CHILDHOOD FOOD EXPOSURE, PARENTAL FEEDING PRACTICES AND CURRENT FOOD NEOPHOBIA IN COLLEGE STUDENTS

A thesis submitted to the
Kent State University College
of Education, Health and Human Service
in partial fulfillment of the requirements
for the degree Master of Science in Nutrition and Dietetics

By

Elizabeth D. Grove

May 2019

A thesis written by

Elizabeth D. Grove

B.S., Olivet Nazarene University, 2017

M.S., Kent State University, 2019

Approved by

_____, Director, Master's Thesis Committee
Natalie Caine-Bish

_____, Member, Master's Thesis Committee
Emily Baker

_____, Member, Master's Thesis Committee
Karen Lowry Gordon

Accepted by

_____, Interim Director, School of Health Sciences
Ellen Glickman

_____, Dean, College of Education, Health, and Human Services
James C. Hannon

GROVE, ELIZABETH D., M.S., May 2019 Nutrition and Dietetics

CHILDHOOD FOOD EXPOSURE, PARENTAL FEEDING PRACTICES AND CURRENT FOOD NEOPHOBIA IN COLLEGE STUDENTS (145 pp.)

Director of Thesis: Natalie Caine-Bish, Ph.D, R.D., L.D.

Food neophobia (FN) has been linked to adverse health behaviors in children and adults such as higher preference for high-fat, energy-dense foods, low intake of fruits and vegetables, and poor dietary variety. Negative parental feeding practices and poor food exposure as a child have been linked to increasing food neophobic tendencies within children. However, little to no research has been conducted on the lasting impact of childhood food exposure and parental feeding practices on college student's FN. The purpose of this study was to compare college student's FN scores to previous food exposure and parental feeding practices experienced during childhood. Participants were limited to undergraduate and graduate college students from the ages of 18-25. Participants completed an online survey with demographic information, recollection of childhood food exposure and childhood parental feeding practices statements, and a Food Neophobia Scale (FNS) to assess current FN. The data revealed a significant negative relationship between childhood food exposure and FNS score ($p \leq 0.001$). However, there was no significant relationship found between childhood parental feeding practices and FNS score. The study has several implications such as (1) expanding the research on FN in adults (2) providing further evidence for healthcare professionals on how to educate parents on the importance of proper child feeding techniques and (3) provides opportunity for future research on strategies to combat FN in adults.

ACKNOWLEDGEMENTS

I would like to, first of all, thank Dr. Bish for her time and effort put into my thesis as my advisor. She was so helpful throughout the entire process and provided much needed advice, expertise, and encouragement along the way. Without Dr. Bish, the entire thesis process seemed impossible. However, with her help I was able to complete a thesis on a topic that I am passionate about and learn the proper way to conduct research in an ethical, effective, and meaningful manner from someone who is extremely knowledgeable.

I would also like to express gratitude towards the other members on my committee, Dr. Karen Gordon and Emily Baker. Both provided great insights and advice on how to improve my research. I appreciated all of the time and effort that they contributed to my thesis development as well.

I am grateful for the individuals who took the time to complete my survey and answer thoughtfully and honestly. This provided me with data that was presentable and beneficial to nutrition research. Without participants in the study, this thesis would have no merit. I also want to thank the authors Wadhera, Phillips, Wilkie & Boggess (2015), Galloway, Farrow and Martz (2010), and Pliner and Hobden (1992) for granting me permission to use their surveys in my research.

Last but not least, I would like to thank Anthony Shreffler. Anthony was crucial in helping me analyze my data and worked with me to analyze it in the way that fit my research study. He provided valuable expertise and knowledge regarding statistics and took much time to prepare the data in the best way possible.

TABLE OF CONTENTS

Page

ACKNOWLEDGEMENTS……iv

LIST OF TABLES……ix

LIST OF FIGURES……x

CHAPTER

I. INTRODUCTION……1
Statement of the Problem……3
Purpose Statement……4
Hypotheses……4
Operational Definitions……5

II. REVIEW OF LITERATURE……6
What is Food Neophobia (FN)?……6
Etiology of FN……8
Diagnostic Criteria of FN……10
Effects of FN on Child Health……11
Dietary variety…… 11
BMI & adiposity…… 12
ARFID…… 13
Effects of FN on Adult's Health…… 15
Recommended Approaches to Feeding Children……17
Parental Feeding Practices Effect on Children's Eating Behavior……22
Restriction……22
Parent Modeling & Parent's Dietary Intake…… 26
Pressure to Eat……27
Monitoring……29
Family Meals……30
Parental Feeding Practices Effect on Adult's Eating Behavior……32
Effects of Parental Feeding Practices on FN……35
As a Child……35
As an Adult……37
Effects of Food Exposure on FN……38
As a Child……38
As an Adult……40
Origin of Food Preferences and Eating Behaviors……40
Heredity for Food Preferences……41
Taste gene markers……41
Twin studies……43
Heredity for Eating Behaviors……45

Food intake self-regulation……..……..……..……..……45
Food Exposure……..……..……..……..……47
Prenatal……..……..……..……....47
Postnatal: breastfeeding……..…..……..…..48
Postnatal: formula...…….…..…….……50
Postnatal: weaning infants…...…….……..…....51
Early adolescents.…….…….…….……..…53
Food Availability…….55
Current Food Preferences and Eating Behaviors of College Students.....56
Dietary Guidelines for Americans…...…..……..……..….....56
Current Dietary Intake of College Students……..……..……..…58
Current Food Preferences of College Students…….....……60

III. METHODOLOGY…….…..……..……...…62
Overview…….…..…….……..62
Participants.…….…….……...62
Instrumentation…….…….……63
Survey Design……..……..……...63
Survey Components……..64
Part I: demographics…….…….……64
Part II: recollection of childhood food exposure…….....…..….....64
Part III: recollection of childhood parental feeding practices.....65
Part IV: current FNS……...……..…..…….…..66
Data Collection Procedures…..……..…….……66
Data Analysis Procedures…...…….……...……67
Demographics……..……..……...67
Childhood Food Exposure ..…..……...68
Childhood Parental Feeding Practices...……...68
Food Neophobia Scale……..…….……...68

IV. JOURNAL ARTICLE…….…..……..……...…70
Introduction…..……...…..……..70
Methodology.…….……...73
Participants……..……..……...……...73
Instrumentation...……..……...……...73
Demographics……..……74
Recollection of childhood food exposure……..…….……74
Recollection of childhood parental feeding practices.....…..…..74
FNS…….…….……..…..……..75
Procedure…..……...……...……...75
Statistical Analysis.……...……...……...76
Results…….……...……..77
Demographics…..……..……...……...77
Childhood Food Exposure…..……..……...78
Childhood Parental Feeding Practices...……...79
FNS…….……..……...……...81

Hypothesis 1……..……..……...……...82
Hypothesis 2……..……...……...83
Discussion...……..……...84
Study Population..……..…..……...……..……...84
Comparing Food Exposure and FNS Score…..…….……...85
FNS……..……..……...……...86
Comparing CPFP and FNS…..……..……...…….……...87
Strengths and Limitations…….……...89
Implications…..……..……...……...89
Conclusion…..……...……...91

APPENDICES……..……92
APPENDIX A. CHILDHOOD FOOD EXPOSURE, PARENTAL FEEDING PRACTICES, AND CURRENT FNS SURVEY…….……...93
APPENDIX B. RECRUITMENT E-MAIL…….……...……108

REFERENCES……....111

LIST OF TABLES

Table Page

1. Demographics of Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (n=529)……..…...78

2. Food Exposure Questionnaire Food Group Frequency from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (n=529)……..79

3. Childhood Parental Feeding Practices Questionnaire from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (n=529)……...80

4. Food Neophobia Scores of Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (N=529)…….…..82

5. Comparing Childhood Food Exposure and Food Neophobia Scores from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (n=529)……...…83

6. Comparing CPFP and Food Neophobia Scores from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (n=529)……..…84

LIST OF FIGURES

Figure Page

1. Progression of Responsive Feeding in the CF Process…….....…….…..19

2. The Relationship between Authoritarian Parenting, Responsive Feeding, and sDOR…….….20
.
3. Main Effects of Session Type……25

4. Pathway of Restriction and Pressure to Eat and Child Outcomes…….29

CHAPTER I

INTRODUCTION

Food neophobia (FN) is described by Birch & Fisher (1998) as an aversion to new, novel foods. FN has been linked to adverse health behaviors in children. Children can develop FN from genetic contribution or from their environment (Cooke, Haworth, & Wardle, 2007). Food neophobic children have a higher preference for high-fat, energy-dense foods, low intake of fruits and vegetables, and poor dietary variety (Wardle, Carnell, & Cooke, 2005; Falciglia, Couch, Gribble, Pabst, & Frank, 2000; Galloway, Fiorito, Lee, & Birch, 2005). FN can even develop into an eating disorder, termed Avoidant Restrictive Food Intake Disorder (ARFID) (Smith et al., 2016b). As one gets older, the variance for these behaviors is also contributed to by shared and unshared unique feeding environments (Smith et al., 2016a).

This feeding environment experienced as a child can transmit into adulthood in various ways, such as interference of self-regulation skills resulting in restraint and disinhibition (Galloway, Farrow, & Martz, 2010; Ellis, Galloway, Webb, Martz, & Farrow, 2016). Food neophobic tendencies have also been observed within adulthood resulting in a decrease in dietary variety, and a poor consumption of fruits and vegetables (Zickgraf, & Schepps, 2016; Knaapila et al., 2011). Negative parental feeding practices such as pressure to eat, restriction, high levels of monitoring and poor food exposure as a child have been linked to increasing food neophobic tendencies within children (Wardle et al., 2005; Falciglia, Pabst, Couch, & Goody, 2004; Tan & Holub, 2012). The more control that is exhibited within parental feeding practices have been related to an increase

in a child's FN (Wardle et al., 2005). Negative parental feeding practices experiences result in negative emotions being associated with food, which ultimately affect food preferences. Young adults who remembered being forced to eat certain foods had a higher dislike for those foods (Wadhera, Phillips, Wilkie & Boggess, 2015). Food exposure also plays an important role in decreasing unfamiliarity to new foods (Coulthard & Sealy, 2017; Owen et al., 2018). During the weaning process, before FN peaks, is the optimal time for mere food exposure to decrease aversions to novel foods (Birch & Marlin, 1982). However, food exposure throughout adolescence can still have an impact on food preferences that last until adulthood (Wadhera et al., 2015). Environmental factors such as parental feeding practices, food availability, and food exposure play an important role later in the development of food preferences (Elkins & Zickgraf, 2018; Lakkakula, Geaghan, Zanovec, Pierce, & Tuuri, 2010; Fildes et al., 2016). In addition to environmental factors, many food preferences are developed early on in life (Beauchamp & Mennella, 2009; Mennella, Johnson, & Beauchamp, 1995; Mennella, Jagnow, & Beauchamp, 2001).

Food preferences and taste sensitivity are developed in an individual starting from utero (Beauchamp & Mennella, 2009; Mennella, Johnson, & Beauchamp, 1995; Mennella, Jagnow, & Beauchamp, 2001). Genetic taste markers are inherited at the time of conception (Chamoun et al., 2017). The mother also has an impact on the child's food preferences through her dietary intake during pregnancy and during breastfeeding (Beauchamp & Mennella, 2009; Rudley & Ramsay, 2014). Children should be exposed to a high variety of foods early in the complementary feeding process and within early

adolescence for there to be a high acceptance of least preferred foods such as fruits and vegetables (Hausner, Nicklaus, Issanchou, Mølgaard, & Møller, 2010; Cooke & Fildes, 2011). Some children are more difficult to accept a variety of foods including familiar and unfamiliar foods. These children are considered "picky" or "fussy." When children present as "picky" or "fussy", familiar and unfamiliar foods are not accepted. When a child presents with FN, only unfamiliar foods are highly unaccepted (Smith et al., 2016b).

Statement of the Problem

College students are failing to meet the Dietary Guidelines for Americans, for poor dietary variety, low intake of fruits and vegetables, and poor eating habits (Wasshenova, Mahas, Geers, & Boardley, 2015; Schroeter & House, 2015; Crowe et al., 2017; Deforche, Dyck, Deliens, & Bourdeaudhuij, 2015). More than half, 70.6% of college students are only consuming two or fewer fruits and vegetables daily (Fall 2017 Reference Group Executive Summary - acha.org, 2017). FN has also been linked to adverse health behaviors such as lack of dietary variety and low intake of fruits and vegetables in children and adults due to low acceptance of unfamiliar foods (Wardle et al., 2005; Zickgraf, & Schepps, 2016). It is not known whether FN plays an important role within the current poor dietary behaviors of college students. High levels of food exposure decrease the amount of unfamiliar foods, in return reducing effects of FN (Coulthard & Sealy, 2017; Owen et al., 2018; Birch & Marlin, 1982). Also, the more control that is exhibited within parental feeding practices have been related to an increase in a child's FN (Wardle et al., 2005). These effects have been seen to last until adulthood

(Wahera et al., 2015). As parental feeding practices and food exposure have been associated with higher incidences of FN in children, further investigation must be conducted to provide more background if these also effect the food neophobic tendencies within adulthood. Children and college students both are at a critical period to develop healthy habits for the rest of their lives. Since FN has impacts on dietary quality and health, it is important to determine the causation of aversion to new, novel foods and the food neophobic tendencies that could be induced from childhood feeding environment. It is important to also determine strategies to combat FN within young adults, as research focuses on strategies for children.

Also, most of the research on FN is not current, and newer research must be conducted to remain relevant in today's current society. The lasting impact of parental feeding practices and food exposures on college student's FN has not been studied. The data collected will allow for inferences to be made about the lasting impact of these negative parental feeding practices as a child on FN in college students.

Purpose Statement

The purpose of this study is to compare college student's current FN scores to previous food exposure and parental feeding practices experienced during childhood.

Hypotheses

H_1: College students will have increased FN scores as food exposures experienced decreases.

H_2: College students will have increased FN scores as negative parental feeding practices experienced increases.

Operational Definitions

FN: Food Neophobia is defined as "the reluctance to eat, or the avoidance, of new foods" (Birch & Fisher, 1998). This will be tested through the Food Neophobia Scale (FNS) created by Pliner & Hobden in 1992.

Food exposure: Food exposure is defined as the presentation or consumption of a food repeatedly (Wadhera et al., 2015). Food exposure will be determined using the Food Exposure Survey created by Wadhera et al. in 2015.

Negative parental feeding practices: Negative parental feeding practices consist of nonresponsive feeding practices such as controlling, indulgent, and uninvolved feeding practices (Black & Aboud, 2014). Specifically, controlling feeding practices will be examined. Controlling practices include: pressuring to eat, monitoring and restricting. This will be tested using the adapted version of the Child Feeding Questionnaire (CFQ) which was created by Galloway et al. (2010). This adapted version was created for college students to retrospectively describe the parental feeding practices they experienced.

CHAPTER II

REVIEW OF LITERATURE

What is Food Neophobia (FN)?

FN is derived from study of the omnivore's dilemma. This refers to the dilemma where one must seek new foods (neophilia) for them to meet their nutritional needs but simultaneously have a fear (neophobia) that what they consume might be toxic (Armelagos, 2014; Rozin, 1979). Birch & Fischer (1998) describes FN as the reluctance or avoidance to try new, unfamiliar, novel foods. This aversion to novel foods occurs with foods that a child has no experience with, and it occurs at the presentation of the item. Ingesting the item would risk poisoning therefore, it is rejected based on visual of the food alone (Dovey, Staples, Gibson, & Halford, 2008). Children build up a conception of what an acceptable food should look like, and if a food item is presented that does not meet this criterion, it will be rejected. A high rejection rate of food items poses children with FN to have poor dietary variety (Dovey et al., 2008). Children with FN are also less compliant eaters, resulting in coercive parental strategies to increase eating (Faith, Heo, Keller, & Pietrobelli, 2013b). There are many characteristics that are related to FN and useful strategies to increase acceptance of new foods (Pliner & Hobden, 1992; Cooke & Wardle, 2005).

FN is associated with specific individual personality factors as increases in FN scores are correlated with increased anxiety, decreased Experience Seeking of the Sensation Seeking Scale, and increased general neophobia (Pliner & Hobden, 1992). Openness and Extraversion have been reported to be negatively correlated with food

neophobia (Knaapila et al., 2011). Age and gender are also factors that are incorporated within the expression of FN (Cooke & Wardle, 2005). Boys tend to experience FN more than girls (Laureati, Bergamaschi, & Pagliarini, 2014), and food neophobic tendencies decrease as age increases (Cooke & Wardle, 2005). This occurs because as one ages, their experiences with food become more frequent and varied. This allows for familiarity with more foods and a less frequent occurrence of encountering a novel food (Cooke & Wardle, 2005). FN starts to increase in older adulthood possibly from a lowered ability to detect between senses or because they may be avoiding foods they do not know to decrease the occurrence of gastric discomfort. The actual mechanism is unknown (Dovey et al., 2008).

FN overlaps with the terms "picky eating" or "fussy eating." Food fussiness (FF) is a trait that is closely related to FN. As individuals who experience FF also tend to have FN (Smith et al., 2016b). However, food fussiness typically is the rejection of foods that a child already eats, and does not discriminate based on familiarity (Perry et al., 2015). Further characteristics of FN, "picky" or "fussy" eating include: limited number of food items in the diet, unwillingness to eat familiar foods or new foods, special preparation of food required for the child, inadequate intake of variety due to rejection of food items, high energy intake coming from drinks, only will eat foods when disguised with familiar foods, requires lengthy time to complete a meal, eating only certain foods, and strong food preferences (Mascola, Bryson & Agras, 2010; Horst, 2012; Dovey et al., 2008; Falciglia, Couch, Gribble, Pabst, & Frank, 2000; McCormick & Markowitz, 2013). FN relates to over sensitivity with food tastes, smells, or textures, gastrointestinal problems,

and negative associations with food such as choking, and or gagging (Kraur, Pelchar, Rozin, Zickgraf, 2015; Fitzpatrick, Forsberg, & Colborn, 2015).

FN as seen within the Omnivore's Dilemma is an innate characteristic of humans, however, this can be propelled further or repressed through the feeding environment such as pressure to eat, restriction, role modeling, parenting style and control (Fildes et al., 2016; Smith et al., 2016b; Knaapila et al., 2011; Cooke, Haworth, & Wardle, 2007; Nicklaus, 2017; Elkins & Zickgraf, 2018). FN can be influenced or manipulated by situations through familiarity (Pliner & Hobden, 1992). As an individual gets more familiar with a novel food item, the willingness to accept also increases. Providing a novel food with a familiar food, repeated exposure of the novel food, or through the encompassing environment where the food is presented increases acceptance or willingness to try the food item (Pliner & Hobden, 1992).

Etiology of FN

FN peaks from the ages of two to six. Infants tend to have higher adaptation to new foods (Dovey et al., 2008). Within children, FN has been reported to have a strong heritable component. FN has a 78% genetic contribution from ages eight-eleven and 72% from ages four-seven (Cooke et al., 2007; Faith et al., 2013b). However, a heritability of only 58% was found for toddlers at 16 months old (Smith et al., 2016a). This is consistent with the conclusion that the best time to introduce new foods to children is during infancy as environment plays a larger role in the variance (Hausner, Nicklaus, Issanchou, Mølgaard, & Møller, 2010; Cooke & Fildes, 2011).

Interestingly, Cooke et al. (2007) found that non-shared environment effects accounted for 22% of the variance in FN children from eight-eleven. These results indicate that siblings within the same household have different feeding experiences, which contribute to FN more than their shared environment (Cooke et al., 2007). The parents' greatest influences on FN with non-shared environment effects may be how they treat each child differently with parental practices or expose the siblings to different foods (Faith et al., 2013b). Children who were FN did not respond to shared environments as much as children who were FF, indicating that even though the two terms largely share common etiology, the home environment plays more of a role in the development of FF rather than FN which is predominantly genetic (Smith et al., 2016b). An example of how home environment could affect FN is breastfeeding duration; exclusive breastfeeding for six months and proper complementary feeding indicated that the child would be less likely to develop FN (Galloway, Lee & Birch, 2003).

The genetic component of FN tendencies is found to still affect young adults. An association has been discovered between the food neophobic tendencies of biological parents and their young adult children (Elkins & Zickgrad, 2018). This could be related to the fact that parents with limited diets as a result of FN are less likely to present their children with a variety of foods during all the important developmental aspects of a child's life when food preferences are formed. This would result in the heritability of FN (Elkins & Zickgrad, 2018). Knaapila et al. (2011) found that young adult women had a strong heritability of FN at 61%, whereas with men, shared environmental effects played

a bigger role in FN. This research displays that FN can be prevented and can be developed independently from genetics (Tan & Holub, 2012).

Diagnostic Criteria of FN

FN typically starts to develop between the ages of two to six, and typically do not continue into adulthood (Dovey et al., 2008). There are common signs and symptoms that may indicate a child has FN. These symptoms include: refusal to eat new foods that may persist beyond childhood into adolescence, fear of new foods is overwhelming causing anxiety and distress, and social activities become avoided due to the fear of possibly having to eat a new food (What is Food Neophobia?, 2019). It is further diagnosed by the development of the Food Neophobia Scale (FNS) by Pliner and Hobden (1992). Participants answer 10 statements which are graded from one to seven. Seven indicates strong FN and one indicates low FN. Therefore, the total scoring is from 10 to 70. A few of the statements are reversed scored as appropriate. These 10 statements are:

- I am constantly sampling new and different foods.*
- I don't trust new foods.
- If I don't know what is in a food, I won't try it.
- I like foods from different countries. *
- Ethnic food looks too weird to eat.
- At dinner parties, I will try a new food. *
- I am afraid to eat things I have never had before.
- I am very particular about the foods I will eat.
- I will eat almost anything. *

- I like to try new ethnic restaurants.*

The items in asterisks are reversed. To diagnose children with FN, a Child Food Neophobia Scale (CFNS) was also developed by Pliner (1994). The statements are framed for the children, but the parents answer the same statements included in the FNS. This was developed and validated by measuring the relationship between children's willingness to accept unfamiliar foods and the parents' score of their children with the CFNS (Pliner, 1994).

Effects of FN on Child Health

As food preferences for sweet and salty are predisposed genetically, it makes sense that FN would affect the intake of vegetables (Perry et al., 2015). FN is characterized as the avoidance of unfamiliar foods in general, however it is specifically seen in fruits and vegetables (Wardle, Carnell, & Cooke, 2005; Falciglia et al., 2000). Children who are food neophobic tend to have a low dietary variety and a low consumption of fruits and vegetables (Wardle et al., 2005). Dietary variety and fruit and vegetable consumption are important for the prevention of chronic diseases, proper nutrition such as intake of micro and macronutrients, and weight maintenance (Fletcher, Wright, Jones, Parkinson, & Adamson, 2016). In relation to this, FN has been related to BMI and adiposity. FN can even develop into a more serious eating disordered termed Avoidant Restrictive Food Intake Disorder (ARFID) (Smith et al., 2016b).

Dietary variety. FN has been shown to be the most significant predictor of fruit and vegetable intake at age seven (Fletcher et al., 2016). A direct negative association between FN and fruit and vegetable intake has been reported (Cooke, Wardle, Gibson,

2003; Wardle et al., 2005). The higher the FN score of children, the lower the intake of fruits and vegetables (Wardle et al., 2005). FN affects the dietary variety and intake of fruit and vegetables differently based on gender. Being male and food neophobic results in the lowest consumption of fruits and vegetables (Wardle et al., 2005). When looking at picky eating among girls, picky eaters had significantly lowered intake of fiber, fruits, vegetables, fats, and sweets. This increased their risk of being deficient in Vitamins C and E (Galloway, Fiorito, Lee, & Birch, 2005). A prior study completed displayed results that FN did not result in adequate intake of vitamins except for Vitamin E. Results did support that FN children have a lower dietary variety including less unique foods and higher saturated fat intake than neophillic children (Falciglia et al., 2000).

BMI & adiposity. Since children with FN tend to have a lower intake of fruits and vegetables, one would hypothesize that they would have greater BMIs or higher adiposity (Fletcher et al., 2016; Wardle et al., 2005). Girls at the age of nine who are picky eaters tend to have lower BMIs and body fat because of a lower intake of total energy compared to non-picky girls (Galloway et al., 2005). A previous study reported that fruit and vegetable intake was only weakly inversely related to BMI and skinfold Z scores at 30 months (Fletcher et al., 2016). Similarly, no significant correlation was found between BMI and FN at 24 months (Perry et al., 2015). Familial resemblance of BMI with FN children is also hypothesized as genes play a large part in the development of FN (Faith et al., 2013b). Maternal BMI was positively correlated with children who were high in FN but not in children who were low in FN (Faith et al., 2013b). Therefore,

FN could be related to being overweight or underweight, but the implications are unable to be seen in early adolescence (Perry et al., 2015).

ARFID. An extreme case of FN can result in a new diagnosis in the Diagnostic and Statistical Manual, 5th Edition (DSM-5) called Avoidant Restrictive Food Intake Disorder (*Diagnostic and statistical manual of mental disorders: DSM-5*, 2013). This disorder was previously "Selective Eating Disorder." This eating disorder is typical with Anorexia Nervosa (AN), as one does not have adequate intake of food, but there is no involvement of weight preoccupation (Fitzpatrick et al., 2015). This spectrum of "picky" eating is severe as it results in failure to grow and stalled weight gain in children, and can result in adults unable to perform basic body function because of inadequate intake of nutrients (Fitzpatrick et al., 2015). The criteria for ARFID includes:

- An eating or feeding disturbance (e.g., apparent lack of interest in eating or food; avoidance based on the sensory characteristics of food; concern about aversive consequences of eating) as manifested by persistent failure to meet appropriate nutritional and/or energy needs associated with one (or more) of the following:
    - Significant weight loss (or failure to achieve expected weight gain or faltering growth in children).
    - Significant nutritional deficiency.
    - Dependence on enteral feeding or oral nutritional supplements.
    - Marked interference with psychosocial functioning.
- The disturbance is not better explained by lack of available food or by an associated culturally sanctioned practice.

- The eating disturbance does not occur exclusively during the course of anorexia nervosa or bulimia nervosa, and there is no evidence of a disturbance in the way in which one's body weight or shape is experienced.
- The eating disturbance is not attributable to a concurrent medical condition or not better explained by another mental disorder. When the eating disturbance occurs in the context of another condition or disorder, the severity of the eating disturbance exceeds that routinely associated with the condition or disorder and warrants additional clinical attention. (*Diagnostic and statistical manual of mental disorders: DSM-5*, 2013).

Food avoidance usually presents during early infancy and can last until adulthood, as is the same with avoidance based on sensory characteristics (*Diagnostic and statistical manual of mental disorders: DSM-5*, 2013). Individuals with ARFID are more likely to be male, have an earlier onset and longer duration of illness than individuals with AN or Bulimia Nervosa (BN), more likely to have anxiety related disorder, and experience selective eating since early childhood (Fisher et al., 2014). ARFID encompasses the characteristics of FN, but with such an intense fear that it impacts their development (Fitzpatrick et al., 2015; Smith et al., 2016b). The nature of ARFID is primarily related to novel aversion rather than taste aversion. Little is known about the complete difference between picky eating and ARFID, but it appears that these behaviors are based on a continuum or spectrum (Fitzpatrick et al., 2015). An example of what ARFID might look like in a child:

> We call them vegetables behind her back because she acts like we are poisoning her. We have tried different plans to help her eat more, but it seems like she always goes

> back to the same, plain, 'white foods' that she favors: bread, peanut butter, sweets, chips, and other 'junk' foods. She is incredibly sensitive to any changes; she will only eat the same brands and will gag and spit out foods she does not like. We ate out at a restaurant, and they served ketchup in a cup—she wouldn't touch it even though she usually slathers her food in the stuff. It was even the same brand she likes, but because it looked different, she couldn't be coaxed to try it (Fitzpatrick et al., 2015).

ARFID will not resolve itself, and the current treatments for this eating disorder are based on increasing food exposure experiences, flavour-flavour learning, and decreasing novelty, much like the strategies to combat FN (Fraker, Fishbein, Cox, & Walbert, 2007). Another important aspect of treatment is decreasing the anxiety and tension our meal times through parent education and Family Based Therapy (FBT) (Fitzpatrick et al., 2015).

Effects of FN on Adult Health

Fewer research has been conducted on adults with FN. Therefore, there is not as much information on the effects FN has on adult health (Zickgraf & Schepps, 2016; Knaapila et al., 2011). Picky eating status in adults is highly correlated with FN (Kauer, Pelchat, Rozin & Zickgraf, 2015). It was previously thought that picky eating was a phenomenon that only occurred in childhood, but Kauer et al. (2015) studied a community sample of adults with 35% of them reporting to be a picky eater. Adult picky eaters reject foods based on sensory properties, contact between foods, mixing flavors of foods, display higher anxiety about eating away from home, and receive less enjoyment from eating (Kauer et al., 2015).

Adult picky eaters (defined as meeting criteria for ARFID and FN) have been reported to consume a lower percentage of foods from all subcategories of food: fruits, vegetables, meats, and fish (Zickgraf & Schepps, 2016). Eating inflexibility (defined as

inflexibility around types of brands of foods, preparation or presentation) was significant for overall decrease in dietary variety and consumed a lower percentage of fruits, vegetables, meats and fish. Fruit and vegetable intake was compared between typical eaters, picky, or severe picky eaters in this study as well. Picky eaters were 50% less likely to consume five or more servings of fruits and vegetables daily, and severe picky eaters were 250% less likely to consume five or more servings of fruits and vegetables a day (Zickgraf & Schepps, 2016). This could be related to the fact that young adults with FN report significantly less pleasantness of fruits, vegetables and fish (Knaapila et al., 2011). In older adults, food selectivity or "picky" eating corresponded with an increased risk for malnutrition (Maitre et al., 2014). Increased malnutrition risk was also parallel to eating difficulties experienced within the elderly population. Eating difficulties have a greater impact on malnutrition, but food selectivity was found to be more prevalent (Maitre et al., 2014).

Similarly, little is known about the relationship between BMI and adult FN (Knaapila et al., 2011). FN could affect BMI in two ways: a decrease in dietary variety could equal a decrease in overall energy consumption resulting in a lower BMI or a decrease in nutrient dense foods could equal an increase in high energy dense foods resulting in a higher BMI (Knaapila et al., 2011). The current research supports that there is not a strong significant correlation between BMI and FN in both men and women (Ellis, Galloway, Webb, Martz, & Farrow, 2016; Knaapila et al., 2011). However, it is hypothesized that childhood picky eating can be predictive of disordered eating psychology in young adulthood. This could be related to the coercive strategies (i.e.

pressure to eat or restricting food access) that are employed during childhood when a child is food neophobic and displays as a picky eater (Ellis et al., 2016; Russell, Worsley, & Campbell, 2015). Childhood picky eating was not associated with intuitive eating or disordered eating but recollection of pressure to eat as a child was correlated with increased BMI, increased bulimia scores, and decreased scores of intuitive eating in college students. Therefore, the result of coercive strategies for picky eaters to eat during childhood, have an independent effect on the eating behavior and BMI of adults (Ellis et al, 2016).

Recommended Approaches to Feeding Children

Children's eating behaviors are formed in response to genetics and in response to the parental style used by the parents (Scaglioni, Arrizza, Vecchi, Tedeschi, 2011; Black & Aboud, 2014). Parental feeding practices have been related to growth and development within children, have an association with BMI, and self-regularity skills (Black & Aboud, 2014; Hurley & Black, 2011). Parent-child feeding relationship is also involved in the development of the child's relationship to food (Branen & Fletcher, 1999). There are two types of feeding practices employed from parents. These are responsive feeding and non-responsive feeding. These two concepts encompass particular parenting styles (Black & Aboud, 2014; Branen & Fletcher, 1999).

Parenting styles (authoritative, authoritarian, indulgent, and neglectful) as determined by Baumrind (1971) have a reported impact on adolescent eating behavior (Pearson, Atkin, Biddle, Gorely & Edwardson, 2009). Authoritative parents have a degree of high demandingness and high responsiveness. They are strict but still involved,

responsive, and have a balanced parent-child relationship. Authoritative parenting is also known as responsive parenting (Black & Aboud, 2014). Authoritarian (controlling) parents have a degree of low demandingness and high responsiveness. Authoritarian parents are strict but not involved, controlling, and have a parent over child hierarchy. Indulgent (permissive) have a degree of high demandingness and low responsiveness. Indulgent parents are involved but not strict, and provide little structure. Uninvolved (neglectful) parents have a degree of low demandingness and low responsiveness. They are not strict or involved, detached emotionally, and also provide little structure (Pearson et al., 2009; Maccoby & Martin, 1983; Baumrind, 1971; Black & Ruder, 2018). Authoritarian, permissive, and uninvolved parenting styles are also known as non-responsive parenting (Black & Aboud, 2014).

Responsive feeding has a bidirectional framework that corresponds with responsive parenting (Black & Aboud, 2014). The child responds to the environment through facial expressions, actions, and vocalization, the caregiver responds (not necessarily always giving into the demands but acknowledges the request), and then the child relays a response based on the caregiver response (Black & Aboud, 2014). This framework is based on the child's psychosocial, cognitive, and language competence (Hurley & Black, 2011). The three principles of responsive feeding are:

1. Ensuring that the feeding context is pleasant with few distractions; that the child is seated comfortably, ideally facing others; that expectations are communicated clearly; and that the food is healthy, tasty, developmentally

appropriate, and offered on a predictable schedule so that the child is likely to be hungry;

2. Encouraging and attending to the child's signals of hunger and satiety;
3. Responding to the child in a prompt, emotionally supportive, contingent, and developmentally appropriate manner (Black & Aboud, 2014).

These principles coincide with the authoritative/responsive feeding strategy where the parents share responsibility in the feeding relationship with the children (Branen & Fletcher, 1999). This results in only taking control over what is served but allowing the children to respond by eating how much based on their hunger and satiety signals. In the authoritarian feeding style, parents take control of all aspects of the child's eating such as what, when and how much the child eats. In the permissive/indulgent feeding style, the child takes control over the entire feeding process, and there is no structure on timing of meals, the eating environment, or the food served (Branen & Fletcher, 1999). Figure 1 provides a good example of how responsive feeding would be employed in the early feeding process.

TABLE 1 Example of the progression of feeding behavior and responsivity for young children and caregivers[1]

	Caregiver proactive preparation	Child skills and signals	Caregiver responsivity	What child learns
Birth to 6 mo	Prepare to feed when infant signals hunger.	Signal hunger/satiety through voice, facial expression, and actions	Responds to infants signals: feeds when hungry, stop with satiety	Caregiver will respond and meet her needs
6–12 mo	Ensure child is comfortably positioned; establish family mealtimes/routines	Sit; chew and swallow semisolid foods; self-feed with fingers	Respond to child's signals; increase variety, texture, and tastes Respond positively to child's attempts to self-feed	To begin to self-feed; to experience new tastes and textures; that eating and mealtimes are fun
12–24 mo	Offer 3–4 healthy choices/meal; offer 2–3 healthy snacks each day; offer foods that can be picked up, chewed, and swallowed	Self-feed many different foods; use baby-safe utensils; use words to signal requests	Respond to child's signals of hunger and satiety; respond positively to child's attempts to self-feed	To try new foods; to do things for herself; to ask for help; to trust that caregiver will respond to her requests

[1] Represents a nonexhaustive example of caregiver preparation and responsivity.

Figure 1. Progression of Responsive Feeding in the CF Process (Black & Aboud, 2014).

A child development based feeding model was created that includes all the important principles of responsive feeding. This feeding model is the Satter's Division of Responsibility in Feeding (sDOR) created by Satter (1986). The sDOR ensures that parents take responsibility for the what, when and where of the feeding process, and the child determines whether to eat and how much to eat. The parents also oversee providing and maintaining a regular schedule of meals and snacks, providing family meals, and allowing the child to serve him or herself depending on the development stage of the child (Satter, 1986). The sDOR has been endorsed by the American Academy of Pediatrics as the optimal feeding practice (Hagen, Shaw, & Duncan, 2017). Authoritarian parenting, responsive feeding, and sDOR are all involved in the self-regulation of a child's appetite and their weight (Black & Ruder, 2018). Figure 2 is an image that displays this relationship.

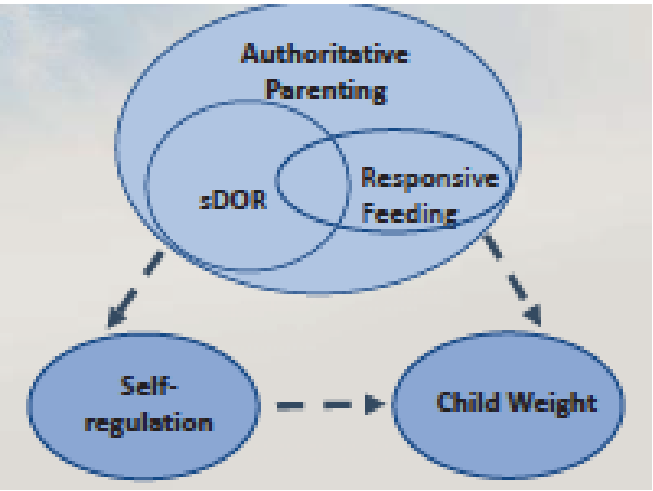

Figure 2. The Relationship between Authoritarian Parenting, Responsive Feeding, and sDOR (Black & Ruder, 2018)

Research has shown the effectiveness of sDOR on decreasing non-responsive feeding strategies such as pressure to eat and restriction (Argas et al., 2012). After

comparing parents who had been educated with sDOR and a control group, parent pressure on their child to eat was significantly decreased in the sDOR group. The sDOR educated parents also had a reduction in food restriction of girls, but not boys, indicating that restriction feeding practices may be employed more on female eating patterns (Argas et al., 2012). These three parental strategies have important implications for the health of the child as healthy eating patterns are developed (Argas et al., 2012). An example is that adolescents who described their parents as authoritative ate more fruit, ate breakfast on more days per week, and ate fewer unhealthy snacks per day than neglectful parents (Pearson et al., 2009).

Non-responsive feeding strategies have various impacts on the dietary intake and eating behaviors of adolescents (Pearson et al., 2009). Indulgent feeding practices have been linked to children being at risk for a higher BMI (Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008). Children who described their parents as authoritarian had a fewer consumption of sweets, snacks, and soft drinks. This could be related to food rules and restrictiveness that are significant attributes of the authoritarian parenting style (Pearson et al., 2009). However, this may be effective for certain children during childhood but has later negative impacts on the eating behaviors of adults (Puhl & Schwartz, 2001; Ellis et al., 2016; Kral & Rauh, 2010). Non-responsive feeding strategies can have lasting negative impacts on the dietary intake and eating behaviors of adults (Pearson et al., 2009).

Parental Feeding Practices Effect on Child's Eating Behavior

Responsive and non-responsive feeding practices contribute with genetics to determine the eating behavior of children (Scaglioni, Arrizza, Vecchi, Tedeschi, 2011; Black & Aboud, 2014). The use of controlling feeding practices (non-responsive feeding practices) has been found to differ based on child temperament, child's weight status, inhibitory control, and due to the parent's own eating habits (Rollins, Loken, Savage, & Birch, 2014; Carnell, Cooke, Cheng, Robbins, & Wardle, 2011; Argas et al., 2014; Fisher, & Birch, 1999a; 1999b). Parents have also reported to employ different feeding strategies in between siblings based on child temperament, level of pickiness, or food responsivity (Carnell et al., 2011). The bidirectional mechanism of controlling feeding practices is not completely understood; it could either be a reaction to their child's current eating behavior or the cause of a child's current eating behavior (Agras et al., 2012). Parental control has been seen to increase as child's FN increases (Wardle et al., 2005). It is extremely important to understand the positive or negative effects of feeding practices such as restriction, parent modeling, pressure to eat, monitoring, and family meals for children to develop and grow properly, have proper self-regulating skills, have a healthy relationship with food and healthy dietary habits that continue into adulthood (Scaglioni, Arrizza, Vecchi, Tedeschi, 2011).

Restriction

Restricting access to foods is a controlling feeding practice (Birch et al., 2001). Restricting access to foods high in fat or sugar may appeal to parents as an effective strategy to moderate the intake of these foods (Fisher, & Birch, 1999a). Certain foods

that are deemed as “bad” by parents may be kept out of reach, only allowed occasionally, provided in limited quantities, or only allowed after eating certain foods (i.e. cleaning your plate before having dessert). The concept of the parental practice of restriction is the restriction of specific foods not total energy intake, and that the parent is the one enforcing the restriction, therefore it is not in control of the child (Fisher, & Birch, 1999a). It has been proposed that the restriction of foods makes palatable foods or restricted foods more attractive, therefore these children will have a higher food responsiveness towards those foods (Fisher, & Birch, 1999a; Webber, Cooke, Hill, & Wardle, 2010a). However, parents may employ restriction based on increased food responsiveness in a child, instead of causing increased food responsiveness (Webber et al., 2010a). The use of restriction is also associated with a mother’s concern about their child becoming overweight (Webber, Hill, Cooke, Carnell, & Wardle, 2010c). As mothers who feel that their child may need to lose weight employ the use of restriction more often (Rhee et al., 2009; Birch & Fisher, 1999a). However, the use of restriction has inconsistent and mixed results regarding the bidirectional long term effects on child’s adiposity (Webber, Cooke, Hill & Wardle, 2010b; Campbell et al., 2010).

Children that are exposed to a high level of restriction have an increase in unhealthy eating behaviors (Fisher & Birch, 1999a; 1999b; Loth, MacLehose, Larson, Berge & Neumark-Sztainer, 2016; Birch, Fisher, & Davison, 2003). Maternal restrictive feeding practices have been associated with young girls eating in the absence of hunger (Birch et al., 2003). Eating in the absence of hunger (EAH) is a behavior that refers to a child’s tendency to disrupt food intake self-regulation by ignoring innate hunger and

fullness cues by intake of appetizing snacks despite not being hungry (Fisher & Birch, 2002). Five-year-old girls who were overweight and experienced a high level of restriction, resulted in a higher rate of EAH at the age of nine (Birch et al., 2003). Fisher & Birch (1999a) found that restricting access to palatable foods was also not effective in developing dislike or a reduction in intake of these foods. Girls that experienced high levels of maternal restriction at home, consumed more of the restricted snack after stating they were "full" in a laboratory setting (Birch & Fisher, 1999a). The mother's own restrained eating was predictive of maternal restriction in their daughters, and this strategy poses a greater risk for girls to develop similar eating problems than it does with boys (Birch & Fisher, 1999a).

Fisher & Birch (1999b) conducted another study that showed similar results in a laboratory setting, when children experienced high levels of maternal restriction at home, selection of the restricted food increased. Figure 3 results show the levels of selection, intake, and behavioral response significant differences during restricted and unrestricted sessions. The target food and the control food consumption decreased over time before and after restriction (Fisher & Birch, 1999a).

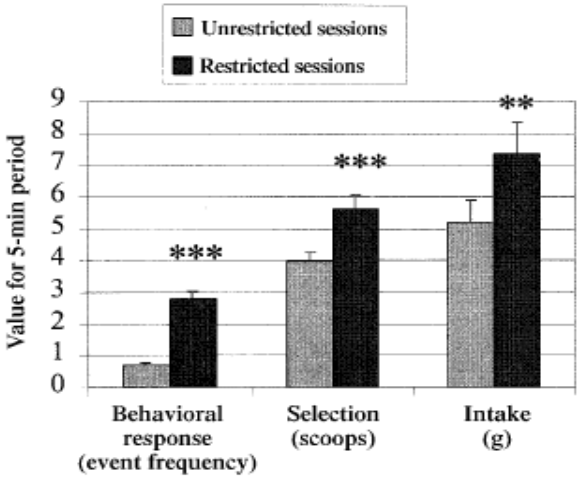

FIGURE 2. Main effects of session type (unrestricted compared with restricted access) on behavioral response (frequency of positive and negative events), selection of restricted food, and intake of restricted food during 5-min periods ($n = 37$). **,***Significantly different from unrestricted sessions: **$P < 0.01$, ***$P < 0.001$.

Figure 3. Main Effects of Session Type (Birch & Fisher, 1999a)

This study was replicated in 2014 by Rollins, Loken, Savage & Birch. Restriction proved to increase intake and behavioral response, and children lower in inhibitory control had a higher intake of the restricted food. Restriction did not have continuous effects on eating behavior one week following the restriction session, similar to Fisher & Birch's (1999b) study. It also replicated the results that parents who kept palatable snacks out of reach at home, resulted in their children consuming more of the restricted food (Rollins, et al., 2014).

Interestingly, it has been found that high levels of restriction are associated with healthful and unhealthful eating habits (Wardle et al., 2005). Higher parental control within feeding is associated with decreased fruit and vegetable consumption. High levels of restriction when compared to healthy role modeling, and food availability was significantly associated with an increase in sugar sweetened beverages, increase in fruits and vegetables, and increase in palatable snacks consumption (Loth et al., 2016). Other

studies have found similar results that high levels of limits and restrictions improved dietary quality (Couch, Glanz, Zhou, Sallis, & Saelens, 2014). These studies, although, do not discuss the longitudinal aspects of restriction and their possible effects on dietary behavior later in life (Loth et al., 2016).

Parent Modeling & Parent's Dietary Intake

Parent role modeling is defined as "parents actively demonstrating healthy eating for the child" (Birch et al., 2001). Role modeling includes healthy eating in front of the child, including a variety of foods that may be less preferred such as fruits and vegetables. It also involved supporting, encouraging, and promoting the consumption of healthy foods (Birch et al., 2001). Pearson et al. (2009) conducted a systematic review that revealed that parent role modeling and the role of the parent's dietary intake was positively associated with the child's dietary intake.

There needs to be a distinction between parent role modeling and parent dietary intake, as it is speculated that they are two different entities (Vaughn, Martin, & Ward, 2018). Vaughn et al. (2018) found that these two terms are suggested to be different from one another and have different impacts on the dietary intake of the child. Role modeling was found to have a larger impact than the parent's dietary intake on children's diet quality. Parents that displayed healthy eating behaviors and food choices were positively associated with children with higher scores on the Healthy Eating Index (HEI) (Vaughn et al., 2018). It has also been seen that parent role modeling of healthy eating behaviors resulted in an increase in fruit and vegetable consumption, and a decrease in sugar sweetened beverages and palatable snacks (Loth et al., 2016).

A meta-analysis revealed that there was a weak to moderate relationship between parent and child energy intake (Wang, Beydoun, Li, Liu, & Moreno, 2011). However, mothers may have a primary effect on influencing their children to eat healthy. Mothers have been seen to influence their daughter's fruit and vegetable intake through their own dietary intake (Galloway, Fiorito, Lee, & Birch, 2005). Another study revealed that parent energy intake explained a significant 9.2% of the variance in children's energy intake after adjusting for independent factors. This study was primarily on parent and younger children dyads (where parents have greater control over their food choices) and could be a result of over-reporting in children's dietary intake and under-reporting in their own dietary intake (Robson et al., 2016). Therefore, the impact of parent's dietary intake on children's dietary intake has conflicting results but when coupled with role modeling can be very effective (Vaughn et al., 2018). Parent role modeling and parent's dietary intake have the capability to enhance dietary variety and promote healthy eating behaviors, or it can enhance the opposite (Black & Aboud, 2011; Papas, Hurley, Quigg, Oberlander, & Black, 2009).

Pressure to Eat

Pressuring to eat is defined as demanding a child to eat more food by cleaning their plate, prompting a child to eat even when they say they are not hungry, or forcing them to eat (Birch et al., 2001). Pressuring to eat is a non-responsive feeding strategy that disrupts a child's internal hunger and satiety cues (Black & Aboud, 2011). Parents view refusal to eat as a sign of poor appetite, pressure their child to eat, and can ultimately cause negative emotions such as frustration and stress around the dinner table

(Black & Aboud, 2011). This coercive feeding strategy to eat more food is often employed by parents when they feel their child is at risk for being underweight (Webber et al., 2010c; Webber et al., 2010b). Higher child BMI was associated with a decrease in the use of this parental practice in a longitudinal study (Webber et al., 2010b). Therefore, it is considered a bidirectional relationship and may be employed as a reaction to their child's current eating behavior (Agras et al., 2012).

Other characteristics that may increase the use of this practice is a child's temperament, FF, and/or picky eating (Agras et al., 2012). Pressuring to eat is significantly negatively associated with a child's enjoyment of food (Agras et al., 2012; Webber at al., 2010b). The parent's own eating behavior can affect the use of this strategy as parents with low disinhibition scores more frequently employ pressure to eat (Agras et al., 2012). This relates to the fact that some parents use pressure to eat as a strategy to encourage their children to eat a larger variety of healthier foods (Vaughn et al., 2016; Webber et al., 2010c).

This strategy is continually associated with a decrease in fruit and vegetable consumption, and contributes to a child disliking the foods that they were pressured into eating (Galloway et al., 2005). It is hypothesized that a highly-controlled food environment results in the inability to self-regulate food intake and stimulates emotions towards foods i.e. shame when one eats a "bad" food and strays from parents control or rules (Loth, MacLehose, Fulkerson, Crow, Neumark-Sztainer, 2014). This is confirmed through results that correlate pressure to eat and increase in EAH and disordered eating behaviors (Harris, Mallan, Nambiar, & Daniels, 2014; Loth et al., 2014). A study by

Harris et al. (2014) found pressuring to eat was associated with EAH within boys ages three to four. EAH is eating due to hedonic hunger, not physiological hunger (Harris et al., 2014). Pressure to eat was also significantly positively associated with adolescent boys' use of dieting and extreme weight control measures (Loth et al., 2014). At five years old, a daughter's perception of being pressured to eat was also associated with an increased in emotional disinhibition and dietary restraint (Carper, Fisher, & Birch, 2000). Figure 4 shows the proposed mechanism that this occurs. Children are aware of the controlling feeding practices being used even at an early age (Carper, Fisher, & Birch, 2000).

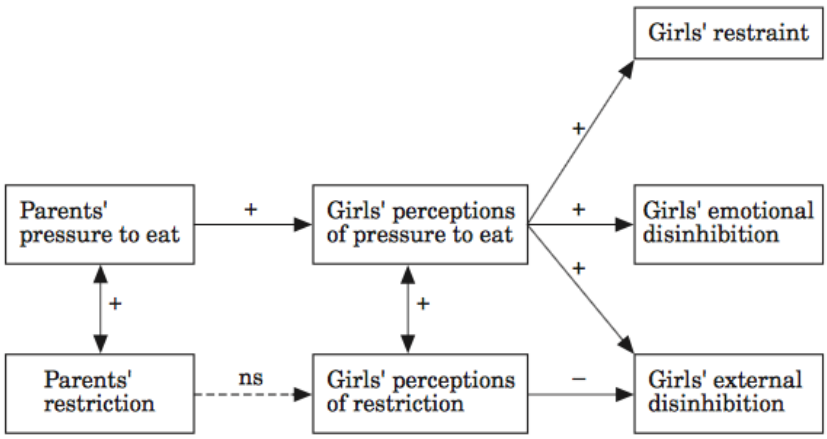

Figure 3. Proposed pathway of parental feeding practices in relation to child outcomes. ns, not significant.

Figure 4. Pathway of Restriction and Pressure to Eat and Child Outcomes (Carper, Fisher, & Birch, 2000)

Monitoring

Monitoring is a parental feeding practice in which "parents 'keep track' of their children's consumption of different foods (particularly sweets, snacks, and high-fat foods)" (Vaughn et al., 2016). Monitoring is generally associated with increased levels

of restriction and pressure to eat (Birch et al., 2001). Monitoring is suggested to have positive effects upon a healthy dietary intake, while other studies have not shown any significant associations (Vaughn et al., 2016; Jansen, et al., 2012).

There is a consensus of the possibility that child adiposity "induces" controlling feeding practices, instead of controlling feeding practices increasing a child's weight (Webber at al., 2010b). Monitoring was found to not have a significant association with maternal perception of weight, concern about weight, or with child adiposity (Webber at al., 2010c; Birch et al., 2001). A conflicting longitudinal analysis revealed that monitoring was increased when a child had a higher BMI (Webber at al., 2010b). However, most of the data collected on monitoring is cross-sectional, therefore, creating a difficult task to interpret these conflicting results (Gubbels et al., 2011).

Monitoring has been associated with increased healthy behaviors such as consumption of healthy foods and fiber, as well as a decreased consumption of added sugar. However, this was not found for hungry or picky eaters (Gubbels et al., 2011). It has been suggested that monitoring might be beneficial until a certain point, but too much monitoring can be counterproductive (Vaughn et al., 2016; Mellin, Neumarksztainer, Story, Ireland, & Resnick, 2002).

Family Meals

Family meals provide family connectedness, which promotes positive healthy behaviors and emotional well-being. It correlates with Social Cognitive Theory that socioenvironmental factors have a strong influence on actual behaviors (Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000). Usually the concept of family meals

coincides with other concepts of healthy behaviors such as increased home availability of fruits, support from parents to eat healthy, and higher levels of limits on television use (Utter, Scragg, Schaff, & Mhurchu, 2008). Family meals allow for adults to model healthy eating behavior for adolescents, which can create an increase in food responsiveness, food enjoyment, and less emotional overeating (Palfreyman, Haycraft, & Meyer, 2015). In infants and toddlers, family meals result in healthier food intake and less eating problems (fussiness) (Verhage, Gillebaart, Veek, & Vereijken, 2018).

Frequency of eating together as a family has strong positive relationships with increased health behaviors such as consumption of fruits and vegetables and decreased BMI in adolescents (Videon & Manning, 2003; Utter et al., 2008; Hammons & Fiese, 2011). The amount of family meals needed to observe health outcomes display inconsistent results. A recent meta-analysis revealed that children and adolescents who share more than three meals per week together are less likely to be overweight, eat unhealthy foods, engage in disordered eating, and are more likely to consume healthy foods (Hammons & Fiese, 2011). Whereas another study found that adolescents who ate six or seven family meals as a family (with at least one parent present) had lower odds of poor consumption of fruits, vegetables, dairy foods, and skipping breakfast (Videon & Manning, 2003). One conclusion despite varied amounts of family meals is that a general high occurrence of family meals has been positively associated with eating five fruits and vegetables a day and eating breakfast at home (Utter et al., 2008). When parents take control, and make breakfast time a structured family meal time, adolescents are more likely to eat breakfast (Videon & Manning, 2003).

The association between where a family meal occurs and the interpersonal family dynamics at the table affect the health outcomes associated with family meals (Berge et al., 2014). Children that experienced a higher positive interpersonal family dynamic during family meals were associated with a decreased prevalence of a child being overweight or obese. An increased prevalence of a child being overweight or obese was seen when family meals times consisted of indulgent/permissive parental feeding practices, hostility or food lecturing (Berge et al., 2014).

It has been found that family meals are more difficult and less likely to happen in older adolescents vs. younger adolescents (Utter et al., 2008). The reasons it can be more difficult to include older adolescents within meal times is the varying schedule differences between teens and parents, teens increasing autonomy, teens dissatisfaction with the family environment, or teens dislike of the foods that are served at family meal times (Neumark-Sztainer et al., 2000). Therefore, practitioners should be aware of these factors and work individually with families to increase the occurrence of family meals including older adolescents for them to continue to reap the benefits (Neumark-Sztainer et al., 2000).

Parental Feeding Practices Effects on Adult's Eating Behavior

Eating behaviors that occur during childhood have a contribution to the eating habits that are carried on throughout adulthood (Wadhera, Phillips, Wilkie & Boggess, 2015). Parents ultimately create a feeding environment for their children, and it can either have a positive or negative effect on a child into adulthood (Kral & Rauh, 2010). There are different contributors to a feeding environment such as parent modeling of food

choices and their behaviors and parental practices (Kral & Rauh, 2010). Multiple studies have reported the impact of parental practices on adulthood (Cullen et al., 2003; Elkins & Zickgraf, 2018; Fletcher et al., 2016; Loth et al., 2016; Daniel, 2016).

Nonresponsive controlling feeding practices such as food rules, pressure to eat, and restriction results in the increase of eating behaviors such as restraint and disinhibition in adulthood (MacBrayer, Smith, McCarthy, Demos, & Simmons, 2001; Kral & Rauh, 2010; Puhl & Schwartz, 2003). Dietary restraint and disinhibition are concepts that both relate to an individual disrupting their internal cues of hunger and satiety in different ways (Heatherton, & Polivy, 1992; Herman, & Polivy, 1975). Dietary restraint is a concept that relates to an individual's attempt to deny hunger cues by purposefully limiting or restricting food intake to avoid gaining weight or to lose weight (Herman, & Polivy, 1975). Disinhibition is the concept of a lack of control over satiety, and an individual exhibiting disinhibition responds to environmental effects or emotional reactions by overeating or binging (Heatherton, & Polivy, 1992).

High dietary restraint has been associated with frequent dieting, a strong drive for thinness (anorexic characteristics), and low episodes of excess dietary intake (Lawson et al., 1995). High disinhibition or low dietary restraint has been associated with extreme adiposity and a lowered energy expenditure related to a decrease in TEF (Lawson et al., 1995). The binge and dietary restraint characteristics are typically exhibited together due to the diet-binge cycle (Puhl & Schwartz, 2003). This occurs when an individual avoids certain foods (dietary restraint) and then breaks the "diet" or restriction, a binge is

typically followed. After a binge occurs, the individual feels "bad", and this results in further restriction and then further binges (Puhl & Schwartz, 2003).

When women were asked to retrospectively report parental practices, pressure to eat (encouraging the child to clean their plate) and using food as a reward (food rules) were associated with increased dietary restraint and disinhibition scores in adults (Brunstrom, Mitchell, & Baguley, 2005). Recollections of increased pressure to eat as a child was also associated with an increased BMI, higher bulimia scores, and lower intuitive eating scores (Ellis et al., 2016; Puhl & Schwartz, 2003). Bulimic symptomatology in adults is greatly affected by parenting practices such as pressure to eat and maternal role modeling (MacBrayer et al., 2001). Adolescents had statistically significant increased bulimia scores when their mothers exhibited and modeled binging, used food as a coping mechanism to improve mood, and had a constant concern about their weight (MacBrayer et al., 2001). High incidence of food rules through reward or punishment exhibited as a child were reported to increase binge tendencies, and dietary restraint within adults (Puhl & Schwartz, 2003). This could be because when children are taught that good or bad behavior is associated with certain foods, the association follows into adulthood (ie: rewarding oneself with sweets after completing something challenging). Other parental feeding practices experienced as a child that result in an increase in emotional eating and higher BMI in adulthood is high monitoring and restriction (Galloway, Farrow, & Martz, 2010).

Foods that were encouraged, role modeled by parents, and allowed in moderation as a child resulted in an increased preference (Wadhera et al., 2015). Interestingly, when

foods were restricted as a child (sweets, fried foods, or pizza), these foods received higher liking scores as an adult. This was not the case for all food items because when soda was restricted as a child, there was a decreased liking for soda as an adult. A possible explanation is that adults dislike foods that have a negative connotation associated with them such as guilt. These results are consistent with previous findings of the effects of restriction being determined by palatability of the foods or negative associations with certain foods (Wadhera et al., 2015).

Effects of Parental Feeding Practices on FN

Parental feeding practices have been related to the development of eating behaviors within children (Wardle et al., 2005). It is suggested that parental feeding practices have an effect within the food neophobic tendencies of a child and adults (Tan & Holub, 2012).

As a Child

Many factors go into the concept of parental feeding practices and their effect on children's FN (Tan & Holub, 2012). Strategies to combat FN deal with parental feeding practices (Hausner et al., 2012; Hetherington et al., 2015). The more control that is exhibited within parents feeding practice has been related to an increase in a child's FN (Wardle et al., 2005). It is unclear if more controlling feeding practices are used because of the child's FN or the cause of the child's FN (Wardle et al., 2005). Practices that may be employed on a child with FN are pressuring to eat, using food as a reward to encourage eating new foods, or using food as a punishment of not consuming foods (Tan & Holub, 2012).

Child's FN has been positively associated with the use of restriction for health but not for pressure or restriction for weight (Tan & Holub, 2012). It is suggested that parents with a child with FN may only serve familiar foods to their child to decrease frustration, reducing the need for pressure (Tan & Holub, 2012). In contrast, pressure to eat was associated with increased child FN and decreased intake of fruits and vegetables (Wardle et al., 2005; Fisher, Mitchell, Smiciklaus-Wright, Birch, 2002). A parent may have their own FN which can overlap in the way that they feed their children (Falciglia, Pabst, Couch, & Goody, 2004; Tan & Holub, 2012; Elkins & Zickgraf, 2018). This was determined as maternal neophobia was inversely related to providing a healthy feeding environment for children (Tan & Holub, 2012). Mothers with FN were also more likely to employ the use of restriction for weight (Tan & Holub, 2012). Children who are FN tend to like sweets or high fat foods so the use of restriction may be a way for a parent to control intake of those foods (Falciglia et al., 2000; Tan & Holub, 2012). Mothers with food neophobic children may not provide healthy options at home because they know their child will not consume them. It could also be that not keeping healthy foods at home, promotes FN (Tan & Holub, 2012).

Another parental feeding strategies associated with children's FN is role modeling (Falciglia et al., 2004; Tan & Holub, 2012). Parents who consumed fruit more frequently had children with lower FN scores. This was also true for the overall total variety of foods consumed by parents, indicating that parent's role modeling and dietary intake effect FN (Falciglia et al., 2004).

As an Adult

There is very limited research on FN in adulthood, but there is emerging evidence that is considering this relationship with adults (Ellis et al., 2016; Zickgraf, & Schepps, 2016; Knaapila et al., 2011). There is even less research on the implications of parental feeding practices on FN in adulthood (Ellis et al., 2016). Ellis et al. (2016) found that in retrospective reports of college students who were picky eaters as children, pressure to eat as a child was a significant predictor of decreased intuitive eating and disordered eating symptoms. Picky eating was not a significant predictor of the college students current eating behavior. Therefore, the result of parental practice that was employed due to the child's picky eating, resulted in disordered eating behaviors in adulthood (Ellis et al., 2016).

Another retrospective report regarding college students' current food preferences due to the parental feeding practices experienced as a child, revealed that for all foods, including vegetables, college students had an increased liking for foods when their parents ate or encouraged those foods, or allowed those foods in moderation (Wadhera et al., 2015). When parents forced their child to consume foods, there was a significant decrease liking in those foods (Wadhera et al., 2015). High levels of forced consumption as a child result in a high level of rejection of those foods in college students (Batsell, Brown, Ansfield, & Paschall, 2002). More than half the respondents (70%) in Batsell et al. (2002) study stated that they had experienced forced feeding practices as a child. Individuals who did experience this feeding practice rated themselves as picky eaters significantly higher than the control group who did not experience forced consumption.

There was not a significant difference in their picky eating status as a child, therefore, forced consumption practices may have contributed to the picky eating status of these individuals as adults (Batsell et al., 2002). Individuals stated feeling out of control, helpless and interpersonal conflict arose during forced consumption periods, resulting in negative emotions associated those food items (Batsell et al., 2002). Disliking of a large amount of foods can be detrimental for someone with FN as they already have a decreased dietary variety (Zickgraf, & Schepps, 2016; Knaapila et al., 2011).

Effects of Food Exposure on FN

The variety of food that one is exposed to within the early stages of life impact food preferences (Lange, Jacob, Chabanet, Schlich, & Nicklaus, 2013; Birch & Marlin, 1982). It is suggested that it may be a beneficial strategy to increase the acceptance of novel foods in children who are FN (Birch & Marlin, 1982). Therefore, food exposure may affect child and adult's food neophobic tendencies (Howard, Mallan, Byrne, Magarey, Daniels, 2012).

As a Child

Food exposure provides opportunities to increase familiarity for children with FN (Owen, Kennedy, Hill, & Houston-Price, 2018; Birch & Marlin, 1982). Repeated taste exposures have been reported to increase liking of fruits and vegetables in children (Fildes et al., 2014; Lakkakula et al., 2010; Fletcher et al., 2016). It has been determined that around the age of two, mere exposure in the way of picture books also increases liking of unfamiliar foods such as vegetables (Owen et al., 2018). The acceptance was significantly increased when the picture books were shown directly prior to the taste

exposures. This result was particularly found in FN and FF children lasting over a three-month period (Owen et al., 2018). Likewise, exposure with sensory activities including fruits and vegetables is associated with increased willingness to try and food preferences for fruits and vegetables in FN and non-FN children (Coulthard & Sealy, 2017). In children ages six to nine, a school based strategy 'Food Dudes' involving rewards and peer-modeling resulted in a decrease in FN scores as well as an increase in liking of fruits and vegetables (Laureati et al., 2014). This result lasted for six months. A higher decrease in FN score was seen in the younger children, similar to the results that younger children are more susceptible to changing food preferences or eating behaviors than older children (Laureati et al., 2014; Mustonen & Tuorila, 2010; Cooke & Wardle, 2005).

In a study completed by Howard et al. (2012), no correlation was found between when a mother introduced their toddler to an item at least six times and a decrease in FN score. This result could have been found because this age range might require more than six exposures to increase acceptance. It also could be because parental feeding practices were not assessed within this study, and the way a food is presented alters the acceptance of the food (Howard et al., 2012; Scaglioni, Arrizza, Vecchi, Tedeschi, 2011; Black & Aboud, 2014). An intervention study in two to four year olds that increased exposure to vegetables prepared in a variety of different ways had similar results that pure taste exposure was less effective in increasing acceptance of FN children over non-FN children (Wild, Graaf, & Jager, 2017). This could be indicative of the best time to alter FN with food exposure is early in the weaning process before FN peaks or with combination of food related sensory activities, rewards, and parental practices (Wild et al., 2017;

Coulthard & Sealy, 2017; Owen et al., 2018; Cooke & Fildes, 2011; Forestell & Mennella, 2007).

As an Adult

There is limited research that has been conducted on the impact of food exposure as a child and the relationship with FN as an adult. Previous literature reveals the importance of food exposure on development of food preferences (Pliner, 1982; Hausner et al., 2010; Cooke & Fildes, 2011). Wadhera et al. (2015) completed a study on the impact of frequent exposure of foods in childhood and the association with college students liking. They determined that frequent exposure to novel foods during childhood is a critical component of maintaining long-term liking for these food items and an effective strategy for overcoming food aversions. Students that were never or rarely exposed to certain vegetables or meat, described disliking these certain foods (Wadhera et al., 2015). These are the food items that are typically rejected by food neophobic individuals (Cooke et al., 2003; Wardle et al., 2005; Zickgraf & Schepps, 2016). Even foods disliked as a child that they were frequently exposed to, resulted in a current liking of those foods (Wadhera et al., 2015).

Origin of Food Preferences and Eating Behaviors

Food preferences and eating behaviors are formed at the beginning of life, as early as in utero (Beauchamp & Mennella, 2009; Mennella, Johnson, & Beauchamp, 1995; Mennella, Jagnow, & Beauchamp, 2001). They can be influenced by many factors such as genetics (Fildes et al., 2014), prenatal and postal experiences (Beauchamp & Mennella, 2009), availability of food in the home (Cullen et al., 2003; Elkins & Zickgraf,

2018; Fletcher et al., 2016; Loth et al., 2016; Daniel, 2016), and food exposure (Fildes et al., 2014). These influences can shape food preferences, food intake, and eating behaviors that can have lasting impacts that reach into adulthood (Galloway et al., 2010; Brunstrom et al., 2005; Ellis et al., 2016).

Heredity of Food Preferences

There are specific gene markers related to bitter, sweet, and umami that have been discovered. Twin studies make it possible to determine the genetic influence on food preferences (Fildes et al., 2014). Using twin studies, a connection has been found between genetics and liking of nutrient dense food (Fildes et al., 2014; Breen, Plomin & Wardle, 2006; Smith et al., 2016a).

Taste gene markers. Beauchamp and Mennella (2009) describe flavor "as the perceptual combination of three anatomically distinct chemical senses: taste, smell, and chemosensory irritation." Flavor stimuli are perceived by the tongue, palate, and the gut. The flavor is then transformed to taste once dissolved by salvia (Bachmanov & Beauchamp, 2007). Taste over time has evolved as culture influences have impacted or overcame genetics (Rozin, 1976). Taste was originally biologically created for animals to determine whether a substance was toxic and should be rejected (Bachmanov & Beauchamp, 2007). There are five primary taste qualities: sweet, salty, bitter, sour and umami or savory (Beauchamp & Mennella, 2009).

The mechanism of salty and sour is not fully known (Beauchamp & Mennella, 2009). It is perceived that these tastes flow by ways of ion channels, which act as receptors. Sour (H+) and salty (Na+) activate the taste receptors by flowing through the

ion channels (Beauchamp & Mennella, 2009). For the taste umami, G-protein coupled receptors (GPCRs) are the binding force between taste molecules and activating the taste cell. This occurs for the sweet taste as well as a group of three GPCRs named T1R1, T1R2, and T1R3 by coupling and detecting sweet and umami taste qualities. The GPCRs T1R1 + T1R3 combine to activate the taste mechanism for umami, and the GPCRs T1R2 + T1R3 combine to activate the taste mechanism for sweet (Beauchamp & Mennella, 2009).

The fat taste has been related to a single nucleotide polymorphism (SNP) in the CD36 fat taste receptor, which creates a higher preference for the fat taste. This has been linked with higher chronic disease biomarkers as well through a review of literature by Chamoun et al. (2017). However, the CD36 fat taste receptors under normal conditions, binds to long chain fatty acids (LCFA). This has been corresponded with a higher sensitivity to tasting LCFA and correlated with a reduction in fat intake, total caloric intake, and total body mass index (Stewert et al., 2010). This is suggestive that sensitivity to fat decreases fat intake. This is further explained when obese adults with the lack of sensitivity to the fat taste had a higher intake of fat than normal weight adults with a higher sensitivity to the fat taste (Stewert et al., 2011; Liang et al., 2012).

Polymorphisms in the Taste 2 receptor gene family (TAS2R) have 25 bitter-taste receptors. There are variations in sensitivity towards the bitter taste receptors such as phenylthioncarbamide (PTC) and 6-n-propylthiouracil (PROP) (Smith et al., 2016a). Bitter taste aversion is primarily due to the biological innate nature of bitter foods containing toxins (Bachmanov & Beauchamp, 2007). Rozin (1976) hypothesized that

bitter taste aversion decreases around the time of puberty and is evidenced by the increased acceptance of bitter tasting foods and beverages such as a coffee later in life. However, due to the sensitivity to bitter foods, an association has been found between PTC and PROP tasters and liking of cruciferous vegetables. A study by Turnbull & Matisoo-Smith (2002) displayed that the sensitivity of bitter from PROP was positively correlated with dislike of the taste of raw spinach. In contrast, one study conducted found vegetable preferences to have a slightly less genetic influence than on fruit preferences. However, PROP was not tested within this study and could be related to other shared environmental effects within the home (Breen et al., 2006). It has also been suggested through research that PROP sensitivity leads to an increase preference for sweet tasting food items (Mennella, Pepino, & Reed, 2005). Resulting in PROP tasters having a higher risk for adverse health outcomes from a decreased of intake of vegetables and an increased intake in sweet and fatty foods (Chamoun et al., 2017).

Twin studies. Twin studies allow for estimation of the genetic influence on food preferences (Fildes et al., 2014). The comparison between monozygotic twins (twins who share 100% of their genes) and dizygotic twins (twins who share 50% of their genes) make this possible (Fildes et al., 2014; Smith et al., 2016b). When determining the phenotypic variance between monozygotic (MZ) twins and dizygotic (DZ) twins, there are three variables that are addressed. These variables are the additive genetic effect (A), the shared environmental effect (C), and the unique environmental effect, which also includes measurement error (E) (Smith et al., 2016a). These three variables are, then, placed into an ACE model by Maximum Likelihood Structural Equation Modeling

(MLSEM). The shared environmental effect can contribute by similarities between twins such as living in the same household. The unique environmental effect can contribute by experience specific to each twin such as having different friends (Smith et al., 2016a). This method of genetic testing for heritability of food preferences between DZ and MZ twins are used in all the following studies discussed.

Breen et al. (2006) conducted a study with 214 children that were same-sex twin pairs to determine the heritability of food preferences. A total of 77 food items were categorized into four food categories: “vegetables”, “fruit”, “dessert”, and “meat and fish”. The MZ correlations were higher for all four categories than DZ, indicating a high genetic influence on food preference. There was a modest genetic influence on liking of “dessert” foods, a moderate genetic influence for “fruits and vegetables”, and a high genetic influence on ”meat and fish”. Overall, genetics only explained 24% of the variance after factoring for the ACE model. In similarity, Fildes et al. (2014) replicated this study with 6,754 twin pairs. It was determined that there was a high hereditability for preferences for the food groups fruit, vegetables and protein and a small hereditability preference for snacks. Fruits, vegetables and protein accounted for 48-54%, and snacks accounted for 29% of the variance. Shared environmental effects had a more significant portion of the variance regarding preference for food groups dairy, starch, and snacks at 54-60%. Shared environmental effects only accounted for 35-37% variance for preference for fruit, vegetables, and protein foods. Breen et al. (2006) and Fildes et al. (2014) both conducted their research on children. There is limited research conducted on

the genetic influence of food preferences in older adolescents or adulthood (Smith et al., 2016a).

It is expected that within older adolescents, unique environment effects will have a higher effect on food preference because of the increased chance to be influenced by food related behaviors outside of the home as autonomy increases (Smith et al., 2016a). This assumption was researched on 2,865 on 18-19-year-old twin pairs and in 2,009 22-27 year olds. There was found to be no influence on shared environment on food preferences, consistent with the suggested assumption. There was a moderate genetic influence observed on food preference as well as unique, non-shared environmental factors (Smith et al., 2016a; Keskitalo et al., 2008). The strongest correlation observed was for genetic influence on preference of fruits and vegetables and accordingly was higher in MZ pairs over DZ pairs (Smith et al., 2016a). Hereditability continues to be a high indicator for food preference even after unique environmental experiences begin to occur (Smith et al., 2016a).

Heredity of Eating Behaviors

An eating behavior that is genetically influenced is food intake self-regulation. It is indicated through genetic research that humans are born with the ability to self-regulate food intake (Grimm & Steinle, 2011). However, this can be disrupted by polymorphisms and by environmental factors such as parental practices (Faith, Carnell & Kral, 2013a).

Food intake self-regulation. Specific hormones are associated with food intake self-regulation, appetite, and eating behaviors. These hormones include ghrelin, leptin, CCK, and FTO (Grimm & Steinle, 2011). Ghrelin stimulates appetite and is called the

'hunger hormone.' Ghrelin also promotes food intake and fat storage within the body. It is produced by the stomach and pancreas. The hypothalamus regulates the receptors of Ghrelin. Ghrelin levels rise just before eating and are the reason for the internal cues that occur when one is hungry (Ghrelin, 2018). The hormones, CCK and Leptin, produce satiety instead of hunger. Normal eating is disrupted when there are gene variations of these self-regulating hunger hormones. These gene variations increase meal sizes due to decreased satiety or increased hunger, and result in a higher risk for obesity, metabolic syndrome, and binge eating (Grimm & Steinle, 2011).

EAH has been studied to have a 51% genetic influence (Butte et al., 2007). EAH is associated with an A allele for a FTO (fat mass and obesity gene) polymorphism rs9939609 and AA genotype (Wardle et al., 2008). Children with a poorer responsiveness to hunger and fullness cues were also associated with an AA genotype (Haworth, Davis, & Plomin, 2012). Environmental factors can also contribute to this neglect of food intake self-regulation. Maternal pressure to eat was associated with a higher EAH in boys, indicating that children are responsive to environmental cues to eat as well and may have a stronger influence than their internal cues (Harris, Mallan, Nambiar & Daniels, 2014). There is limited research within this topic of food intake self-regulation, however, the current research that is available suggests a genetic association in combination with environment factors (Faith et al., 2013a; Harris et al., 2014). This is consistent with the research presented about genetics influence on food preference and taste (Smith et al., 2016a; Breen et al., 2006; Fildes et al., 2006).

Food Exposure

Ventura (2017) states that first 1,000 days of life are a critical and key period for an infant's flavor and food preferences to develop. This first 1,000 days relate to healthy eating during pregnancy, during breastfeeding, and introducing variety of foods during weaning. Food exposure plays the most important role for these three stages because the amniotic fluid changes in relation to food exposure of the mother (Mennella et al., 1995), breastmilk flavor changes in relation to the food exposure of the mother (Beauchamp & Mennella, 2009), and then repeated food exposure of a variety of foods during weaning and beyond develops more food preferences from flavor variety (Lange et al., 2013). These three stages all build up on each other and continue to influence food preferences by more and more exposure of novel flavors and foods (Ventura, 2017). Zajonc in 1968 developed the "mere exposure" hypothesis. This hypothesis states that "mere repeated exposure of the individual to a stimulus object enhances his attitude toward it." The exposure effect works primarily when stimulus object is novel or unfamiliar (Zajonc, 1968; Birch & Marlin, 1982). Food exposures can continue to influence food preferences and eating behaviors in the development stage of early adolescents (Fildes et al., 2014; Lakkakula, Geaghan, Zanovec, Pierce, & Tuuri, 2010; Fletcher et al., 2016; Puhl & Schwartz, 2003).

Prenatal. The foods consumed throughout pregnancy has been believed to have an impact on a child's dietary preferences (Beauchamp & Mennella, 2009; Mennella et al., 2001). This is because fetus' swallow amniotic fluid transmitting flavors to the infant from the mother's diet during her pregnancy (Mennella et al., 2001). The sensory

environment changes in the womb upon the ingestion by the mother. When pregnant women were studied ingesting garlic capsules, the odor of their ammonitic fluid was altered (Mennella et al.,1995). Various flavors and exposure in the amniotic fluid have led to increased food preferences for these flavors at birth and can have lasting impacts through the weaning process (Mennella et al., 2001; Schaal & Marlier, 2000). Mennella et al. (2001) studied 46 women and required them to drink 300ml of carrot juice or water daily for four days per week for three weeks during the last trimester and then repeated during the first two months of breastfeeding. The purpose was to determine the infants' preference for carrot flavored cereal over plain cereal after the habitual ingestion of carrot juice. The infant's food preferences were determined by their facial expressions and their intake of the cereal. The results demonstrated that infants that were exposed to the carrot flavor had fewer negative facial expressions when eating the carrot flavored cereal than the control group. Mothers also rated their infants' liking of the carrot flavored cereal higher than the plain cereal (Mennella et al., 2001).

Postnatal: breastfeeding. Breastfeeding is recommended by the American Academy of Pediatrics to be exclusive for approximately six months of the infant's life, and then continued breastfeeding for up to one year with introduction of complementary feeding (Infant Food and Feeding, 2018). Breastfeeding duration as well as the mother's diet quality during breastfeeding has an impact on food preferences related to the composition of the milk. Specifically, breastfeeding has been reported to increase the liking and acceptance of fruits and vegetables during the weaning process and beyond (Rudley & Ramsay, 2014; Mennella et al., 2001; Forestell & Mennella, 2007). Breast

milk transfers flavors from the mother's dietary intake, similarly to amniotic fluid. Flavors that have been seen to be transmitted through breast milk include: carrot, garlic, vanilla, tobacco, and even alcohol (Beauchamp & Mennella, 2009; Mennella et al., 2001; Mennella & Beauchamp, 1991; Mennella & Beauchamp, 1996; Mennella & Beauchamp, 1995; Mennella & Beauchamp, 1998; Mennella & Beauchamp, 1992). The flavor of breast milk is also consistent with the flavor preferences innately born in infants. Breast milk has a sweet and savory taste from lactose and free amino acid glutamate content (Ventura, 2017). This is consistent with the innate preference for sweet-tasting compounds in infants and children (Beauchamp & Mennella, 2009). Repeated exposure of breast milk will continue to further drive the preference for sweet and savory increasing acceptance of these flavors when a new food is introduced (Ventura, 2017).

However, breastfeeding alone is not enough to completely increase acceptance of a new food. Research examines three main mechanisms involved in the food preference development of adolescents during introductions of complementary foods (CF). These are repeated exposure, variety exposure, and associative conditioning (Ventura, 2017). Forestell & Mennella (2007) determined the effects of breastfeeding and dietary experience on acceptance of fruits and vegetables on four to eight-month-old infants. This study looked at 45 infants, and the results showed that breastfeeding provided an increase in initial acceptance of a food during the introduction period, but it was only beneficial if the mothers habitually ate that food. Concluding with the inference that after weaning, repeated exposure may have a higher impact on increased acceptance of a food (Forestell & Mennella, 2007) Duration of breastfeeding alone is also not associated with

increased acceptance without repeated exposure (Lange et al., 2013). Infants communicate their acceptance of foods through facial expressions and the amount that they will intake a food. Parents will stop feeding their infants foods that they continually reject. This creates a problem when there is clear evidence that repeated exposures increases the liking of that food (Lange et al., 2013; Beauchamp & Mennella, 2009).

The impacts of breastfeeding reach into later childhood and even young adults Cooke et al., 2004; Galloway et al., 2003). Children who were breastfed are typically less neophobic at age seven than formula fed children and have an increased fruit and vegetable intake from ages two to six according to previous research (Cooke et al., 2004; Galloway et al., 2003). Young adults that reported to have been breastfed for a longer period had a significantly higher fruit intake than individuals who had a shorter breastfed duration (Rudley & Ramsay, 2017). This result is suggestive that breast feeding duration has a lasting impact on the food preferences as an adult and could result in increased preferences for nutrient dense foods such as fruits and vegetables (Ventura, 2017).

Postnatal: formula. Infant formulas have various tastes depending on the composition of the milk. There is milk made from unaltered bovine, and those made from hydrolyzed casein. Infants that cannot tolerate milk formulas must drink the formula composed of hydrolyzed casein. This formula has a stronger, bitter and sour taste (Beauchamp & Mennella, 2009). Infants that have been fed with hydrolysate formulas have increased acceptance and liking of infant cereals with bitter, savory or sour tasting. They also consumed these foods quicker (Beauchamp & Mennella, 2009; Mennella, Forestell, Morgan, & Beauchamp, 2009). Flavor preferences that develop

from formula feeding have been reported to last up until the ages of four and five (Mennella & Beauchamp, 1996). However, formula-fed infants still are introduced to less flavors than breast-fed infants (Birch & Fisher, 1998). Therefore, it is suggested that variation of formulas be fed to infants to increase the flavor exposure during this critical stage of taste development (Cooke & Fildes, 2011).

Breast-fed babies have a higher acceptance rate of foods compared to formula-fed infants when their mothers regularly consume that food (Forestell & Mennella, 2007). This increase of acceptance of CF in breast-fed infants occurs at the onset of CF or within one month, after that time-period the increased effect is not as significant. Indicating that the most crucial time to introduce new, novel foods and receive the benefit of increased acceptance from breast feeding is early in the introduction of foods (Mennella et al., 2001; Hausner et al., 2010).

Interestingly, formula-fed infants experience higher and quicker growth spurts than breast-fed infants (Birch & Fisher, 1998). This has been speculated to be due to the differences in intake. A breast-fed infant has a greater control over the amount consumed and can self-regulate by listening to their innate cues of hunger and satiety, whereas formula-fed infants are under the control of the parent. The parent might encourage the infant to finish the bottle, resulting in overfeeding (Birch & Fisher, 1998).

Postnatal: weaning infants. The introduction of CF has been proven to be an important taste developmental time-period during weaning infants (Nicklaus, 2017). This is the time when infants start to understand and learn the sensory properties of texture, taste, and flavor, and when healthy foods with higher nutritional properties such as

nutrient dense foods are discovered (Nicklaus, 2017). The American Academy of Pediatrics recommends starting to introduce CF around the age of six months depending on the developmental status of the baby (Breastfeeding, 2019). Cooke & Fildes (2011) suggests that at no point in one's life are they more open to new and novel foods than during that time-period. Within the four to six-month range, it can require as little as one exposure to increase the acceptance of that food (Cooke & Fildes, 2011). Timing is an important aspect of repeated exposure during the CF process (Mennella et al., 2001; Hausner et al., 2010). The earlier vegetables are introduced, the higher the acceptance. Also, the higher the variety of foods introduced, the higher acceptance of new novel foods (Lange et al., 2013).

In infants, repeated exposure has been found to be the best strategy to increase acceptance, in breastfed and non-breast fed infants (Forestell & Mennella, 2007; Mennella et al., 2001; Hetherington et al, 2015). There are varying results on the number of exposures it may take to increase acceptance. It has generally been observed that 10-20 exposures are needed for preschoolers and school aged children (Hausner, Olsen & Møller, 2012; Birch, 1989; Lakkakula et al., 2010). Forestell & Mennella (2007) found that it required eight repeated exposures of green beans for an increase in intake to be seen within infants.

There are various ways to introduce novel foods (Hausner et al., 2012). These consist of mere exposure, flavour-flavour learning, and flavour-nutrient learning (Remy, Issanchou, Chabanet, & Nicklaus, 2013). Hetherington et al. (2015) concluded that when infants were provided with the gradual introduction of vegetable taste incorporated with

familiar tastes such as milk or cereal (flavour-flavour learning) increased liking and acceptance of the vegetable over a control group. Flavour-flavour learning was an effective strategy for increasing the acceptance of green beans, when peaches were offered at the same time (Forestell & Mennell, 2007). In contrast, Remy et al. (2013) found that it was not necessary to incorporate vegetables in a familiar taste to increase liking. Mere repeated exposure was the most significant predicator of increased acceptance of that vegetable and could result in long-term acceptance of at least three months. This study added to the findings that at the beginning of complementary feeding, there was the highest acceptance of an unfamiliar vegetable (Mennella et al., 2001; Hausner et al., 2010; Cooke & Fildes, 2011).

Early adolescents. As children get older, they prefer higher fat, sugary foods over vegetables (Cooke & Wardle, 2005). Birch (1989) proposed that disliking of foods can be reconstructed through repeated exposure of various foods and tastes. Shared environment effects have a substantial impact on children's food preferences. Shared environment effects accounted for 54-60% for dairy, starch and snacks in a study by Fildes et al (2014). Therefore, it is important for children to be exposed to a variety of foods instead of energy-dense food items as this increases the liking for these foods (Fildes et al., 2014). This was the first study to determine the effect of shared and genetic effects on the liking of starch and dairy.

Repeated and frequent exposure of foods can be effective at home and as well as in the school system (Fildes et al., 2014). Lakkakula et al. (2010) conducted a study on 360 fourth and fifth graders on repeated food exposure over four new vegetables for nine

weeks. The results showed a 5.5x higher liking score for carrots, 5.6x higher liking score for peas, and a 2.8x higher liking score for tomatoes on the tenth taste testing. However, it did not increase for bell peppers. This could be related to the taste differences between carrots, peas, tomatoes and bell peppers, with bell peppers having a more bitter taste than the former three. Eight to nine exposures had the greatest percentage of increased liking for a particular vegetable (Lakkakula et al., 2010).

An example of how food exposure can improve food preferences for nutrient-dense foods at home was conducted by Fletcher et al. (2016). Liking for fruit and vegetables at 30 months old was found to be significantly positively associated with intake at seven years. The number of vegetables tried at 30 months was also a significant predictor of vegetable intake at seven years. This result was not found with fruits. This is indicative that liking is significantly associated with intake, however, intake can be increased alternatively through repeated exposure (Fletcher et al., 2016).

Hausner et al. (2012) found that mere repeated exposure had the greatest impact on acceptance of an artichoke puree over ten exposures. The highest intake was seen after the fifth exposure, suggesting that it only takes five exposures for children ages two to three to have increased liking for a novel vegetable. Flavour-flavour learning had the most impact from the fifth to the tenth exposure. Within this study, there was a significant amount of 'non-eaters' and could be related to food neophobia (FN). Both strategies with repeated exposure had an impact on increasing the liking of novel foods long term and could be a possible strategy in dealing with in food neophobic children (Hausner et al., 2012; Hetherington et al., 2015).

It has been previously discussed the importance of food exposure on molding food preferences within utero, infants and children (Fletcher et al., 2016; Fildes et al., 2014; Cooke & Fildes, 2011; Mennella et al., 2001). It also has been seen retrospectively in young adults. In college students, an increase in preference as well as intake of fruits and vegetables was associated with recollection of fruit and vegetable offering as a child (Ramsay, Rudley, Tonnemaker, & Price, 2016).

Food Availability

Research provides a good basis of information that parents can influence children's dietary habits in a positive way by providing healthful foods at home **(**Loth et al., 2016). Children have higher intakes of fruits and vegetables when they are accessible and available within the home (Wardle et al., 2005). Availability within the home has the most significant impact on girls (Cullen et al., 2003). Food availability compared to parenting practices such as modeling and restriction, showed the highest impact of daily servings of fruits and vegetables consumed (Loth et al., 2016). However, providing healthy foods comes at a cost and can be not always be a part of everyday life when socioeconomic status is a factor (Daniel, 2016). Socioeconomic status has been predicted as the strongest predicator for fruit and vegetable intake and preferences when compared to repeated food exposure and FN from 30 months old to seven years old (Fletcher et al., 2016).

When parents have limited means and must deal with picky eaters simultaneously, often the risk of buying healthy foods and the food getting wasted is too big of a risk (Daniel, 2016). This is especially true when it can take up to 20 exposures of a food item

before a child will accept it (Hausner et al., 2012; Birch, 1989; Lakkakula et al., 2010). Daniel (2016) asked a mother if she knew that after the tenth time of offering a vegetable to her son, he would finally like it, would she consider it. She responded:

No. No. That's a lot of wasted food. No. Not for me, not for me.

High-income individuals stated that introducing a food up to 15 times, sounded feasible, despite all the wasted food that would occur. This indicates that a beneficial way to combat this problem is to educate about how to introduce healthy foods while minimizing food waste (Daniel, 2016). This mechanism of lower socioeconomic children with a decreased introduction and consumption of fruits and vegetables may explain why in a group of college students, the higher the socioeconomic status seen, the lower the levels of pickiness and FN occurred (Elkins & Zickgraf, 2018).

Current Food Preferences and Eating Behaviors of College Students

The Dietary Guidelines for Americans provide specific recommendations for eating habits (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). However, college students tend to consume below the recommended intakes for fruits, vegetables, and fiber and face many obstacles to eating a healthy diet (Fall 2017 Reference Group Executive Summary - acha.org, 2017.; Harris, 2017).

Dietary Guidelines for Americans

The U.S. Department of Health and Human Services and U.S. Department of Agriculture have developed the Dietary Guidelines for Americans 2015-2020. Within the guidelines are general healthy principles to follow as well as specific recommendations for servings of food groups and macronutrients. There are five key guidelines addressed

within the Dietary Guidelines for Americans 2015-2020. The first guideline is to "follow a healthy eating pattern across the lifespan." Every food decision that occurs throughout one's life matters. A healthy eating pattern should consist of an appropriate calorie amount to maintain body weight, achieve proper nutrients, and reduce the risk of chronic disease. The second guideline is "Focus on variety, nutrient density, and amount." Optimal nutrition health is achieved through intake of variety of foods as each food has different nutritional compositions. It is also achieved by eating foods in moderation. Too much of a nutrient-dense food is not good for the body just as too much of an energy-dense food is not good for the body. This guideline is also promoting picking nutrient-dense foods over energy-dense foods. The third guideline is "Limit calories from added sugars and saturated fats and reduce sodium intake." This refers to limiting energy-dense foods and foods higher in sodium for a healthy eating pattern to occur. The fourth guideline is "Shift to healthier food and beverage choices." Choosing nutrient-dense foods and beverages should be chosen with food preferences and cultural implications taken into account in order for this habit to be maintained. The fifth guideline is to "Support healthy eating patterns for all." Everyone can play a role in promoting healthy behaviors in home, school, work and community settings.

Included within the Dietary Guidelines for Americans 2015-2020, there are key recommendations for a healthy eating pattern and limits.

A healthy eating pattern includes:

- A variety of vegetables from all of the subgroups—dark green, red and orange, legumes (beans and peas), starchy, and other

- Fruits, especially whole fruits
- Grains, at least half of which are whole grains
- Fat-free or low-fat dairy, including milk, yogurt, cheese, and/or fortified soy beverages
- A variety of protein foods, including seafood, lean meats and poultry, eggs, legumes (beans and peas), and nuts, seeds, and soy products
- Oils

A healthy eating pattern limits**:**

- Saturated fats and *trans* fats, added sugars, and sodium

Key Recommendations that are quantitative are provided for several components of the diet that should be limited. These components are of particular public health concern in the United States, and the specified limits can help individuals achieve healthy eating patterns within calorie limits:

- Consume less than 10 percent of calories per day from added sugars
- Consume less than 10 percent of calories per day from saturated fats
- Consume less than 2,300 milligrams (mg) per day of sodium
- If alcohol is consumed, it should be consumed in moderation—up to one drink per day for women and up to two drinks per day for men—and only by adults of legal drinking age. (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015)

Current Dietary Intake of College Students

The National College Health Assessment in 2017, reported that 23.2% of college students were overweight and 14.6% were obese (Fall 2017 Reference Group Executive Summary - acha.org, 2017). Weight gain has specifically been observed from high

school to college. Poor eating habits and decreased physical activity are exhibited within college students (Deforche, Dyck, Deliens, & Bourdeaudhuij, 2015). More than half, 70.6% of college students are only consuming two or fewer fruits and vegetables daily (Fall 2017 Reference Group Executive Summary - acha.org, 2017). College students are also not meeting fiber, grain or dairy recommendations and overconsuming protein and empty calories (Crowe et al., 2017; Wasshenova et al., 2015).

These findings are not generalizable however, because vegetable intake differs based on race and ethnicity, vegetarians and non-vegetarians, and grade level. Non-Hispanic Caucasians consume vegetables more frequently than non-Caucasians. Hispanic/Latino college students consumed more vegetables than non-Hispanics (Schroeter & House, 2015). Vegetarians are also more likely to consume fruits and vegetables more frequently. An incidence of 53% higher fruit and vegetable intake was seen over vegetarians and non-vegetarians (Schroeter & House, 2015). Upperclassmen ages 21-25 consumed a great amount of fruits and vegetables compared to underclassmen 18-20 (Ramsay et al., 2016)

Previous research has indicated that college students demonstrate other unhealthy behaviors such as an increase in sedentary behaviors, increase in consumption of alcohol, and decreased hours of sleep (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). An increase in sedentary behaviors is typical within college students because of the increased free time or increased requirement for studying. Leisure time spent on the internet is was positively associated with an increase in weight gain but when sedentary time was spent studying, less weight gain was seen (Deforche et al., 2015). This could be

related to the fact that individuals who care about their grades may also exhibit more discipline with their health. Weight gain also occurs from poor dietary habits of college students. Fruit and vegetable intake is associated with a decrease in weight gain in women and high alcohol consumption increases weight gain in men (Deforche et al., 2015).

Current Food Preferences of College Students

College students are in a unique position where they are gaining autonomy within their food choices but their family may still have impact on their intake. An example of this, is that fruit intake at home was highly predictive of fruit intake within college students (Schroeter & House, 2015). Despite the lingering impact of the family, there are many other factors that play a role within the food preferences and selections of college students (Harris, 2017). College students justify their food preferences by stating that they are following the "typical college" lifestyle (Harris, 2017). They focus on food items that are fast, cheap, practical, convenient, and consider the way the food tastes. The fact that most college students are low income is considered a predictor of the "typical college" diet as well (Harris, 2017). In addition, where the student lives such as on campus or off campus affects food preferences (Zuercher, & Kranz, 2012). College students consider consumption of fruit and vegetables as part of a "healthy diet," causing them to be very critical of themselves and their diets when these food items are not consumed. However, by incorporating and generalizing the claim that it is typical for college students to eat unhealthy, they are giving themselves permission to continue unhealthy eating habits (Harris, 2017).

College students are aware of the impact that poor consumption of fruits and vegetables have on the nutritional quality of their diets. However, an increase in health and nutrition knowledge is not significantly associated with an increase in fruit and vegetable consumption (Schroeter & House, 2015). Gender differences are prevalent among the food decisions among college students (Rudley & Ramsay, 2017). Females have been reported to make more mindful decisions regarding their food intake (Zuercher, & Kranz, 2012).

CHAPTER III

METHODOLOGY

Overview

The purpose of this study was to compare college student's current FN scores to previous food exposure and parental feeding practices experienced during childhood. An electronic questionnaire was sent via email for data collection. This data collected contained questions and statements assessing current food neophobia (FN) characteristics in individuals and contained questions regarding parental feeding practices experienced as a child as well as the food exposure experienced. This was a quantitative, post-test only, correlation design. The variables of this study were current FN scores and parental feeding practices experienced in childhood. This research was approved by the Institutional Review Board (IRB) at Kent State University.

Participants

The participants of this study were recruited via convenience sampling. The participants included all undergraduate and graduate students at Kent State University enrolled in courses during the semester of Spring 2019. Participants consisted of students either full-time or part-time status, from all class levels-freshman to senior, Masters, or PhD and all levels of housing status. Participants consisted of all genders, ethnicities, and majors. Participants were limited to undergraduate students and graduate students at

Kent State University's main campus to increase uniformity between participants and between geographic location. Individuals under the age of 18 or over the age of 25 were not included within the study. Participants that have ever been clinically diagnosed with an eating disorder (such as: Anorexia Nervosa, Bulimia Nervosa, Binge eating disorder, Purging disorder, Binging disorder, Avoidant/Restrictive Food Intake disorder, eating disorder not otherwise specified) or a food allergy were also excluded from the study. One participant was selected for a $25 Amazon gift card to encourage and increase participation.

Instrumentation

A survey (located in Appendix A) was developed for data collection as a combination of three previously created and validated surveys (Galloway, Farrow, & Martz, 2010; Pliner & Hobden, 1992; Wadhera, Phillips, Wilkie, & Boggess, 2015). Permission was granted from all three authors for the use of their surveys. The data collected included demographic information. The survey had four sections which are demographics, recollection of childhood food exposure, parental feeding practices, and the Food Neophobia Scale (FNS).

Survey Design

The survey consisted of four parts. Part one included 12 questions regarding demographics. Part two consisted of recollection of childhood food exposure questions. Part three had questions regarding the recollection of childhood parental feeding practices. The last part of the survey was the FNS. All surveys are located in Appendix A.

Survey Components

The survey consisted of four parts: demographics, recollection of childhood food exposure, recollection of childhood parental feeding practices, and current FNS.

Part I: demographics. The demographic information consisted of 12 questions. The first question determined if the student was above the age of 18 and whether the participant consented to the study. The second and third questions were the exclusion criteria questions. The second question asked if the student has ever been clinically diagnosed with an eating disorder, if the student answered yes then the survey was discontinued. The third question asked if the individual has any clinically diagnosed food allergies, if the student answered yes then the survey was discontinued. The fifth and sixth question of this section asked about the grade level of the student including whether the student is an undergraduate or graduate student. The next questions asked about the gender, the actual age of the participant and their race/ethnicity. The student was then asked for self-reported weight and height, for BMI to be calculated. The next question was regarding the current living situation of the student such as on-campus or off-campus living. The last question asked the participants if they were considered a "picky" or "fussy" eater as a child.

Part II: recollection of childhood food exposure. This survey was created by Wadhera, Phillips, Wilkie, & Boggess in 2015. This survey consisted of foods in the categories of fruit, vegetables, dairy-protein, high fat/high carbohydrate, high fat, and high carbohydrate foods. There was a total of 96 foods evaluated within the survey. Each food was placed into a category with a corresponding food group. Fruits had a total

of 16 foods; Vegetables had a total of 12 foods; Dairy-protein had a total of 25 foods; High carbohydrate had a total of 14 foods; High fat had a total of 12 foods; and High Fat/High Carbohydrate had a total of 17 foods. The participant was requested to think back to when they were in elementary school and to answer the questions about their eating experience with these foods. Each food item was allowed multiple responses. The responses for each food item included: "I NEVER ate this", "I was NOT ALLOWED to eat this", "I ate this RARELY", "I SAW others eat this frequently", "I ate this FREQUENTLY", "I LIKED eating this", "I was ENCOURAGED to eat this", and "I was FORCED to eat this". For all foods combined, the Cronbach's alpha, the internal reliability of this survey was found to be 0.94 with the correlation at 89% (Wadhera et al., 2015). Respondents had to provide a valid response of only one answer "I NEVER ate this," "I ate this RARELY," or "I ate this FREQUENTLY" for at least 77 of the foods (80%) to be included within the final participants of the study.

Part III: recollection of childhood parental feeding practices. The Child Feeding Questionnaire (CFQ) created by Birch et al. (2001) was adapted by Galloway et al. in 2010. This is titled "Retrospective College Student CFQ" and was used to determine the participants' experience of parental feeding practices as a child. The questionnaire consisted of 18 questions with seven "pressure to eat" questions (questions one, three-seven, and 11), seven "restriction" questions (questions two, eight, nine, and 12-15), and three "monitoring" questions (questions 16, 17 and 18). The participants were asked to think about the person who was most responsible for feeding them. They were to state the person and fill in the person's name for each "x" indicated in the

questions. Responses were based on a five point Likert scale with the options "Always, Often, Sometimes, Rarely, and Never." Reversing score was used when appropriate. Questions one, three-eight, 10-11, and 16-18 are reversed. Galloway, Farrow, and Martz (2010) completed an internal reliability test for the student retrospective CFQ, which showed good reliability for restriction (α=0.71), pressure to eat (α=0.75), and monitoring (α=0.91). Respondents had to answer 15 of the statements (80%) to be included within the final participants of the study.

Part IV: current FNS. The FNS is a 10-item questionnaire to determine FN characteristics within an individual was developed by Pliner & Hobden (1992). The ten items are statements, and the respondents answered based on a seven point Likert scale with the options "Agree strongly, agree, agree slightly, neither agree nor disagree, disagree slightly, disagree, disagree strongly". These are scored from one to seven, reversing the scoring when appropriate, and a higher score indicates greater FN. Statements one, four, six, nine, and ten were reverse scored. Damsbo-Svendsen, Frøst & Olsen (2017) performed a Cronbach's validity assessment on the 10-item FNS, and it was 0.88. Participants had to answer 8 out of the 10 statements (80%) in order to be included within the final participants of the study.

Data Collection Procedures

After approval from IRB was received, university emails for Kent State University's main campus undergraduate and graduate students were collected. The email was sent to 25,337 students via Qualtrics's emailing system. Included with the email was a link to the survey, instructions for the survey, the individuals' right as a

participant, the purpose of the study, benefits of the study, and a statement regarding the participants' privacy (located in Appendix B). The participants' answers remained anonymous throughout data collection. Participants were asked to electronically sign a consent form stating that they read the information provided and agreed to participate within the study. The participants were incentivized to take the survey because one participant was selected to win a $25 Amazon gift card. At the end of the survey, participants were asked if they consented to be involved in the Amazon gift card drawing. If participants selected "yes," then they were directed to a new survey which allowed them to enter in their email address. This kept their answers anonymous, and their email addresses were not linked to their answers on the initial survey.

A reminder email was sent out two weeks later to the non-respondents. The survey was open for a total of three weeks. The participants took the survey one time, and the information received from the surveys was collected through the 2019 version of the electronic survey system, Qualtrics.

Data Analysis Procedures

Each section of the survey required different data analysis procedures.

Demographics

Demographics are reported as descriptive statistics such as percentages and total number. Each section of the survey is also reported as descriptive statistics including mean, standard deviation (SD), percentage (%) and total number (n).

Childhood Food Exposure

Childhood food exposure was also described with descriptive statistics for each food group such as mean, SD, %, and n. Childhood food exposure was scored using a three point Likert scale. This scale ranged from one (1) "I NEVER ate this," two (2) "I ate this RARELY," to three (3) "I ate this FREQUENTLY." A Spearman Rho correlation was then used to correlate the mean childhood food exposure score of each food group with the mean FNS score. This determined the relationship between FN and childhood food exposure. Spearman Rho correlation was used because the variable was considered ordinal-level rather than interval/ratio. The foods incorporated within the food exposure were separated into six food groups (fruit, vegetables, dairy-protein, high fat, high carbohydrate, and high fat/high carbohydrate) and correlated with their corresponding FNS score. A p-value of 0.05 was selected a-priori for significance.

Childhood Parental Feeding Practices

Childhood parental feeding practices was described with descriptive statistics for each statement such as mean, SD, %, and n. The survey section had 18 questions that are scored from one to five. There developed a possible score range from 18-90 with higher scores indicating higher control. The score is reversed in questions one, three-eight, 10-11, and 16-21. Restriction was assessed was questions two, eight, nine, and 12-15. Pressure was assessed in questions one, three-seven, and 11. Monitoring was assessed in questions 16, 17, and 18. A Pearson correlation was then used to correlate the mean childhood parental feeding practices score with the mean FNS score. This determined the

relationship between FN and childhood parental feeding practices. A p-value of 0.05 was selected a-priori for significance.

Food Neophobia Scale

FNS was described with descriptive statistics for each statement such as mean, SD, %, and n. FNS was scored on a scale from one (1) "agree strongly" to seven (7) "disagree strongly." Reverse scoring was applied on questions two, three, five, seven, and eight. This developed a possible score from 10-70. A higher score would indicate a higher level of FN. A p-value of 0.05 was selected a-priori for significance.

CHAPTER IV

JOURNAL ARTICLE

Introduction

Food neophobia (FN) is described by Birch & Fisher (1998) as an aversion to new, novel foods. FN has been linked to adverse health behaviors in children. Children can develop FN from genetic contribution or from their environment (Cooke, Haworth, & Wardle, 2007). Food neophobic children have a higher preference for high-fat, energy-dense foods, low intake of fruits and vegetables, and poor dietary variety (Wardle, Carnell, & Cooke, 2005; Falciglia, Couch, Gribble, Pabst, & Frank, 2000; Galloway, Fiorito, Lee, & Birch, 2005). The feeding environment experienced as a child can transmit into adulthood in various ways, such as interference of self-regulation skills resulting in restraint and disinhibition (Galloway, Farrow, & Martz, 2010; Ellis, Galloway, Webb, Martz, & Farrow, 2016). Food neophobic tendencies have also been observed within adulthood resulting in a decrease in dietary variety, and a poor consumption of fruits and vegetables (Zickgraf, & Schepps, 2016; Knaapila et al., 2011). Environmental factors such as parental feeding practices, food availability, and food exposure all play an important role as well in the development of food preferences in combination with genetics (Beauchamp & Mennella, 2009; Mennella, Johnson, & Beauchamp, 1995; Mennella, Jagnow, & Beauchamp, 2001; Elkins & Zickgraf, 2018; Lakkakula, Geaghan, Zanovec, Pierce, & Tuuri, 2010; Fildes et al., 2016). Negative parental feeding practices such as pressure to eat, restriction, high levels of monitoring

and poor food exposure as a child have been linked to increasing food neophobic tendencies within children (Wardle et al., 2005; Falciglia, Pabst, Couch, & Goody, 2004; Tan & Holub, 2012). The more control that is exhibited within parental feeding practices have been related to an increase in a child's FN (Wardle et al., 2005). The negative parental feeding practices experienced associate negative emotions with foods that affect food preferences. Young adults who remembered being forced to eat certain foods had a higher dislike for those foods (Wadhera, Phillips, Wilkie & Boggess, 2015). Food exposure also plays an important role in decreasing unfamiliarity to new foods and can help decrease aversions to novel foods particularly during the weaning process (Coulthard & Sealy, 2017; Owen, Kennedy, Hill, & Houston-Price, 2018; Birch & Marlin, 1982). It can also have a lasting impact on the food preferences in adulthood as individuals who were frequently exposed to certain foods had an increased liking of those foods (Wadhera et al., 2015).

College students and individuals with FN are failing to meet the Dietary Guidelines for Americans, for poor dietary variety, low intake of fruits and vegetables, and poor eating habits (Wasshenova, Mahas, Geers, & Boardley, 2015; Schroeter & House, 2015; Crowe et al., 2017; Deforche, Dyck, Deliens, & Bourdeaudhuij, 2015; Wardle et al., 2005; Zickgraf, & Schepps, 2016). More than half, 70.6% of college students are only consuming two or fewer fruits and vegetables daily (Fall 2017 Reference Group Executive Summary - acha.org, 2017). It is not known whether FN in college students contributes to their poor dietary behaviors. As parental feeding practices and food exposure have been associated with higher incidences of FN in children, further

investigation must be conducted to provide more background if these also effect the food neophobic tendencies within adulthood. Children and college students both are at a critical period to develop healthy habits for the rest of their lives. Since FN has impacts on dietary quality and health, it is important to determine the causation of aversion to new, novel foods. There is little to no research conducted on college students regarding food neophobic tendencies that could be induced from childhood. Also, the lasting impact of parental feeding practices and food exposures on college student's FN has not been studied. The data collected will allow for inferences to be made about the lasting impact of negative parental feeding practices and poor food exposure experienced as a child on FN in college students.

Retrospective surveying has been proven to be a reliable method for nutrition research as it has been a method used in many previous studies (Brunstrom et al., 2005; Galloway et al., 2010; Wadhera et al., 2015; Puhl & Schwartz, 2003), therefore it was determined to look at college student's recollection of their childhood feeding experiences. The purpose of this study was to compare college student's current FN scores to previous food exposure and parental feeding practices experienced during childhood. The first hypothesis of this study was that college students will have increased FN scores as food exposures experienced decreases. The second hypothesis of this study was that college students will have increased FN scores as negative parental feeding practices experienced increases.

Methodology

The methodology consists of participants, instrumentation, and procedure.

Participants

The participants of this study were recruited via convenience sampling. The participants included all undergraduate and graduate students at Kent State University enrolled in courses during the semester of Spring 2019. Participants consisted of students either full-time or part-time status, from all class levels-freshman to senior, Masters, or PhD and all levels of housing status. Participants consisted of all genders, ethnicities, and majors, however they were limited to students at Kent State University's main campus to increase uniformity between participants and between geographic location. Individuals under the age of 18 or over the age of 25 were not included within the study. Participants that have ever been clinically diagnosed with an eating disorder (such as: Anorexia Nervosa, Bulimia Nervosa, Binge eating disorder, Purging disorder, Binging disorder, Avoidant/Restrictive Food Intake disorder, eating disorder not otherwise specified) or a food allergy were also excluded from the study. This research was approved by the Institutional Review Board (IRB) at Kent State University.

Instrumentation

A survey was developed for data collection as a combination of three previously created and validated surveys (Galloway et al., 2010; Pliner & Hobden, 1992; Wadhera et al., 2015). Permission was granted from all three authors for the use of their surveys. The data collected included demographic information. The survey had four sections

which were demographics, recollection of childhood food exposure, parental feeding practices, and the Food Neophobia Scale (FNS).

Demographics. Demographics consisted of 12 questions including consent to the survey, exclusion criteria questions, grade level, gender, age, self-reported weight and height, current living situation, and if they were considered a "picky" or "fussy" eater as a child.

Recollection of childhood food exposure. This survey was created by Wadhera et al. in 2015. This survey consisted of foods in the categories of fruit, vegetables, dairy-protein, high fat/high carbohydrate, high fat, and high carbohydrate foods. There was a total of 96 foods evaluated within the survey. Respondents had to provide a valid response of only one answer "I NEVER ate this," "I ate this RARELY," or "I ate this FREQUENTLY" for at least 77 of the foods (80%) to be included within the final participants of the study. Each food was placed into a category with the corresponding food group. Fruits had a total of 16 foods; Vegetables had a total of 12 foods; Dairy-protein had a total of 25 foods; High carbohydrate had a total of 14 foods; High fat had a total of 12 foods; and High Fat/High Carbohydrate had a total of 17 foods. The participant was requested to think back to when they were in elementary school and to answer the questions about their eating experience with these foods.

Recollection of childhood parental feeding practices. The Child Feeding Questionnaire (CFQ) created by Birch et al. (2001) was adapted by Galloway et al. in 2010. The questionnaire consisted of 18 questions with seven "pressure to eat" questions, seven "restriction" questions, and three "monitoring" questions. Respondents

had to answer 15 of the statements (80%) to be included within the final participants of the study. Responses were based on a five point Likert scale with the options "Always, Often, Sometimes, Rarely, and Never." Reverse scoring used when appropriate.

FNS. The FNS is a 10-item questionnaire to determine FN characteristics within an individual and was developed by Pliner & Hobden (1992). Participants had to answer 8 out of the 10 statements (80%) in order to be included within the final participants of the study. The ten items are statements, and the respondents answered based on a seven point Likert scale with the options "agree strongly, agree, agree slightly, neither agree nor disagree, disagree slightly, disagree, disagree strongly". Reverse scoring was used when appropriate. To determine overall mean score, the average response of each statement was multiplied by the amount of statements (10). This arrives at the overall mean score within the range of 10-70.

Procedure

After approval from IRB was received, university emails for Kent State University's main campus undergraduate and graduate students were collected from the Provost office. An electronic survey was distributed via email and was sent to 25,337 students through Qualtrics's emailing system. Included within the email was a link to the survey, instructions for the survey, the individuals' right as a participant, the purpose of the study, benefits of the study, a statement regarding the participants' privacy, and contact information. The participants' answers remained anonymous throughout data collection. Participants were asked to electronically sign a consent form stating that they read the information provided and agreed to be a participant in the study. The

participants then answered demographic questions. The second part of the survey was the childhood food exposure section. The participants then answered statements regarding childhood parental feeding practices, followed by the FNS. The survey was available for completion for three weeks from January 29, 2019 to February 19, 2019. One reminder email was provided after two weeks on February 12, 2019 to the non-respondents. A total of 2,296 students responded, for an 11% response rate.

Statistical Analysis

Demographics are reported as descriptive statistics such as percentages and total number. Each section of the survey is also reported as descriptive statistics including mean, standard deviation, percentage and total number. Childhood food exposure was scored using a three point Likert scale. This scale ranged from one (1) "I NEVER ate this," two (2) "I ate this RARELY," to three (3) "I ate this FREQUENTLY." A Spearman Rho correlation was then used to correlate the mean childhood food exposure score of each food group with the mean FNS score. This determined the relationship between FN and childhood food exposure. Spearman Rho was used because the variable was considered ordinal-level rather than interval/ratio. The foods incorporated within the food exposure were separated into six food groups (fruit, vegetables, dairy-protein, high fat, high carbohydrate, and high fat/high carbohydrate) and correlated with their corresponding FNS score.

Childhood parental feeding practices was scored using a five point Likert scale. This scale ranged from one (1) "Always" to five (5) "Never." This developed a possible score from 18-90. Higher scores would indicate a higher level of control enforced on the

child. A Pearson correlation was then used to correlate the mean childhood parental feeding practices score with the mean FNS score. This determined the relationship between FN and childhood parental feeding practices.

FNS was scored on a scale from one (1) "agree strongly" to seven (7) "disagree strongly." This developed a possible score from 10-70. A higher score would indicate a higher level of FN. A p-value of 0.05 was selected a-priori for significance.

Results

The results were broken down into categories based on the section of the survey.

Demographics

The survey was started by 2,296 total students. A total of 1,452 students passed the exclusion criteria and consented to participate within the study. In order to be considered a valid respondent, participants had to provide valid responses for 80% of the questions in each section of the four-part survey. Only 564 participants answered 80% of the childhood food exposure questions, 1,161 participants answered 80% of the Childhood Parental Feeding Practices (CPFP) questions, and only 1,154 individuals answered 80% of the FNS questions. This left a total of 529 respondents who gave consent, passed the exclusion criteria, and provided valid answers for 80% of the questions in each section of the survey. Table 1 provides descriptive data regarding the demographics of the participants. The majority of the participants were white/Caucasian, undergraduate, freshman or senior, females who lived on campus. The mean age of the participants was 20 ± 1.11 years. The results also displayed that half of the participants responded that they were considered a "picky" or "fussy" eater as a child.

Table 1

Demographics of Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (N=529)

Demographics		n	%
Graduate level			
	Undergraduate	446	84.3
	Graduate	83	15.7
Class level			
	Freshman	131	24.8
	Sophomore	104	19.7
	Junior	100	18.9
	Senior	111	21
	Masters	71	13.4
	PhD	11	2.1
Gender			
	Female	414	78.3
	Male	106	20
	Other	8	1.5
Race/Ethnicity			
	African American	26	4.9
	American Indian/Native American	1	0.2
	Asian/Pacific Islander	18	3.4
	Hispanic	10	1.9
	White/Caucasian	449	84.9
	Other	20	3.8
	I would rather not answer.	5	0.9
Living situation			
	On campus	209	39.5
	Off campus, alone	46	8.7
	Off campus with roommates	159	30.1
	Off campus with parent/guardian	89	16.8
	Off campus with spouse	25	4.7
Were you considered a "Picky" or "Fussy" Eater?			
	Yes	244	49.1
	No	260	49.1

Abbreviations. n, number of participants in survey sample.

Childhood Food Exposure

Vegetables displayed to be the food group that was least exposed to the participants as children with a mean score of 1.87±0.48, and high fat foods displayed to be the food group that was most exposed to the participants as children with a mean score of 2.32±0.31.

Table 2

Food Exposure Questionnaire Food Group Frequency from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (N=529)

Food Group	Mean ±SD
Fruit	2.15±0.48
Vegetable	1.87±0.48
Dairy-Protein	2.00±0.31
High Carbohydrate	2.13±0.31
High Fat	2.32±0.31
High Fat/High Carbohydrate	2.11±0.35

Note. Scores were calculated using a 3 point Likert scale from one (1) being "I NEVER ate this" to three (3) being "I ate this FREEQUENTLY."
Abbreviations. SD, Standard Deviation.

Childhood Parental Feeding Practices

The descriptive data displayed in Table 3 describes the mean answer of each question. The data displays that the majority of the participants experienced positive parental feeding practices during childhood with mean scores of $\leq$3. A higher mean score would indicate more negative parental feeding practices experienced. Restriction, monitoring and pressure to eat were the three parental feeding practices assessed within the survey. Monitoring had the highest mean score of 2.82, pressure to eat had a mean score of 2.74, and restriction had the lowest mean score of 2.15.

Table 3

Childhood Parental Feeding Practices Questionnaire from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (N=529)

Item	Mean±SD	% Never (n)	% Rarely (n)	% Sometimes (n)	% Often (n)	% Always (n)
When you said, "I'm not hungry" at dinnertime, did X say, "You need to eat anyway"?**	3.67±1.17	5.1 (27)	12.9 (68)	21.4 (133)	31.1 (165)	29.5 (156)
Was it okay with X if you didn't eat all of the food on your plate?	2.78±1.16	6.8 (36)	21.4 (113)	31.8 (168)	23.4 (124)	16.6 (88)
Did X make you eat all the food on your plate?**	2.85±1.21	16.6 (88)	22.9 (121)	28.2 (149)	23.3 (123)	9.1 (48)
Did X say, "If you don't eat all your food, you won't get dessert"?**	2.87±1.44	23.8 (126)	20.4 (108)	19.3 (102)	17.6 (93)	18.9 (100)
If there was something X wanted you to eat, but you don't eat it, did X ever make you sit at the table until you ate it?**	2.81±1.38	28.7 (152)	22.7 (120)	20.6 (109)	14.7 (78)	13.2 (70)
Did X get upset when you played with your food?**	2.58±1.20	21.2 (112)	30.1 (159)	25.5 (135)	14.6 (77)	7.9 (42)
Did X ever say things like, "I don't think you've had enough to eat; you need to eat more"?**	2.39±1.19	28.4 (150)	29.1 (154)	23.3 (123)	13.0 (69)	5.9 (31)
Did X ever say things like, "You've had enough to eat now; you need to stop"?**	1.7±0.99	57.7 (305)	22.9 (121)	12.1 (64)	5.7 (30)	1.5 (8)
Did X ever let you have snacks?	1.92±0.81	0.2 (1)	2.5 (13)	20.4 (108)	43.1 (228)	33.8 (179)
If there was a food you didn't like, did X ever say, "Eat it anyway, it's good for you"?**	3.28±1.12	7.2 (38)	16.4 (87)	32.1 (170)	29.3 (155)	14.9 (79)

*Scored on a 5-point Likert scale from one (1) "Always" to five (5) "Never."
**Reverse scored questions
Abbreviations. SD, Standard Deviation.

Table 3 (continued)

Childhood Parental Feeding Practices Questionnaire from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (N=529)

Item	Mean±SD	% Never (n)	% Rarely (n)	% Sometimes (n)	% Often (n)	% Always (n)
If you told X you were full and didn't want to eat anymore, did X ever say, "You need to eat more anyway"?**	2.00±1.05	40.5 (214)	31.6 (167)	18.7 (99)	6.4 (34)	2.8 (15)
Did X buy sweets for you when you asked for them?	2.99±0.88	2.8 (15)	24.8 (131)	46.1 (244)	20.8 (110)	5.1 (27)
If you asked for a snack, did X used to let you have it?	2.36±0.76	0.4 (2)	4.2 (22)	38.6 (204)	44.6 (236)	12.3 (65)
If you were with X and you wanted something to eat, did X used to let you pick what you wanted to eat?	2.44±0.85	0.9 (5)	8.3 (44)	37.4 (198)	40.3 (213)	12.9 (68)
If you were with X and you wanted something to eat, did X let you pick how much you eat?	2.55±1.01	2.6 (14)	15.5 (82)	30.6 (162)	35.9 (190)	15.1 (80)
Did X keep track of the sweets (candy, ice cream, cake, pies, pastries) that you ate?**	2.98±1.34	18.0 (95)	21 (111)	22.1 (117)	23.3 (123)	15.7 (83)
Did X keep track of the snack foods (potato chips, Doritos, cheese puffs) that you ate?**	2.95±1.29	16.8 (89)	21.9 (116)	25.0 (132)	22.3 (118)	14.0 (74)
Did X keep track of the high fat foods that you ate?**	2.52±1.31	28.7 (152)	25.1 (133)	21.2 (112)	15.1 (80)	9.8 (52)

*Scored on a 5-point Likert scale from one (1) "Always" to five (5) "Never."
**Reverse scored questions
Abbreviations. SD, Standard Deviation.

FNS

Table 4 displays the descriptive data regarding the FN of the study participants. The mean sum score of the FNS was 3.083±1.35. This mean score is converted to 30.83, because there are ten statements within the FNS. The participants had some level of FN

with a score of 30 out of 70, but most of the participants did not experience high levels of FN (<35). The highest levels of FN were seen with the statements "I am very particular about the foods I will eat." and "If I don't know what is in a food, I won't try it." The lowest levels of FN were seen with the statements "I like foods from different countries" and "At dinner parties, I will try a new food."

Table 4

Food Neophobia Scores of Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (N=529)

Item	Mean ±SD	% SA (n) %A (n)	%SWA (n)	% Neither A nor D (n)	%SWD (n)	%D (n) %SDisgree (n)
I am constantly sampling new and different foods.**	2.78±1.67	26.7 (141) 24.0 (127)	34.6 (130)	7.6 (40)	8.1 (43)	4.9 (26) 4.2 (22)
I don't trust new foods.	3.01±1.66	2.5 (13) 5.30 (28)	17.2 (91)	10.2 (54)	14.6 (77)	30.8 (163) 19.3 (102)
If I don't know what is in a food, I won't try it.	3.74±1.90	8.9 (47) 11.0 (58)	22.3 (118)	8.5 (45)	17.0 (90)	17.6 (93) 14.7 (78)
I like foods from different countries.**	2.44±1.48	32.7 (173) 226.3 (139)	23.1 (122)	7.8 (41)	4.0 (21)	3.6 (19) 2.3 (12)
Ethnic food looks too weird to eat.	2.57±1.54	1.1 (6) 4.7 (25)	9.5 (50)	9.5 (50)	13.8 (73)	33.3 (176) 28.2 (149)
At dinner parties, I will try a new food.**	2.48±1.46	26.7 (141) 35.0 (185)	21.4 (113)	5.9 (31)	4.7 (25)	3.8 (20) 2.5 (13)
I am afraid to eat things I have never had before.	3.28±1.88	5.7 (30) 9.5 (50)	17.2 (91)	8.5 (45)	13.4 (71)	25.1 (133) 20.4 (108)
I am very particular about the foods I will eat.	3.83±1.96	11.0 (58) 13.0 (69)	18.3 (97)	10.0 (53)	13.8 (73)	20.0 (106) 13.6 (72)
I will eat almost anything.**	3.67±2.02	17.2 (91) 19.5 (103)	17.0 (90)	7.9 (42)	13.6 (72)	13.8 (73) 11.0 (58)
I like to try new ethnic restaurants.**	3.02±1.76	24.2 (128) 21.7 (115)	20.4 (108)	11.0 (58)	10.8 (57)	7.8 (41) 4.2 (22)

Abbreviations. SD, Standard Deviation; SA, Strongly Agree; A, Agree; SWA, Somewhat Agree; Neither A nor D, Neither Agree nor Disagree; SWD, Somewhat Disagree; D, Disagree; SDisagree, Strongly Disagree.
*Scored on a 7-point Likert scale from one (1) "Disagree Strongly" to seven (7) "Agree Strongly."
**Reverse scored questions

Hypothesis 1

H_1 stated that college students will have increased FN scores as food exposures experienced decreases. A significant negative correlation was found for every food

group and FNS scores within college students ($p \leq 0.001$). Table 5 displays these results. As food group exposure within childhood decreased, FNS score increased. Each food group was statistically significant with $p \leq 0.001$ as p-value ≤ 0.05 was selected for significance a-priori. Moderate negative correlations were discovered for vegetables and fruit and FNS, indicating that fruit and vegetable exposure had the largest impact on FNS score. High carbohydrate foods displayed to have the least amount of impact on FNS score, although still statistically significant.

Table 5

Comparing Childhood Food Exposure and Food Neophobia Scores from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (N=529)

Food Group	r	p-value
Vegetables	-0.487	P≤0.001
Fruits	-0.432	P≤0.001
Dairy-Protein	-0.391	P≤0.001
High Fat-High Carbohydrate	-0.210	P≤0.001
High Carbohydrate	-0.164	P≤0.001
High Fat	-0.278	P≤0.001

Note. Scores were calculated using a 3 point Likert scale from one (1) being "I NEVER ate this" to three (3) being "I ate this FREQUENTLY."
Abbreviations. FNS, Food Neophobia Scale; SD, Standard Deviation; r, Spearman Rho's correlation coefficient; p-value, statistical significance.

Hypothesis 2

H_2 stated that college students will have increased FN scores as negative parental feeding practices experienced increases. Table 6 displays the results of a Pearson correlation statistical analysis. Results indicated that the mean score of the CPFP was not significantly correlated with the mean score of the FNS ($p<0.302$), as the p-value is >0.05. As negative childhood parental feeding practices increased, FNS score did not.

Table 6

Comparing CPFP and Food Neophobia Scores from Undergraduate and Graduate College Students Surveyed on Childhood Food Exposure, Parental Feeding Practices, and Current FN (N=529)

Test	Mean±SD	r	p-value
CPFP	2.64±0.61	-0.045	0.302

Abbreviations. CPFP, Childhood Parental Feeding Practices; SD, standard deviation; r, Pearson correlation coefficient; p-value, statistical significance.

Discussion

The purpose of this study was to compare college student's current FN scores to previous food exposure and parental feeding practices experienced during childhood. To my knowledge, this is the first study to examine a relationship between childhood food exposure and parental feeding practices with FN as a young adult. The results indicated that there was a significant negative correlation with childhood food exposure and FNS score. In contrast, there was no significant relationship found between childhood parental feeding practices and FNS score. These results indicate that Hypothesis 1 was accepted, and Hypothesis 2 was rejected.

Study Population

The study population revealed that the majority of the respondents were undergraduate, White/Caucasian females. Most participants were between the ages of 19-21 years old, were primarily in their freshman or senior year of college, and living on campus. This is consistent with the overall population of the Midwestern University Kent State University (Student Body Profile, 2019; Institutional Research, 2019). Previous research has displayed American college students to have a mean FNS score of 29.8-31.2 (Olabi, Najm, Baghdadi, & Morton, 2009; Knaapila et al., 2011). The original

FNS by Pliner & Hobden (1992) studied adults from ages 18-74 with the majority of the participants being in between the ages of 19-25 and displayed a mean FNS score of 34.54±11.86. The current study was found to be consistent as the college students had a mean FNS score of 3.083 or 30.83. There has previously been discovered a small significant negative correlation between FN and age (Pliner & Hobden, 1992; Pliner, 1994). However, by studying FN in college students, selection bias could affect these results. College students may possibly be more adventurous than someone the same age who did not receive a college education.

Comparing Food Exposure and FNS Score

The findings showed that every food category was found to be significantly negatively associated with FNS scores. This is consistent with previous research that mere food exposure plays an important role within food preferences of infants, adolescents, and adults (Ventura, 2017; Fildes et al., 2014; Lakkakula, Geaghan, Zanovec, Pierce, & Tuuri, 2010; Fletcher et al., 2016; Puhl & Schwartz, 2003; Ramsay, Rudley, Tonnemaker, & Price, 2016; Wadhera, et al., 2015). Typically, when a child displays dislike to a food, a parent will stop feeding that food to the child. This decreases the food exposure the child receives. This study did not determine if the individuals were previously FN as children, this could help provide further research about whether children who are FN have increased exposure to high fat, high carbohydrate, or high fat/high carbohydrate foods and decreased exposure to fruits, vegetables, and dairy-protein foods due to their FN.

Food exposure is an opportunity to increase familiarity with novel foods, which can ultimately decrease FN (Owen et al., 2018; Birch & Marlin, 1982). The higher the variety of foods introduced, the higher acceptance and willingness to try novel foods (Lange, Jacob, Chabanet, Schlich, & Nicklaus, 2013; Schindler, Corbett, & Forestell, 2013). Children who are FN have a decreased consumption of fruits and vegetables, and adults who are FN consume a lower percentage of fruits, vegetables, and meats (Cooke, Wardle, & Gibson, 2003; Wardle et al., 2005; Fletcher et al., 2016; Zickgraf & Schepps, 2016). The survey population described being least exposed to vegetables and dairy-protein. Therefore, if these children were also considered FN as children, it would make sense that they would have a decreased exposure to vegetables and dairy-protein foods. Fruits and vegetables are also frequently under consumed in children, as they have a higher taste preference for sweet and salty (Guenther, Dodd, Reedy, & Krebs-Smith, 2006; Beauchamp & Mennella, 2009). Frequent exposure of these foods can not only increase acceptance, but also can increase taste preference for these foods. Food neophobic children have an even higher dislike towards fruits, vegetables, and dairy-protein foods therefore, food exposure seems to be an even more important component of proper feeding techniques for them.

FNS

As FN has sparsely been studied in the young adult population, these results help indicate the current level of FN within college students, and provide some insight on possible explanations of poor dietary behaviors within college students. Each individual statement within the FNS displayed different levels of FN. The two statements that

received the highest mean score were indicative of a key component of FN which is fear of novel, unfamiliar foods. College students responded less likely to try a new food if they are unsure about what is in it. They also responded to be very particular about the foods that they will eat. FN impacts the dietary quality and variety of adults and specifically decreases the consumption of fruits, vegetables, and protein foods (Zickgraf & Schepps, 2016), therefore it is important to understand where young adults are struggling the most to decrease food neophobic traits and tendencies. Strategies to combat fear of novel foods includes frequent food exposure (Pliner, 1982; Hausner, Nicklaus, Issanchou, Mølgaard, & Møller, 2010; Cooke & Fildes, 2011). Examples of frequent food exposure in the college setting could include constantly serving a high variety of foods (i.e. ethnic foods, vegetables, fruits) in cafeterias, as the majority of college students live on campus, or providing more class opportunities for college students to take nutrition courses to learn about and try new foods.

Comparing CPFP and FNS

This study did not find that the childhood parental feeding practices experiences were significantly correlated with FNS scores. This study population had very positive parental feeding scores, which could result in the nonsignificant relationship found. Past research has found that individuals who recalled many experiences of forced consumption, rated themselves as picky eaters higher than those who did not recall forced consumption (Batsell, Brown, Ansfield, & Paschall, 2002). Therefore, if our analysis displayed the results of different FNS scores and their individual CPFP score, the results may be different.

Although, FN has a strong genetic component (Cooke et al., 2007; Faith, Heo, Keller, & Pietrobelli, 2013b; Knaapila et al., 2011), evidence supports that childhood parental feeding practices and food exposure can increase the risk of genetic predisposition of problematic eating behaviors such as FN that can last until adulthood (Kral & Rauh, 2010; Smith et al., 2016a; Elkins & Zickgraf, 2018; Wadhera, et al., 2015). When positive parental feeding practices are employed as a child such as healthy eating modeling, allowing foods in moderation, and encouraging foods, an increased liking for those foods were seen in young adults (Wadhera et al., 2015).

Picky eating in childhood can be predictive of disordered eating psychology in young adults (Ellis et al., 2016; Russell, Worsley, & Campbell, 2015). Coercive strategies (i.e. high levels of monitoring, pressure to eat or restricting access to food) are frequently used to get picky eaters to eat during childhood. These feeding strategies have resulted in an increase in restraint and disinhibition, and lower intuitive eating scores as an adult (MacBrayer, Smith, McCarthy, Demos, & Simmons, 2001; Kral & Rauh, 2010; Puhl & Schwartz, 2003). The highest negative parental practice experienced within this study population was parents telling them to eat anyway after stating that they were not hungry. This is an example of pressure to eat and discourages children from listening to their internal hunger cues causing eating in the absence of hunger (Fisher & Birch, 2002; Harris, Mallan, Nambiar & Daniels, 2014). This is an example of disordered eating psychology that could occur within adults from negative parental feeding practices.

Strengths and Limitations

Although, there are limitations to this study, there are also a few strengths. This study used three validated surveys to collect data. It also resulted in a good sample size. The first limitation within this study is that the study population was a convenience sample of Midwestern University students. This decreases the ability of the results to be generalized to the overall population, since this was a subset limited to the area studied. Within this convenience sample, the data collected was self-reported. This enters in the possibility of self-bias when answering questions and decreases the reliability of the answers given by the participants. The survey was also voluntary with an incentive to receive a gift-card. Participants may have only taken the survey for the incentive and not answered honestly to answer quickly. The biggest limitation of this study is that the data collected was primarily based on recollection from childhood. Although, this method has been used previously and has provided reliable results when compared with parents' answers (Wadhera et al., 2015); this data was not compared with a parent's answers to determine reliability, and past events, memories, or experiences of childhood can be difficult to remember and can result in false recollections of the past.

Implications

This research provides implications and questions for further research. Additional research is needed to determine whether genetics or feeding environment within adults play a larger role within the current eating behaviors as college students. Researching further into this area provides insight on the possible explanations of poor dietary behaviors within college students, as their childhood feeding experiences likely plays a

role. This area should continue to be researched in hopes to allow healthcare professionals to educate parents on the importance of responsive feeding techniques such as high food exposure to a variety of foods and a decreased use of negative parental feeding practices including pressure to eat, restriction, and high levels of monitoring. The two concepts go hand in hand, because research shows that children who are exposed to a high variety of foods, especially fruits and vegetables, and are not forced to eat these foods (responsive feeding practices), have increased rates of acceptance (Ramsay et al., 2016; Black & Aboud, 2014). Registered Dietitians should promote these concepts to parents to decrease the possibility of their children growing up with disordered eating behaviors such as FN.

This study did not look at the current eating behaviors or food aversions that college students who are highly food neophobic may have. A future study should determine if food neophobic college students have the same food aversions to food groups as children do. A future study should also determine specifically how many times a child was exposed to these foods in each food group to determine how many exposures is correlated with FN as a young adult, as this study used general terms such as "never," "rarely," and "frequently". As one gets older, the number of food exposures needed for acceptance increases, therefore, college students may possibly need many more food exposures than children to reverse some of the effects of FN (Birch, 1989; Hausner et al., 2012; Hetherington et al., 2015). Future research should look at these possible strategies for college students to provide evidence on how to treat FN once in adulthood to increase healthy eating behaviors and dietary variety. Our study specifically looked at the ages of

18-25, and we did not determine if there was a negative relationship with age and FN. That could provide further research about whether FN starts to decrease as one gets older as food experiences increase.

Conclusion

The findings from this study show that food exposure as a child has a significant negative relationship with FN as an adult. However, childhood parental feeding practices did not show a significant relationship with FN score as an adult. These results may be different if the population studied had higher scores showing more negative parental feeding practices experienced as child, as this study population showed positive parental feeding practices. This study has three primary implications. It provides valuable results to expand the research currently known on FN in young adults. The study also provides further evidence for healthcare professionals on how to educate parents on the importance of proper child feeding techniques. The results also encourage future research to implement intervention studies to determine the best strategy to combat FN as a college student to increase healthy eating behaviors and dietary variety.

.

APPENDICES

APPENDIX A

CHILDHOOD FOOD EXPOSURE, PARENTAL FEEDING PRACTICES, AND CURRENT FNS SURVEY

Appendix A

Childhood Food Exposure, Parental Feeding Practices, and Current FNS Survey

Start of Block: Consent Form
Q1

Childhood Food Exposure, Parental Feeding Practices and Current Food Neophobia in College Students

You are being asked to take part in a research study on the recollection of college student's parental feeding practices and food exposure experienced as a child and current eating behaviors. Please read this form carefully and e-mail or call us with any questions you may have before agreeing to take part in the study.

The purpose of this study is to compare college student's food neophobia scores to previous food exposure and parental feeding practices experienced during childhood. You must be between the ages of 18-25 and can be either an undergraduate or graduate student to participate in this study.

If you agree to participate in this study, you will complete an online survey that will take you approximately 15-20 minutes to complete. The survey will include questions regarding demographics, childhood food exposure, childhood parental feeding practices, and then current food neophobia. The survey is completely anonymous. One participant will randomly be selected to win a $25 Amazon gift card after the completion of the study.

I do not anticipate any risks to you participating in this study other than those encountered in day-to-day life. There are also no benefits to you. As a Kent State University student, I am looking to further the research on the effects of childhood feeding and food exposure on young adult food neophobia.

In a situation where this material may be reported publicly, any information that will make it possible to identify you will not be included in the report.

Taking part in this study is completely voluntary. You may skip any questions that you do

not want to answer and can stop participating in the study at any point.

If you have any questions, please contact me at egrove3@kent.edu or contact the director of my thesis, Dr. Natalie Caine-Bish, at ncaine@kent.edu. If you have any questions regarding your rights as a participant or any other questions or concerns,

please contact the Kent State University Institutional Review Board at 330-672-2704.

If you are over the age of 18, understand the statements above, and freely consent to participate in this study, click "yes" to start the survey.

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey if No is selected.

End of Block: Consent Form

Start of Block: Exclusion Questions

Q2 Have you ever been clinically diagnosed with an eating disorder (Such as: Anorexia Nervosa, Bulimia Nervosa, Binge eating disorder, Purging disorder, Binging disorder, Avoidant/Restrictive Food Intake disorder, eating disorder not otherwise specified)?

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey if Yes is selected.

Q3 Do you have any clinically diagnosed food allergies?

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey if Yes is selected.

Q4 Are you within the age range of 18-25 years old?

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey if No is selected.

End of Block: Exclusion Questions

Start of Block: Part I: Demographics

Q5 Are you currently an undergraduate student or a graduate student?

- Undergraduate Student (1)
- Graduate Student (2)

Q6 What is your specific grade level?

- Freshman (1)
- Sophomore (2)
- Junior (3)
- Senior (4)
- Masters (5)
- PhD (6)

Q7 What gender do you identify with?

- Male (1)
- Female (2)
- Other (3)

Q8 How old are you?

Skip To: End of Survey if <18 is entered or if >25 is entered..

Q9 What is your Race/Ethnicity?

- ○ African American (1)
- ○ American Indian/Native American (2)
- ○ Asian/Pacific Islander (3)
- ○ Hispanic (4)
- ○ White/Caucasian (5)
- ○ Other, please specify (6) _____
- ○ I would rather not answer. (7)

Q10 What is your height (feet and inches) and weight (pounds)?

Height_____
Weight_____

Q11 What is your current living situation?

- ○ Living on-campus (1)
- ○ Living off-campus, alone (2)
- ○ Living off-campus, with roommate(s) (3)
- ○ Living off-campus, with parents or guardian (4)
- ○ Living off-campus, with spouse (5)

Q12 Were you considered a “picky” or “fussy” eater as a child?

- ○ Yes (1)
- ○ No (2)
- ○ I don’t know (3)

End of Block: Part I: Demographics

Start of Block: Part II: Childhood Food Exposure

Q13 Think back to when you were a child in elementary school and answer the following questions about your experiences eating these foods when young. You may choose more than one answer.

Food	I NEVER ate this	I was NOT ALLOWED to eat this	I ate this RARELY	I SAW others eat this frequently	I ate this FREQUENTLY	I LIKED eating this	I was ENCOURAGED to eat this	I was FORCED to eat this
Collard greens								
Celery sticks								
Broccoli								
Cauliflower								
Spinach								
Mushrooms								
Green beans								
Peas								
Yellow squash								
Green peppers								

Beets								
Brussels sprouts								
Cantaloupe								
Honeydew melon								
Mango								
Lemon								
Watermelon								
Pineapple								
Lime								
Grapefruit								
Strawberries								
Kiwi								
Raspberries								
Plums								
Cherries								
Red seedless grapes								
Tomatoes								
Apple								
Smoothie								
Cottage cheese								
Flavored milk								
Tofu								
Fat-free milk								
Low-fat 1% milk								
Whole milk								
Soy milk								

Parmesan cheese								
Reduced-fat 2% milk								
Swiss cheese								
Yogurt								
Cream cheese								
Mozzarella cheese								
Ice cream								
Blueberry muffin								
Twinkies								
Cinnamon rolls								
Sugar wafers								
French fries								
Apple pie								
Onion rings								
Brownies								
Hash browns								
Potato chips								
Chocolate chip cookies								
M&M's								
Cheesecake								
Fruit tart								
Poptarts								
Cheese quesadilla								
Peanut butter and jelly sandwich								

Tortilla chips with salsa								
Potato salad								
Crackers and cheese								
English muffin								
Jell-O								
Mashed potatoes								
Pancakes								
Breadsticks								
Popsicle								
Popcorn								
Chicken noodle soup								
Roasted potatoes								
Mousse								
Pasta								
Tuna sandwich								
Pork chops								
Bacon								
Shrimp								
Fish filet								
Honey-roasted ham								
Hot dog								
Beef								
Turkey								
Sausage								
Salmon								

Roasted peanuts								
Lamb roast								
McDonald's chicken sandwich								
Roast chicken								
Cashews								
Lobster								
Almonds								
Scrambled eggs								
Steak								
Hamburger								
Chicken nuggets								

End of Block: Part II: Childhood Food Exposure

Start of Block: Part III: Childhood Parental Feeding Practices

Q19 For the following items please think back to when you were a child and your experience with food and eating. Please complete the following questionnaire with the person in mind who was most often responsible for feeding you.

Who was this person?

Q20 Please imagine this person for the following items where indicated as X.

	Always (1)	Often (2)	Sometimes (3)	Rarely (4)	Never (5)
When you said, "I'm not hungry" at dinnertime, did X say, "You need to eat anyway"? (1)	○	○	○	○	○
Was it okay with X if you didn't eat all of the food on your plate? (2)	○	○	○	○	○
Did X make you eat all the food on your plate? (3)	○	○	○	○	○
Did X say, "If you don't eat all your food, you won't get dessert"? (4)	○	○	○	○	○
If there was something X wanted you to eat, but you don't eat it, did X ever make you sit at the table until you ate it? (5)	○	○	○	○	○
Did X get upset when you played with your food? (6)	○	○	○	○	○
Did X ever say things like, "I don't think you've had enough to eat; you need to eat more"? (7)	○	○	○	○	○

Did X ever say things like, “You’ve had enough to eat now; you need to stop”? (8)	○	○	○	○	○
Did X ever let you have snacks? (9)	○	○	○	○	○
If there was a food you didn’t like, did X ever say, “Eat it anyway, it’s good for you”? (10)	○	○	○	○	○
If you told X you were full and didn’t want to eat anymore, did X ever say, “You need to eat more anyway”? (11)	○	○	○	○	○
Did X buy sweets for you when you asked for them? (12)	○	○	○	○	○
If you asked for a snack, did X used to let you have it? (13)	○	○	○	○	○
If you were with X and you wanted something to eat, did X used to let you pick what you wanted to eat? (14)	○	○	○	○	○

If you were with X and you wanted something to eat, did X let you pick how much you eat? (15)	○	○	○	○	○
Did X keep track of the sweets (candy, ice cream, cake, pies, pastries) that you ate? (16)	○	○	○	○	○
Did X keep track of the snack foods (potato chips, Doritos, cheese puffs) that you ate? (17)	○	○	○	○	○
Did X keep track of the high fat foods that you ate? (18)	○	○	○	○	○

End of Block: Part III: Childhood Parental Feeding Practices

Start of Block: Part IV: Food Neophobia Scale

Q21 Please answer rate the following statements about yourself currently from Agree Strongly to Strongly Disagree.

	Strongly Agree (7)	Agree (6)	Somewhat Agree (5)	Neither agree nor diagree (4)	Somewhat disagree (3)	Disagree (2)	Strongly Disagree (1)
I am constantly sampling new and different foods. (1)	○	○	○	○	○	○	○
I don't trust new foods. (2)	○	○	○	○	○	○	○
If I don't know what is in a food, I won't try it. (3)	○	○	○	○	○	○	○
I like foods from different countries. (4)	○	○	○	○	○	○	○
Ethnic food looks too weird to eat. (5)	○	○	○	○	○	○	○
At dinner parties, I will try a new food. (6)	○	○	○	○	○	○	○
I am afraid to eat things I have never had before. (7)	○	○	○	○	○	○	○
I am very particular about the foods I will eat. (8)	○	○	○	○	○	○	○
I will eat almost anything. (9)	○	○	○	○	○	○	○

I like to try new ethnic restaurants. (10)	○	○	○	○	○	○	○

End of Block: Part IV: Food Neophobia Scale

Start of Block: Amazon Drawing

Q22 Would you like to enter the drawing for a chance to win a $25 Amazon gift card?

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey if No is selected.
Skip To: New survey to enter email if Yes is selected.

APPENDIX B

RECRUITMENT E-MAIL

Appendix B

Recruitment E-Mail

Dear Perspective Survey Participant,

My name is Liz Grove and I am a dietetic intern and master's student in the Nutrition and Dietetics department at Kent State University. I am conducting research on the recollection of childhood food exposure, parental feeding practices, and eating behaviors as a college student.
I am hoping for your help by participating in a web-based survey that can be found in this e-mail, below.

The survey will take about 15-20 minutes to complete. Your participation in the survey is strictly anonymous. The survey will start with questions regarding demographics and then questions regarding the recollection of your childhood food exposure, parental feeding practices, and then will identify questions regarding your current eating behaviors.

As a thank you for your participation, at the end of the survey, you will be asked if you would like to participate in a drawing for a $25 Amazon gift card. One participant will be randomly selected!

Follow this link to the Survey:
https://kent.qualtrics.com/jfe/form/SV_0GR50zByT7KbVqJ?Q_DL=55zDVPqaNysxzDf_0GR50zByT7KbVqJ_MLRP_6ojLyP4qBWO8WB7&Q_CHL=email

Your participation is very helpful and greatly valued.

Please, contact me with any questions or concerns at egrove3@kent.edu.

Thank you for your time,

Liz Grove
Dietetic Intern and Master's Student
School of Health Sciences
Kent State University

Reminder to take Graduate Nutrition Survey:

Hello!

You have received this email as a reminder to participate in a 15- to 20-minute survey regarding recollection of childhood food exposure, parental feeding practices, and eating behaviors as a college student. If you have already completed this survey, thank you for your time, and please disregard this email. However, if you have not, please consider doing so. Your response is highly-valued! Remember one participant will be randomly selected to win a $25 Amazon gift card!

Your participation in the survey is strictly anonymous. The survey will start with questions regarding demographics and then questions regarding the recollection of your childhood food exposure, parental feeding practices, and then will identify questions regarding your current eating behaviors.

The survey can be found at this link:
Follow this link to the Survey:
https://kent.qualtrics.com/jfe/form/SV_0GR50zByT7KbVqJ?Q_DL=55zDVPqaNysxzDf_0GR50zByT7KbVqJ_MLRP_6ojLyP4qBWO8WB7&Q_CHL=email

Your participation is very helpful and greatly valued.

Please, contact me with any questions or concerns at egrove3@kent.edu.

Thank you for your time,

Liz Grove
Dietetic Intern and Master's Student
School of Health Sciences
Kent State University

REFERENCES

REFERENCES

Agras, W. S., Hammer, L. D., Huffman, L. C., Mascola, A., Bryson, S. W., & Danaher, C. (2012). Improving healthy eating in families with a toddler at risk for overweight. *Journal of Developmental & Behavioral Pediatrics,33*(7), 529-534. doi:10.1097/dbp.0b013e3182618e1f

Armelagos, G. J. (2014). Brain evolution, the determinates of food choice, and the omnivores dilemma. *Critical Reviews in Food Science and Nutrition,54*(10), 1330-1341. doi:10.1080/10408398.2011.635817

Bachmanov, A., & Beauchamp, G. (2007). Taste receptor genes. *Annual Review of Nutrition,27*,389-414. doi:10.1146/annurev.nutr.26.061505.111329

Batsell, W. R., Brown, A. S., Ansfield, M. E., & Paschall, G. Y. (2002). "You will eat all of that!": A retrospective analysis of forced consumption episodes. *Appetite,38*(3), 211-219. doi:10.1006/appe.2001.0482

Baumrind, D. (1971). Current patterns of parental authority. *Developmental Psychology,4*(1, Pt.2), 1-103. doi:10.1037/h0030372

Beauchamp, G. K., & Mennella, J. A. (2009). Early flavor learning and it's impact on later feeding behavior. *Journal of Pediatric Gastroenterology and Nutrition,48*(Suppl 1). doi:10.1097/mpg.0b013e31819774a5

Berge, J. M., Rowley, S., Trofholz, A., Hanson, C., Rueter, M., MacLehose, R. F., & Neumark-Sztainer, D. (2014). Childhood obesity and interpersonal dynamics during family meals. *Pediatrics,134*(5), 923-932. doi:10.1542/peds.2014-193

Birch, L. L. (1989). Effects of experience on the modification of food acceptance patterns. *Annals of the New York Academy of Science,561*, 209-216. doi:10.1111/j.1749-6632.1989.tb20983

Birch, L. L., & Fischer, J. O. (1998). Development of eating behaviors among children and adolescents. *Pediatrics,101*, 539-549.

Birch, L. L., Fisher, J. O., & Davison, K. K. (2003). Learning to overeat: Maternal use of restrictive feeding practices promotes girls eating in the absence of hunger. *The American Journal of Clinical Nutrition,78*(2), 215-220. doi:10.1093/ajcn/78.2.215

Birch, L., Fisher, J., Grimm-Thomas, K., Markey, C., Sawyer, R., & Johnson, S. (2001). Confirmatory factor analysis of the Child Feeding Questionnaire: A measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite,36*(3), 201-210. doi:10.1006/appe.2001.0398

Birch, L. L., & Marlin, D. W. (1982). I don't like it; I never tried it: Effects of exposure on two-year-old children's food preferences. *Appetite,3*(4), 353-360. doi:10.1016/s0195-6663(82)80053-6

Black, M. M., & Aboud, F. E. (2011). Responsive feeding is embedded in a theoretical framework of responsive parenting. *The Journal of Nutrition,141*(3), 490-494. doi:10.3945/jn.110.129973

Black, M. M., & Ruder, E. (2018). *Responsive feeding and division of responsibility: A comparative analysis of childhood feeding approaches.* Symposium conducted at the Food and Nutrition Conference and Expo, Washington. D.C.

Branen, L., & Fletcher, J. (1999). Comparison of college students' current eating habits and recollections of their childhood food practices. *Journal of Nutrition Education,31*(6), 304-310. doi:10.1016/s0022-3182(99)70483-8

Breastfeeding. (2019). Retrieved from https://www.healthychildren.org/English/ages-stages/baby/breastfeeding/Pages/default.aspx

Breen, F., Plomin, R., & Wardle, J. (2006). Heritability of food preferences in young children. *Physiology & Behavior,88*(4-5), 443-447. doi:10.1016/j.physbeh.2006.04.016

Brunstrom, J. M., Mitchell, G. L., & Baguley, T. S. (2005). Potential early-life predictors of dietary behaviour in adulthood: A retrospective study. *International Journal of Obesity,29*(5), 463-474. doi:10.1038/sj.ijo.0802890

Butte, N. F., Cai, G., Cole, S. A., Wilson, T. A., Fisher, J. O., Zakeri, I. F., Ellis, K. J., & Comuzzie, A. G. (2007). Metabolic and behavioral predictors of weight gain in Hispanic children: The Viva la Familia study. *The American Journal of Clinical Nutrition,85*(6), 1478-1485. doi:10.1093/ajcn/85.6.1478

Campbell, K., Andrianopoulos, N., Hesketh, K., Ball, K., Crawford, D., Brennan, L., Corsini, N., & Timperio, A. (2010). Parental use of restrictive feeding practices and child BMI z-score. A 3-year prospective cohort study. *Appetite,55*(1), 84-88. doi:10.1016/j.appet.2010.04.006

Carper, J., Fisher, J. O., & Birch, L. (2000). Young girls emerging dietary restraint and disinhibition are related to parental control in child feeding. *Appetite,35*(2), 121-129. doi:10.1006/appe.2000.0343

Chamoun, E., Mutch, D. M., Allen-Vercoe, E., Buchholz, A. C., Duncan, A. M., Spriet, L. L., Haines, J., & Ma, D. W. (2017). A review of the associations between single nucleotide polymorphisms in taste receptors, eating behaviors, and health. *Critical Reviews in Food Science and Nutrition,58*(2), 194-207. doi:10.1080/10408398.2016.1152229

Cooke, L., & Fildes, A. (2011). The impact of flavour exposure in utero and during milk feeding on food acceptance at weaning and beyond. *Appetite,57*(3), 808-811. doi:10.1016/j.appet.2011.05.317

Cooke, L., Haworth, C., & Wardle, J. (2007). Genetic and environmental influences on children's food neophobia. *American Journal of Clinical Nutrition,86*(2), 428-433. doi:10.1093/ajcn.86.2.428

Cooke, L. J., & Wardle, J. (2005). Age and gender differences in children's food preferences. *British Journal of Nutrition,93*(05), 741. doi:10.1079/bjn20051389

Cooke, L. J., Wardle, J., Gibson, E., Sapochnik, M., Sheiham, A., & Lawson, M. (2004). Demographic, familial and trait predictors of fruit and vegetable consumption by pre-school children. *Public Health Nutrition,7*(02). doi:10.1079/phn2003527

Couch, S. C., Glanz, K., Zhou, C., Sallis, J. F., & Saelens, B. E. (2014). Home food environment in relation to children's diet quality and weight status. *Journal of the Academy of Nutrition and Dietetics,114*(10), 1569-1579. doi:10.1016/j.jand.2014.05.015

Coulthard, H., & Sealy, A. (2017). Play with your food! Sensory play is associated with tasting of fruits and vegetables in preschool children. *Appetite,113*, 84-90. doi:10.1016/j.appet.2017.02.003

Crowe, K., Burns, T., Buzzard, J., Dolan, L., Register, S., & Ellis, A. (2017). Knowledge and intake of nutrient-dense dietary patterns are deficient among college students. [Abstract]. *Journal of the Academy of Nutrition and Dietetics,117*(10). doi:10.1016/j.jand.2017.08.093

Cullen, K., Baranowski, T., Owens, E., Marsh, T., Rittenberry, L., & Moor, C. (2003). Availability, accessibility, and preferences for fruit, 100% fruit juice, and vegetables influence children's dietary behavior. *Health Education and Behavior,30*(5), 615-626. doi:10.1177/1090198103257254

Damsbo-Svendsen, M., Frøst, M. B., & Olsen, A. (2017). A review of instruments developed to measure food neophobia. *Appetite,113*, 358-367. doi:10.1016/j.appet.2017.02.032

Daniel, C. (2016). Economic constraints on taste formation and the true cost of healthy eating. *Social Science & Medicine,148*, 34-41. doi:10.1016/j.socscimed.2015.11.025

Deforche, B., Dyck, D. V., Deliens, T., & Bourdeaudhuij, I. D. (2015). Changes in weight, physical activity, sedentary behaviour and dietary intake during the transition to higher education: A prospective study. *International Journal of Behavioral Nutrition and Physical Activity,12*(1), 16. doi:10.1186/s12966-015-0173-9

Diagnostic and statistical manual of mental disorders: DSM-5. (2013). Arlington, VA: American Psychiatric Association.

Dovey, T. M., Staples, P. A., Gibson, E. L., & Halford, J. C. (2008). Food neophobia and 'picky/fussy' eating in children: A review. *Appetite,50*(2-3), 181-193. doi:10.1016/j.appet.2007.09.009

Elkins, A., & Zickgraf, H. F. (2018). Picky eating and food neophobia: Resemblance and agreement in parent/young adult dyads. *Appetite,126*, 36-42. doi:10.1016/j.appet.2018.02.021

Ellis, J. M., Galloway, A. T., Webb, R. M., Martz, D. M., & Farrow, C. V. (2016). Recollections of pressure to eat during childhood, but not picky eating, predict young adult eating behavior. *Appetite,97*, 58-63. doi:10.1016/j.appet.2015.11.020

Faith, M. S., Carnell, S., & Kral, T. V. (2013a). Genetics of Food Intake Self-Regulation in Childhood: Literature Review and Research Opportunities. *Human Heredity,75*(2-4), 80-89. doi:10.1159/000353879

Faith, M. S., Heo, M., Keller, K. L., & Pietrobelli, A. (2013b). Child food neophobia is heritable, associated with less compliant eating, and moderates familial resemblance for BMI. Obesity, 21(8), 1650-1655. doi:10.1002/oby.20369

Falciglia, G. A., Couch, S. C., Gribble, L. S., Pabst, S. M., & Frank, R. (2000). Food neophobia in childhood affects dietary variety. *Journal of the American Dietetic Association,100*(12), 1474-1481. doi:10.1016/s0002-8223(00)00412-0

Falciglia, G., Pabst, S., Couch, S., & Goody, C. (2004). Impact of parental food choices on child food neophobia. *Childrens Health Care,33*(3), 217-225. doi:10.1207/s15326888chc3303_4

Fall 2017 Reference Group Executive Summary - acha.org. (n.d.). Retrieved from https://www.acha.org/documents/ncha/NCHA-II_FALL_2017_REFERENCE_GROUP_EXECUTIVE_SUMMARY.pdf

Fletcher, S., Wright, C., Jones, A., Parkinson, K., & Adamson, A. (2016). Tracking of toddler fruit and vegetable preferences to intake and adiposity later in childhood. *Maternal & Child Nutrition,13*(2). doi:10.1111/mcn.12290

Fildes, A., Jaarsveld, C., Cooke, L., Wardle, J., & Llewellyn, C. (2016). Common genetic architecture underlying young children's food fussiness and liking for vegetables and fruit. *American Journal of Clinical Nutrition,103*, 1099-1104. doi:10.3945/ajcn.115.122945

Fildes, A., Jaarsveld, C., Llewellyn, C., Fisher, A., Cooke, L., & Wardle, J. (2014). Nature and nurture in children's food preferences. *American Journal of Clinical Nutrition,*911-917. doi:10.3945/ajcn.113.077867

Fisher, J., & Birch, L. (1999a). Restricting access to foods and children's eating. *Appetite,32*(3), 405-419. doi:10.1006/appe.1999.0231

Fisher, J. O., & Birch, L. L. (1999b). Restricting access to palatable foods affects children's behavioral response, food selection, and intake. *The American Journal of Clinical Nutrition,69*(6), 1264-1272. doi:10.1093/ajcn/69.6.1264

Fisher, J. O., Mitchell, D. C., Wright, H. S., & Birch, L. L. (2002). Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *Journal of the American Dietetic Association,102*(1), 58-64. doi:10.1016/s0002-8223(02)90017-9

Fisher, M. M., Rosen, D. S., Ornstein, R. M., Mammel, K. A., Katzman, D. A., Rome, E. S., Callahan, S. T., Malizio, J., Kearney, S., & Walsh, B. T. (2014). Characteristics of Avoidant/Restrictive Food Intake Disorder in children and adolescents: A "new disorder" in DSM-5. *Journal of Adolescent Health,55*, 49-52. doi:10.1016/j.jadohealth.2013.11.013

Fitzpatrick, K. K., Forsberg, S. E., & Colborn, D. (2015). Family-based therapy for Avoidant Restrictive Food Intake Disorder: Families facing food neophobias. In K. L. Loeb, D. L. Grange & J. Lock, *Family therapy for adolescent eating and weight disorders: New applications* (pp. 256-276). New York, NY: Routledge/Taylor & Francis. Loeb, K. L., Grange, D. L., & Lock, J.

Forestell, C. A., & Mennella, J. A. (2007). Early determinants of fruit and vegetable acceptance. *Pediatrics,120*(6), 1247-1254. doi:10.1542/peds.2007-0858

Fraker, C., Fishbein, M., Cox, S., & Walbert, L. (2007). *Food chaining: The proven 6-step plan to stop picky eating, solve feeding problems, and expand your childs diet*. Cambridge, MA: Da Capo/Life Long.

Galloway, A. T., Fiorito, L., Lee, Y., & Birch, L. L. (2005). Parental pressure, dietary patterns, and weight status among girls who are "picky eaters". *Journal of the American Dietetic Association,105*(4), 541-548. doi:10.1016/j.jada.2005.01.029

Galloway, A. T., Farrow, C. V., & Martz, D. M. (2010). Retrospective reports of child feeding practices, current eating behaviors, and BMI in college students. *Obesity,18*(7), 1330-1335. doi:10.1038/oby.2009.393

Galloway, A. T., Lee, Y., & Birch, L. L. (2003). Predictors and consequences of food neophobia and pickiness in young girls. *Journal of the American Dietetic Association,103*(6), 692-698. doi:10.1053/jada.2003.50134

Ghrelin. (2018). Retrieved from http://www.yourhormones.info/hormones/ghrelin/

Grimm, E. R., & Steinle, N. I. (2011). Genetics of eating behavior: Established and emerging concepts. *Nutrition Reviews,69*(1), 52-60. doi:10.1111/j.1753-4887.2010.00361.x

Gubbels, J. S., Kremers, S. P., Stafleu, A., Vries, S. I., Goldbohm, R. A., Dagnelie, P. C., Vries, N. K., Buuren, S., & Thijs, C. (2011). Association between parenting practices and children's dietary intake, activity behavior and development of body mass index: The KOALA Birth Cohort Study. *International Journal of Behavioral Nutrition and Physical Activity,8*(1), 18. doi:10.1186/1479-5868-8-18

Guenther, P. M., Dodd, K. W., Reedy, J., & Krebs-Smith, S. M. (2006). Most Americans eat much less than recommended amounts of fruits and vegetables. *Journal of the American Dietetic Association,106*(9), 1371-1379. doi:10.1016/j.jada.2006.06.002

Hagan, J. F., Shaw, J. S., & Duncan, P. M. (2017). *Bright futures: Guidelines for health supervision of infants, children, and adolescents*(4th ed.). Elk Grove Village, IL: Bright Futures/American Academy of Pediatrics.

Haines, J., Neumark-Sztainer, D., Hannan, P., & Robinson-Obrien, R. (2008). Child versus parent report of parental influences on children's weight-related attitudes and behaviors. *Journal of Pediatric Psychology,33*(7), 783-788. doi:10.1093/jpepsy/jsn016

Hammons, A. J., & Fiese, B. H. (2011). Is frequency of shared family meals related to the nutritional health of children and adolescents? *Pediatrics,127*(6). doi:10.1542/peds.2010-1440

Harris, D. A. (2017). Just the "typical college diet": How college students use life stages to account for unhealthy eating. *Symbolic Interaction,40*(4), 523-540. doi:10.1002/symb.280

Harris, H., Mallan, K. M., Nambiar, S., & Daniels, L. A. (2014). The relationship between controlling feeding practices and boys and girls eating in the absence of hunger. *Eating Behaviors,15*(4), 519-522. doi:10.1016/j.eatbeh.2014.07.003

Hausner, H., Nicklaus, S., Issanchou, S., Mølgaard, C., & Møller, P. (2010). Breastfeeding facilitates acceptance of a novel dietary flavour compound. *Clinical Nutrition,29*(1), 141-148. doi:10.1016/j.clnu.2009.11.007

Hausner, H., Olsen, A., & Møller, P. (2012). Mere exposure and flavour–flavour learning increase 2–3year-old children's acceptance of a novel vegetable. *Appetite,58*(3), 1152-1159. doi:10.1016/j.appet.2012.03.009

Haworth, C. M., Davis, O. S., & Plomin, R. (2012). Twins early development study (TEDS): A genetically sensitive investigation of cognitive and behavioral

development from childhood to young adulthood. *Twin Research and Human Genetics,16*(01), 117-125. doi:10.1017/thg.2012.91

Heatherton, T. F., & Polivy, J. (1992). Chronic dieting and eating disorders: a spiral model. In C. J., T. D. L., H. S. E., S. M. A. P. (Eds). *The Etiology of Bulimia Nervosa: The individual and Family Context* (pp. 133-135). Washington: Hemisphere Publishing Corp.

Herman, C. P., & Polivy, J. (1975). Anxiety, restraint, and eating behavior. *Journal of Abnormal Pyschology,84*, 666-672.

Hetherington, M. M., Schwartz, C., Madrelle, J., Croden, F., Nekitsing, C., Vereijken, C., & Weenen, H. (2015). A step-by-step introduction to vegetables at the beginning of complementary feeding. The effects of early and repeated exposure. *Appetite,84*, 280-290. doi:10.1016/j.appet.2014.10.014

Horst, K. V. (2012). Overcoming picky eating. Eating enjoyment as a central aspect of children's eating behaviors. *Appetite,58*(2), 567-574. doi:10.1016/j.appet.2011.12.019

Howard, A. J., Mallan, K. M., Byrne, R., Magarey, A., & Daniels, L. A. (2012). Toddlers' food preferences. The impact of novel food exposure, maternal preferences and food neophobia. *Appetite,59*(3), 818-825. doi:10.1016/j.appet.2012.08.022

Hughes, S. O., Shewchuk, R. M., Baskin, M. L., Nicklas, T. A., & Qu, H. (2008). Indulgent feeding style and children's weight status in preschool. *Journal of*

Developmental & Behavioral Pediatrics,29(5), 403-410. doi:10.1097/dbp.0b013e318182a976

Hurley, K. M., & Black, M. M. (2011). Introduction to a supplement on responsive feeding: Promoting healthy growth and development for infants and toddlers. *The Journal of Nutrition,141*(3), 489-489. doi:10.3945/jn.110.130070

Infant Food and Feeding. (2018). Retrieved from https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/HALF-Implementation-Guide/Age-Specific-Content/Pages/Infant-Food-and-Feeding.aspx

Institutional Research (2019). *Kent State University:* Fifteenth Day Enrollment Statistics, *Campus System,* from https://www.kent.edu/sites/default/files/file/Kent%20Campus%20201910%20-%20final.pdf

Jansen, P. W., Roza, S. J., Jaddoe, V. W., Mackenbach, J. D., Raat, H., Hofman, A., Verhulst, F. C., Tiemeier, H. (2012). Childrens eating behavior, feeding practices of parents and weight problems in early childhood: Results from the population-based Generation R Study. *International Journal of Behavioral Nutrition and Physical Activity,9*(1), 130. doi:10.1186/1479-5868-9-130

Kauer, J., Pelchat, M. L., Rozin, P., & Zickgraf, H. F. (2015). Adult picky eating. Phenomenology, taste sensitivity, and psychological correlates. *Appetite,90*, 219-228. doi:10.1016/j.appet.2015.03.001

Keskitalo, K., Silventoinen, K., Tuorila, H., Perola, M., Pietiläinen, K. H., Rissanen, A., & Kaprio, J. (2008). Genetic and environmental contributions to food use patterns

of young adult twins. *Physiology & Behavior,93*(1-2), 235-242. doi:10.1016/j.physbeh.2007.08.025

Knaapila, A., Silventoinen, K., Broms, U., Rose, R. J., Perola, M., Kaprio, J., & Tuorila, H. M. (2011). Food neophobia in young adults: Genetic architecture and relation to personality, pleasantness and use frequency of foods, and body mass index—A twin study. *Behavior Genetics,41*(4), 512-521. doi:10.1007/s10519-010-9403-8

Kral, T., & Faith, M. (2010). Eating behaviors of children in the context of their family environment. *Appetite,52*(3), 842. doi:10.1016/j.appet.2009.04.116

Lakkakula, A., Geaghan, J., Zanovec, M., Pierce, S., & Tuuri, G. (2010). Repeated taste exposure increases liking for vegetables by low-income elementary school children. *Appetite,55*(2), 226-231. doi:10.1016/j.appet.2010.06.003

Lange, C., Visalli, M., Jacob, S., Chabanet, C., Schlich, P., & Nicklaus, S. (2013). Maternal feeding practices during the first year and their impact on infants' acceptance of complementary food. *Food Quality and Preference,29*(2), 89-98. doi:10.1016/j.foodqual.2013.03.005

Laureati, M., Bergamaschi, V., & Pagliarini, E. (2014). School-based intervention with children. Peer-modeling, reward and repeated exposure reduce food neophobia and increase liking of fruits and vegetables. *Appetite,83*, 26-32. doi:10.1016/j.appet.2014.07.031

Lawson, O. J., Williamson, D. A., Champagne, C. M., Delany, J. P., Brooks, E. R., Howat, P. M., Wozniak, P. J., Bray, G. A., & Ryan, D. H. (1995). The association of body weight, dietary intake, and energy expenditure with dietary restraint and

disinhibition. *Obesity Research,3*(2), 153-161. doi:10.1002/j.1550-8528.1995.tb00131.x

Liang, L. C., Sakimura, J., May, D., Breen, C., Driggin, E., Tepper, B. J., Chung, W. K. & Keller, K. L. (2012). Fat discrimination: A phenotype with potential implications for studying fat intake behaviors and obesity. *Physiology & Behavior, 105*(2), 470-475. doi:10.1016/j.physbeh.2011.09.002

Loth, K. A., Maclehose, R. F., Fulkerson, J. A., Crow, S., & Neumark-Sztainer, D. (2014). Are food restriction and pressure-to-eat parenting practices associated with adolescent disordered eating behaviors? *International Journal of Eating Disorders,47*(3), 310-314. doi:10.1002/eat.22189

Loth, K. A., MacLehose, R. F., Larson, N., Berge, J. M., & Neumark-Sztainer, D. (2016). Food availability, modeling and restriction: How are these different aspects of the family eating environment related to adolescent dietary intake? *Appetite,96*, 80-86. doi:10.1016/j.appet.2015.08.026

Macbrayer, E. K., Smith, G. T., Mccarthy, D. M., Demos, S., & Simmons, J. (2001). The role of family of origin food-related experiences in bulimic symptomatology. *International Journal of Eating Disorders,30*(2), 149-160. doi:10.1002/eat.1067

Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent–child interaction. In P. H. Mussen, & E. M. Hetherington, *Handbook of child psychology: Vol. 4. Socialization, personality, and social development* (4 ed., pp. 1-101). New York: Wiley.

Maitre, I., Wymelbeke, V. V., Amand, M., Vigneau, E., Issanchou, S., & Sulmont-Rossé, C. (2014). Food pickiness in the elderly: Relationship with dependency and malnutrition. *Food Quality and Preference,32*, 145-151. doi:10.1016/j.foodqual.2013.04.003

Mascola, A. J., Bryson, S. W., & Agras, W. S. (2010). Picky eating during childhood: A longitudinal study to age 11years. *Eating Behaviors,11*(4), 253-257. doi:10.1016/j.eatbeh.2010.05.006

Mellin, A., Neumarksztainer, D., Story, M., Ireland, M., & Resnick, M. (2002). Unhealthy behaviors and psychosocial difficulties among overweight adolescents: The potential impact of familial factors. *Journal of Adolescent Health,31*(2), 145-153. doi:10.1016/s1054-139x(01)00396-2

Mennella, J. A., Forestell, C. A., Morgan, L. K., & Beauchamp, G. K. (2009). Early milk feeding influences taste acceptance and liking during infancy. *The American Journal of Clinical Nutrition,90*(3). doi:10.3945/ajcn.2009.27462o

Mennella, J. A., Jagnow, C. P., & Beauchamp, G. K. (2001). Prenatal and postnatal flavor learning by human infants. *Pediatrics,107*(6). doi:10.1542/peds.107.6.e88

Mennella, J. A., Johnson, A., & Beauchamp, G. K. (1995). Garlic ingestion by pregnant women alters the odor of amniotic fluid. *Chemical Senses,20*(2), 207-209. doi:10.1093/chemse/20.2.207

Mennella, J. A., & Beauchamp, G. K. (1996). The human infants' response to vanilla flavors in mother's milk and formula. *Infant Behavior and Development,19*(1), 13-19. doi:10.1016/s0163-6383(96)90040-5

Mennella, J. A., & Beauchamp, G. K. (1991). Maternal diet alters the sensory qualities of human milk and the nursling's behavior. *Pediatrics,88*, 737-744.

Mennella, J. A., & Beauchamp, G. K. (1998). Smoking and the flavor of breast milk. *New England Journal of Medicine,339*(21), 1559-1560. doi:10.1056/nejm199811193392119

Mennella, J. A., & Beauchamp, G. K. (1992). The transfer of alcohol to human milk. *Obstetrical & Gynecological Survey,47*(3), 166-167. doi:10.1097/00006254-199203000-00011

Mennella, J. A., Pepino, M. Y., Reed, D. R. (2005). Genetic and environmental determinants of bitter perception and sweet preferences. *Pediatrics,115*(2). doi:10.1542/peds.2004-1582

Mustonen, S., & Tuorila, H. (2010). Sensory education decreases food neophobia score and encourages trying unfamiliar foods in 8–12-year-old children. *Food Quality and Preference,21*(4), 353-360. doi:10.1016/j.foodqual.2009.09.001

Neumark-Sztainer, D., Story, M., Ackard, D., Moe, J., & Perry, C. (2000). The "family meal": Views of adolescents. *Journal of Nutrition Education,32*(6), 329-334. doi:10.1016/s0022-3182(00)70592-9

Nicklaus, S. (2017). The role of dietary experience in the development of eating behavior during the first years of life. *Annals of Nutrition and Metabolism,70*(3), 241-245. doi:10.1159/000465532

Ogden, J., Reynolds, R., & Smith, A. (2006). Expanding the concept of parental control: A role for overt and covert control in childrens snacking behaviour? *Appetite,47*(1), 100-106. doi:10.1016/j.appet.2006.03.330

Olabi, A., Najm, N. E., Baghdadi, O. K., & Morton, J. M. (2009). Food neophobia levels of Lebanese and American college students. *Food Quality and Preference,20*(5), 353-362. doi:10.1016/j.foodqual.2009.01.005

Owen, L. H., Kennedy, O. B., Hill, C., & Houston-Price, C. (2018). Peas, please! Food familiarization through picture books helps parents introduce vegetables into preschoolers' diets. *Appetite,128*, 32-43. doi:10.1016/j.appet.2018.05.140

Palfreyman, Z., Haycraft, E., & Meyer, C. (2015). Parental modelling of eating behaviours: Observational validation of the Parental Modelling of Eating Behaviours scale (PARM). *Appetite,86*, 31-37. doi:10.1016/j.appet.2014.08.008

Papas, M. A., Hurley, K. M., Quigg, A. M., Oberlander, S. E., & Black, M. M. (2009). Low-income, African American adolescent mothers and their toddlers exhibit similar dietary variety patterns. *Journal of Nutrition Education and Behavior,41*(2), 87-94. doi:10.1016/j.jneb.2008.01.005

Pearson, N., Atkin, A. J., Biddle, S. J., Gorely, T., & Edwardson, C. (2009). Parenting styles, family structure and adolescent dietary behaviour. *Public Health Nutrition,13*(08), 1245-1253. doi:10.1017/s1368980009992217

Perry, R. A., Mallan, K. M., Koo, J., Mauch, C. E., Daniels, L. A., & Magarey, A. M. (2015). Food neophobia and its association with diet quality and weight status in

children. *International Journal of Behavioral Nutrition and Physical Activity,12*(13), 1-8. doi:10.1186/s12966-015-0184-6

Pliner, P., & Hobden, K. (1992). Development of a scale to measure the trait of food neophobia in humans. *Appetite,19*(2), 105-120. doi:10.1016/0195-6663(92)90014-w

Pliner, P. (1994). Development of measures of Food Neophobia in children. *Appetite,23*(2), 147-163. doi:10.1006/appe.1994.1043

Puhl, R. M., & Schwartz, M. B. (2003). If you are good you can have a cookie: How memories of childhood food rules link to adult eating behaviors. *Eating Behaviors,4*(3), 283-293. doi:10.1016/s1471-0153(03)00024-2

Racette, S. B., Deusinger, S. S., Strube, M. J., Highstein, G. R., & Deusinger, R. H. (2008). Changes in weight and health behaviors from freshman through senior year of college. *Journal of Nutrition Education and Behavior,40*(1), 39-42. doi:10.1016/j.jneb.2007.01.001

Ramsay, S. A., Rudley, M., Tonnemaker, L. E., & Price, W. J. (2016). A comparison of college students' reported fruit and vegetable liking and intake from childhood to adulthood. *Journal of the American College of Nutrition,36*(1), 28-37. doi:10.1080/07315724.2016.1169233

Remy, E., Issanchou, S., Chabanet, C., & Nicklaus, S. (2013). Repeated exposure of infants at complementary feeding to a vegetable purée increases acceptance as effectively as flavor-flavor learning and more effectively than flavor-nutrient learning. *The Journal of Nutrition,143*(7), 1194-1200. doi:10.3945/jn.113.175646

Rhee, K. E., Coleman, S. M., Appugliese, D. P., Kaciroti, N. A., Corwyn, R. F., Davidson, N. S., Bradley, R. H., & Lumeng, J. C. (2009). Maternal feeding practices become more controlling after and not before excessive rates of weight gain. *Obesity,17*(9), 1724-1729. doi:10.1038/oby.2009.54

Robson, S. M., Couch, S. C., Peugh, J. L., Glanz, K., Zhou, C., Sallis, J. F., & Saelens, B. E. (2016). Parent diet quality and energy intake are related to child diet quality and energy intake. *Journal of the Academy of Nutrition and Dietetics,116*(6), 984-990. doi:10.1016/j.jand.2016.02.011

Rozin, P. (1976). The selection of food by rats, humans, and other animals. *Advances in the Study of Behavior,*21-67.

Rudley, M., & Ramsay, S. (2014). Factors influencing college student fruit and vegetable liking and intake. [Abstract]. *Journal of the Academy of Nutrition and Dietetics,114*(9). doi:10.1016/j.jand.2014.06.079

Russell, C. G., Worsley, A., & Campbell, K. J. (2015). Strategies used by parents to influence their children's food preferences. *Appetite,90*, 123-130. doi:10.1016/j.appet.2015.02.038

Scaglioni, S., Arrizza, C., Vecchi, F., & Tedeschi, S. (2011). Determinants of children's eating behavior. *American Journal of Clinical Nutrition,94*, 2006-2011. doi:10.3945/ajcn.110.001685

Schaal, B., & Marlier, L. (2000). Human Foetuses Learn Odours from their Pregnant Mothers Diet. *Chemical Senses,25*(6), 729-737. doi:10.1093/chemse/25.6.729

Schindler, J. M., Corbett, D., & Forestell, C. A. (2013). Assessing the effect of food exposure on childrens identification and acceptance of fruit and vegetables. *Eating Behaviors,14*(1), 53-56. doi:10.1016/j.eatbeh.2012.10.013

Schroeter, C., & House, L. (2015). Fruit and vegetable consumption of college students: What is the role of food culture? *Journal of Food Distribution Research,46*(3), 131-152.

Smith, A., Fildes, A., Cooke, L., Herle, M., Shakeshaft, N., Plomin, R., & Llewellyn, C. (2016a). Genetic and environmental influences on food preferences in adolescence. *American Journal of Clinical Nutrition,104*, 446-453. doi:10.3945/ajcn.116.133983

Smith, A. D., Herle, M., Fildes, A., Cooke, L., Steinsbekk, S., & Llewellyn, C. H. (2016b). Food fussiness and food neophobia share a common etiology in early childhood. *Journal of Child Psychology and Psychiatry,58*(2), 189-196. doi:10.1111/jcpp.12647

Stewart, J. E., Feinle-Bisset, C., Golding, M., Delahunty, C., Clifton, P. M. & Keast, R. S. (2010). Oral sensitivity to fatty acids, food consumption and BMI in human subjects. *British Journal of Nutrition, 104*(01), 145-152. doi:10.1017/s0007114510000267

Stewart, J. E., Feinle-Bisset, C. and Keast, R. S. (2011). Fatty acid detection during food consumption and digestion: Associations with ingestive behavior and obesity. *Progress in Lipid Research, 50*(3), 225-233. doi:10.1016/j.plipres.2011.02.002

Student Body Profile. (2019). Retrieved from https://www.kent.edu/Array/student-body-profile

Tan, C. C., & Holub, S. C. (2012). Maternal feeding practices associated with food neophobia. *Appetite,59*(2), 483-487. doi:10.1016/j.appet.2012.06.012

Turnbull, B., & Matisoo-Smith, E. (2002). Taste sensitivity to 6-n-propylthiouracil predicts acceptance of bitter-tasting spinach in 3–6-y-old children. *The American Journal of Clinical Nutrition,76*(5), 1101-1105. doi:10.1093/ajcn/76.5.1101

U.S. Department of Health and Human Services and U.S. Department of Agriculture. (2015). *2015-2020 Dietary Guidelines for Americans* (8th ed.).

Utter, J., Scragg, R., Schaaf, D., & Mhurchu, C. N. (2008). Relationships between frequency of family meals, BMI and nutritional aspects of the home food environment among New Zealand adolescents. *International Journal of Behavioral Nutrition and Physical Activity,5*(1), 50. doi:10.1186/1479-5868-5-50

Vaughn, A. E., Martin, C. L., & Ward, D. S. (2018). What matters most - what parents model or what parents eat? *Appetite,126*, 102-107. doi:10.1016/j.appet.2018.03.025

Vaughn, A. E., Ward, D. S., Fisher, J. O., Faith, M. S., Hughes, S. O., Kremers, S. P., Musher-Eizenman, D. R., O'Connor, T. M., Patrick, H., & Power, T. G. (2016). Fundamental constructs in food parenting practices: A content map to guide future research. *Nutrition Reviews,74*(2), 98-117. doi:10.1093/nutrit/nuv061

Ventura, A. K. (2017). Does breastfeeding shape food preferences? Links to Obesity. *Annals of Nutrition and Metabolism,70*(3), 8-15. doi:10.1159/000478757

Verhage, C. L., Gillebaart, M., Veek, S. M., & Vereijken, C. M. (2018). The relation between family meals and health of infants and toddlers: A review. *Appetite,127*, 97-109. doi:10.1016/j.appet.2018.04.010

Videon, T. M., & Manning, C. K. (2003). Influences on adolescent eating patterns: The importance of family meals. *Journal of Adolescent Health,32*(5), 365-373. doi:10.1016/s1054-139x(02)00711-5

Wadhera, D., Phillips, E. D., Wilkie, L. M., & Boggess, M. M. (2015). Perceived recollection of frequent exposure to foods in childhood is associated with adulthood liking. *Appetite,89*, 22-32. doi:10.1016/j.appet.2015.01.011

Wang, Y., Beydoun, M. A., Li, J., Liu, Y., & Moreno, L. A. (2011). Do children and their parents eat a similar diet? Resemblance in child and parental dietary intake: Systematic review and meta-analysis. *Journal of Epidemiology & Community Health,65*(2), 177-189. doi:10.1136/jech.2009.095901

Wardle, J., Carnell, S., & Cooke, L. (2005). Parental control over feeding and children's fruit and vegetable intake: How are they related? *Journal of the American Dietetic Association,105*(2), 227-232. doi:10.1016/j.jada.2004.11.006

Wardle, J., Carnell, S., Haworth, C. M., Farooqi, I. S., Orahilly, S., & Plomin, R. (2008). Obesity associated genetic variation in FTO is associated with diminished satiety. *The Journal of Clinical Endocrinology & Metabolism,93*(9), 3640-3643. doi:10.1210/jc.2008-0472

Wasshenova, E. V., Mahas, R., Geers, A., & Boardley, D. (2015). Affective associations and reported intake of fruit, vegetables, and grains in university students.

[Abstract]. *Journal of Nutrition Education and Behavior,47*(4). doi:10.1016/j.jneb.2015.04.155

Webber, L., Cooke, L., Hill, C., & Wardle, J. (2010a). Associations between children's appetitive traits and maternal feeding practices. *Journal of the American Dietetic Association,110*(11), 1718-1722. doi:10.1016/j.jada.2010.08.007

Webber, L., Cooke, L., Hill, C., & Wardle, J. (2010b). Child adiposity and maternal feeding practices: A longitudinal analysis. *The American Journal of Clinical Nutrition,92*(6), 1423-1428. doi:10.3945/ajcn.2010.30112

Webber, L., Hill, C., Cooke, L., Carnell, S., & Wardle, J. (2010c). Associations between child weight and maternal feeding styles are mediated by maternal perceptions and concerns. *European Journal of Clinical Nutrition,64*(3), 259-265. doi:10.1038/ejcn.2009.146

What is Food Neophobia? (2019). Retrieved from https://www.newbridge-health.org.uk/eating-disorders-help/food-neophobia/

Wild, V. W., Graaf, C. D., & Jager, G. (2017). Use of different vegetable products to increase preschool-aged children's preference for and intake of a target vegetable: A randomized controlled trial. *Journal of the Academy of Nutrition and Dietetics,117*(6), 859-866. doi:10.1016/j.jand.2016.11.006

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology Monograph Supplement,9*(2), 2nd ser., 1-32.

Zickgraf, H. F., & Schepps, K. (2016). Fruit and vegetable intake and dietary variety in adult picky eaters. *Food Quality and Preference,54*, 39-50. doi:10.1016/j.foodqual.2016.06.012

Zuercher, J., & Kranz, S. (2012). College eating 101: Factors influencing students' food decisions. *International Journal of Adolescent Health,5*(1), 3-6.