	Yes	No	Yes	No	Yes	No
14. **Fiber** (found, for example, in vegetables, fruits, some breads, cereals, and fortified foods and beverages)						
14a. **Fiber for reduced risk of heart disease.**	Yes	No	Yes	No	Yes	No
14b. **Fiber for weight management and to provide a feeling of fullness.**	Yes	No	Yes	No	Yes	No
14c. **Fiber for maintaining a healthy digestive system.**	Yes	No	Yes	No	Yes	No
14d. **Fiber for reduced risk of cancer.**	Yes	No	Yes	No	Yes	No
15. **Protein** (found, for example, in meat, dairy, beans, nuts, soy, and some fortified foods and beverages)						

15a. **Protein for weight management and to provide a feeling of fullness.**	Yes No	Yes No	Yes No
15b. **Protein for maintaining optimal health.**	Yes No	Yes No	Yes No
Food Components or Nutrients	A. Are you aware of the relationship between **this food and this health condition?**	B. Do you already eat **this food for that health condition?**	C. Do you currently feed your children **this food for that health condition?**
16. **Soy/soy protein** (found, for example, in soy-based products such as meat alternatives, nutritional bars, and beverages, such as soymilk).			
16a. **Soy/soy protein for reduced risk of cancer.**	Yes No	Yes No	Yes No
16b. **Soy/soy protein for reduced risk of heart disease.**	Yes No	Yes No	Yes No
17. **Folate or folic acid** (found, for example, in fortified grain products and citrus juices).			
17a. **Folate for reduced risk of brain or spinal cord (neural tube) birth defects.**	Yes No	Yes No	Yes No
17b. **Folate for reduced risk of heart disease.**	Yes No	Yes No	Yes No
18. **Omega-3 fatty acids** (found, for example, in seafood, fish oil, or fortified			
18a. **Omega-3 fatty acids for reduced risk of heart disease.**	Yes No	Yes No	Yes No
18b. **Omega-3 fatty acids for cognitive development, especially in children.**	Yes No	Yes No	Yes No
19. **Probiotics** (found, for example, in yogurt and other products with beneficial cultures).			
19a. **Probiotics for maintaining a healthy digestive system.**	Yes No	Yes No	Yes No
19b. **Probiotics for maintaining a healthy immune system.**	Yes No	Yes No	Yes No

5. To what extent, if at all, are each of the following reasons why you do not consume more health promoting foods and food components? Mark whether it is a Major Reason – 1, Minor Reason – 2, or Not a Reason – 3

		Major Reason	Minor Reason	Not a Reason
A	These foods are sometimes more expensive.	1	2	3
B	These foods sometimes do not taste as good.	1	2	3
C	It is not easy to find these foods.	1	2	3
D	I do not know enough about how much of these foods to consume for the desired health benefits.	1	2	3
E	I do not know enough about which foods to purchase for the desired health benefits.	1	2	3
F	If I don't understand some aspect of a health claim that I see on a food package, I will not buy it.	1	2	3
G	I am confused over conflicting information I read or hear about these foods.	1	2	3
H	I am uncertain about how to prepare these foods.	1	2	3
I.	Lack of desire to try new foods or to make changes to my regular shopping list.	1	2	3
J.	It takes too much mental effort to learn about and determine what foods are best to eat.	1	2	3
K	I lack confidence in the science supporting the health benefit claims.	1	2	3
L	My diet is already healthful enough so I do not need an extra boost from these foods.	1	2	3

6. To what extent do you **agree or disagree** with the following statements regarding foods that have health benefits beyond basic nutrition?

		Completely disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Completely agree
A	These foods can make a meaningful impact on my health when I consume them.	1	2	3	4	5
B	I have enough information to understand which foods provide an added health benefit.	1	2	3	4	5
C	Added health benefits of these foods provide a compelling reason to consume them more often.	1	2	3	4	5
D	I would consume more of these foods if my physician or another health professional told me I would benefit.	1	2	3	4	5
E	It would take little effort to include more of these foods in my diet.	1	2	3	4	5
F	I have confidence that I could change my diet to incorporate more of these foods.	1	2	3	4	5
G	I have the skills necessary to prepare these foods in order to get the health benefits they offer.	1	2	3	4	5
H	I trust that consuming these foods will provide me with health benefits.	1	2	3	4	5
I	I believe that the health benefits outweigh any potential inconvenience or additional cost of these foods.	1	2	3	4	5

7. 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 +

8. 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

9. 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

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

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

12. How much do you weigh? _____ pounds

13. How tall are you? _____ feet _____ inches
14. Which parent or guardian in the household is the main grocery shopper?
    a. Mother/Female Guardian

b. Father/Male Guardian
c. Other (please specify) _____

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

_____ _____ _____ _____ _____ _____
_____ _____ _____ _____ _____ _____

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

17. 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

18. Which school district does your child attend?
    Lafayette County School District _____
    Tupelo Public School District _____

We appreciate the time you have given to participate in our research study.
THANK YOU!

VITA

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