# HOW FAR DOES THE APPLE FALL FROM THE TREE: A REVIEW OF PARENTAL INFLUENCE ON CHILDREN'S ATTITUDES ABOUT FOOD AND NUTRITION

by

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Parents play an important role in their child's development. Through the socialization process, children acquire knowledge, attitudes, and beliefs about food and nutrition. Parenting styles and parental modeling are two methods by which parents guide their child's eating behavior and overall diet. As children develop, they begin to express thoughts around food and nutrition. In this review, we focus on the impact that parents have on the way children think about food and nutrition. We predict that most studies will rely heavily on parent-reported data, excluding the child's narrative even though the research will claim to be studying children's attitudes and preferences. We also predict that the studies will provide evidence that preschool age children will show a similar knowledge about foods as their parent, and children with authoritarian parents will show a higher preference for fruit and vegetable consumption. This research is important because there has not been a review that has looked at parental modeling and parenting styles, simultaneously, when assessing the preschool children's attitudes and beliefs about food and nutrition.

This review will contribute to the gap in literature that exists on parental influence on children's self-reported ideas about food and nutrition, and will provide recommendations to the field on ways to better asses these beliefs in young children while also providing recommendations to parents on how to help their child develop healthy eating habits and positive ides about food and nutrition.

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# Table of Contents


Introduction 1

Biological Bases of Dietary Preferences 5

Socialization of Children's Food and Dietary Preferences 9

Parental Modeling 9

Parenting styles. 13

Children's Nutritional Knowledge and Food Related Behaviors 18

Age-Appropriate Research Methods 22

Recommendations for the Field 25

Conclusion 29

Bibliography 30

# Introduction

Parents play a crucial role in their child's development, whether it is to ensure their basic survival or to support their eventual productive membership within society. Early in development, parents socialize their children to comprehend the differences between right and wrong, good and bad (Hanfling, 2003) so that children will eventually be able to make adaptive decisions for themselves. One area of particular importance to developmental scientists concerns nutrition, in particular the socialization of children's food knowledge and food preferences (Atik & Ozdamar Ertekin, 2013). Parents serve as an influential source of information about food through socialization processes, such modeling dietary practices (which are likely based on parents' own food preference) as well as parenting behaviors designed to cultivate children's own knowledge, attitudes, and beliefs about food and nutrition. Parenting styles and parental feeding practices are two means by which parents shape their child's eating behaviors, dietary preferences, and overall health (Lopez et al., 2018). In addition to the roles that parents play, children's biological dispositions, in particular, their taste buds, will help to determine children's dietary behaviors and preferences (Ventura & Worobey, 2013). At present, however, there is a lack of research in the field of developmental psychology that considers how children develop food preferences, and the specific, interacting roles that biology and parental socialization play in shaping the type of eaters children become. This paper will consider the biological basis and socialization of children's dietary preferences and beliefs with the goal of reviewing existing research that currently contributes to our understating of how parents impact the way their child perceives food and nutrition.

Good nutrition during the early years of life is vital to healthy growth and development. Starting with breastfeeding and then progressing to complimentary food and, eventually, one's own dietary behaviors, the micronutrient and macronutrient composition of children's nutrition is foundational to all aspects of health (Harte, Theobald & Trost, 2018). Nutrition, as defined by the *World Health Organization* (WHO), is the intake of food considered in relation to the body's dietary needs. Good nutrition, which can be described as having both adequate amounts of food as well as a balance between essential food groups combined with physical activity, is critical to a healthy life. Good nutrition is an important part of leading a healthy lifestyle and helping support immune system functioning, maintaining a healthy weight and promoting overall health. In contrast, poor nutrition can cause reduced immune functioning, which can lead to an increased susceptibility to disease, impaired physical and mental development, and reduced productivity (World Health Organization [WHO], 2018)

Having good nutrition is essential to leading a healthy life. Even preschool-aged children, when asked about nutrition, think that eating good food is necessary for being healthy and returning to health after being ill (Schultz & Danford, 2016). How humans fuel their bodies is vital to the overall health of each individual because of the way food is broken down, used, and stored throughout the body. An unbalanced diet is a key risk factor of many chronic diseases, including cardiovascular diseases, certain types of cancers, chronic respiratory diseases, diabetes, and obesity (Zonneveld et al., 2019). In low- and middle-income countries, millions of children under the age of five are unable

to reach their full physical, cognitive, and socioemotional potential given chronic under nutrition (Grantham-McGregor et al., 2014). Even in a developed country, such as the United States, only a small percentage of children meet the daily recommended intake for fruits and vegetables (Vollmer & Baietto, 2017). A healthy diet, filled with the proper amount of nutrients, helps to protect against nutrition-related diseases (e.g., obesity, respiratory illnesses, and digestive diseases) and noncommunicable diseases (World Health Organization [WHO], 2018). As children develop, what they eat alters the way their bodies adapt and respond to certain deficiencies or surpluses. For example, in more than half of all countries, especially in Africa and South-East Asia, low-income children are vitamin A deficient. Vitamin A can be found in a number of foods including sweet potatoes, carrots, and mangos. Due to these deficiencies, the children are suffering from night blindness—the inability to see in dim light (World Health Organization [WHO], 2019). Then, there are children who are experiencing a different problem because they are over consuming foods high in fat and sugar, such as most highly-processed goods; therefore, increasing the chance of those children becoming obese (WHO, 2018).

Most would agree that the development of good dietary knowledge and practices are crucial to good health and longevity. However, as stated earlier, too little is understood about how children develop their own early and lasting food practices. Although the role that parents play in the socialization of food behaviors has been explored scientifically, much of this work has targeted older children and adolescents once dietary patterns have begun to stabilize. However, it is critical to consider the earliest origins of food preferences and dietary behaviors to understand long-term

outcomes related to nutrition. In the following section, the biological bases of food preferences are considered first. Specifically, the role of children's developing taste buds is considered in terms of their effect on food tolerances and preferences. In sections thereafter, the role of parental socialization is reviewed. Research has shown that children's familial contexts are perhaps the most important influences on food and dietary behaviors, including parents' own food behaviors and, in turn, how they socialize their children's eating behaviors.

## Biological Bases of Dietary Preferences

The development of food preferences are the result of a multidimensional interaction between biological processes and social experiences, including parental and peer influences, previous food experiences, and food marketing (Moreno-Black & Stockard, 2018). From an evolutionary perspective, food preferences emerge from genetically mediated predispositions toward sweet and salty flavors, given their strong association with metabolic energy, and a disinclination to bitter and sour tastes, given they association with toxins and other health-threatening qualities (Benton, 2004). Taste buds, in particular, are the biological determinants of which foods will be liked, and which foods will be disliked. There are five known taste receptor proteins: sweet, salty, sour, bitter, and umami or "savory". Although the five basic tastes are universal, individual differences in food preferences emerge due to variations in the sensitivity of the biological mechanisms responsible for taste. Half of the sensory cells on the tongue are specialized to only react to one of the five tastes while the other half react to several of them (informedhealth.org). Between the sensory cells that react to more than one taste, each cell has its own fixed sensitivity to particular tastes (informedhealth.org). Once all of the sensory cells from the tongue are combined, an individual experiences idiosyncratic patters of taste. Given the multiple ways in which taste buds react to different foods, there is a limitless palette of flavors influencing people's food preferences.

Physiological, nutritional, environmental, and sociocultural factors all influence the food choices individuals make every day; however, sensory qualities such as taste may be the most important determinant of food preferences (Garcia-Bailo, Toguri, Eny,

& El-Sohemy, 2009). Genetic predispositions for basic tastes influence food preferences (Birch, 1999). Birch (1999) reviewed how genetic predispositions interact with aspects of the eating environment to produce phenotypic food preferences during the first years of life. When reporting on the developmental systems perspective, which hypothesizes that environmental factors work in conjunction with genetic predisposition to produce food preferences, Birch (1999) points to three genetic predispositions that initially constrain food preferences (1) the predisposition to prefer foods that are sweet and salty and to reject those that are sour and bitter, (2) the predisposition to reject new foods and to learn preferences for more familiar ones, and (3) the predisposition to learn preferences because of the context and consequences associated with certain foods. Specifically, when measuring children's preference for sweet tastes, one study found that infants preferred sweet solutions to water, but by 6 months of age, preference for sweetened water was linked to the infants dietary experience, which suggests that there is an innate preference for certain tastes that drive food preference, but during the early years of development those innate preferences can evolve based on experience (Birch, 1999). Infants show negative facial expressions to bitter and sour tastes; whereas the preference for salty tastes doesn't typically appear until the baby is 4-months old (Birch, 1999). Birch (1999) concluded that it is typical for the human species to prefer sweet taste and reject sour and bitter tastes at birth, and to show no preference for salty taste until approximately 4-months. In Birch's review, there is no mention of the umami taste receptor; thus, no information on when, and if, there is ever a preference for umami tastes. Similarly, there was very little information about sour taste in the review aside from the fact that sour tastes are typically negatively perceived by infants. While there

was evidence in the review for preference, via the facial expressions that newborns make when consuming food associated with a specific taste, there was no evaluation that linked the preferences to any biological studies aside from sensitivity to bitter substances because of 6-N-propylthiouracil and phenylthiocarbamide. It is also important to follow food preferences as they develop since they are not fixed and change with each individual changes, and could show interesting patters of development as an individual grows through life's developmental stages.

Parents tend to assign blame to the inborn dislike for vegetables that children posses when their child is struggling to achieve a healthy diet (Fildes et al., 2014). Fildes and colleagues (2014) created a study with the aim of getting comprehensive food-preference data from a large sample of young twins in order to assess the genetic and environmental contributions to food preferences. 81 pairs of 3-years-old twins' food preferences were assessed via 114-item parent-report questionnaire in which the parent reported on each child's liking of 114 different foods (Fildes et al., 2014). The foods were grouped into six different categories: vegetables, fruit, protein (e.g., meat), diary (e.g., yogurt), starches (e.g., bread), and snacks (e.g., cookies) (Fildes et al., 2014). Fildes and colleagues (2014) found that there was a substantial genetic influence on preferences for fruit, vegetables, and protein foods, with a lower genetic influence on the preference for snacks, dairy, and starch. Their findings suggest that children have an innate preference for fruits, vegetables, and protein foods (Fildes et al., 2014). There is strong evidence that food preferences in early childhood develop because of genes and environmental factors (Fildes et al., 2014). This study relies on a single informant, parent-reported questionnaire of children's food preferences when the research being

done is specifically focused on the way children feel about different foods. Although 3-year-olds are not able to reliably and validly fill out a questionnaire, as I discuss later in this review, there are other ways to attend to the needs of preschool age children in order to collect useful data from them. Additionally, behavioral observations could have been beneficial as a set of supporting data to what the parents reported.

## Socialization of Children's Food and Dietary Preferences

Although it is important to recognize that children's biological development plays a role in the development of food preferences, parental socialization and other environmental factors are equally crucial to consider when trying to understand children's food preferences (Safan, et al., 2018; Yee, Lwin, & Ho, 2017). Socialization is the process whereby an individual learns how to behave according to societal and group norms. In regard to young children, parents are one of the main socializing agents. Important ways in which parents socialize their children, especially socialization in the context of food and nutrition, are parental modeling and parenting styles. Parents are key determinants of their children's food preferences in how they act as role models, in the food that they purchase and provide for their family, and in the types of eating behaviors they foster in their children (Vollmer & Baietto, 2017). Parents influence their children's food preferences in the ways that they themselves model food preferences and eating behaviors, as wells as their more general approaches to parenting. In the sections that follow next, parental modeling behaviors and parenting styles are considered as two aspects of socialization that impact children's eating attitudes and behaviors.

### Parental Modeling

Parental modeling of healthy eating behaviors is an important social factor positively associated with a child's dietary intake of, and preference for, fruits and vegetables (Draxten et al., 2014). Children's earliest experiences with food and eating happen within the home environment, which parents shape through many factors including food

availability, eating and feeding rules, parents actual food preparation skills, and, importantly, how parents model their own approaches to eating (Zarnowiecki et al., 2012). It is through these early experiences that children gain their knowledge of nutrition and their own eating practices. The Dietary Guidelines for Americans according to the U.S. Department of Agriculture and the U.S. Department of Health and Human Services (2010) suggests that children consume a diet rich in fruits and vegetables because of the associated health benefits such as lower body mass index and reduced risk for multiple chronic diseases. Thus, the research conducted by Draxten and colleagues (2014) had two main objectives (1) to examine the association between parent and child reports of parental modeling of fruit and vegetable consumption at snacks and at dinner and (2) determine if there is an association between parental modeling and children meeting daily fruit and vegetable recommendations. For the study, 160 parent-child dyads, with the child being between the ages of 8 and 12-years-old, were recruited. Parents and children each completed psychosocial surveys of parental role modeling of healthful foods at snacks and dinner and demographic characteristics; children completed three 24-hour dietary recalls (Draxten et al., 2014). In this study, children were classified as meeting daily fruit and vegetable recommendations if they consumed at least four daily servings of fruit and vegetables (Draxten et al., 2014). Draxten and colleagues found that, on average, children consume less than three servings of fruits and vegetables per day; only 23% of children consumed the recommended four daily serving of fruits and vegetables. The study concluded that, in general, parents and children reported similarly on reports of parental role modeling of healthful eating (Draxten et al., 2014). Draxten and colleagues also

reported that parental role modeling may increase the likelihood that the daily recommendations for fruit and vegetable consumption were met. Although, there were not always statistically significant findings that children who had parents that role modeled eating healthy fruits and vegetables, were consistently more likely to meet the daily recommended servings for fruits and vegetables (Draxten et al., 2014). Since parents self-reported their own modeling of healthy foods, it is possible that biases such as the social pressure to appear as a good role model for their child impacted the way in which they reported modeling healthy food and nutrition behaviors. Similarly, the children could have felt comparable social pressure to report that their parents were positive role models even if that wasn't the case. The addition of an observational component to this study would have allowed researchers to code and compare what the parent was reporting, what the child was reporting, and what was actually observed in regard to parental modeling practices of healthy food. Children are observant of their parents habits more frequently than just twice a day, at snack and dinner, so gather information on all meals including breakfast and lunch would allow for a wider scope to more broadly understand the impact that parental modeling of healthy food has on children.

Social learning theories hypothesizes that children develop their own behaviors by imitating others (Bandura, 1977). In a systematic review of multiple studies related to parenting styles, food-related parenting practices, and children's healthy eating, Lopez and colleagues (2018), examined whether parenting styles were associated with three-specific food related practices—mealtime structural practices, parent modeling of healthy food, and household food rules. The data in this study was assessed via

validated scales measuring parenting practices (e.g., 10-item Structure of Family Meal Time questionnaire, 12-item scale for parental modeling of healthy eating, and a 12-item scale for household food rules) and parenting styles completed by mothers and two 24-hour telephone-based dietary recalls by children (Lopez et al., 2018). Researchers found that parental modeling of healthy eating was positively associated with self-reported healthier diet in adolescents (Lopez et al., 2018). One of the most effective ways to teach another individual healthy food and nutrition habits is to be an exemplary consumer. While it can be easy to tell a child, do as I say not as I do, children observe and model the social responses of others (Bandura, 1977). Vollmer & Baietto (2017) conducted a study with the aim of determining the relationship between food-related parenting practices and child fruit, vegetable, and high fat/sugar food preferences. In the study, parents of children (3 - 7 years of age) completed the Comprehensive Feeding Practices Questionnaire (CFPQ) to determine their food-related parenting practices (i.e., I model healthy eating for my child by eating healthy foods myself) (Vollmer & Baietto, 2017). Children's food preferences were assessed via parent-reported measure: The Preschool Adapted Food Liking Survey (PALS) (Vollmer & Baietto, 2017). Vollmer and Baietto (2017) found that when parents made healthy food available in the home, modeled healthy eating in front of their child, and explained why healthy foods should be consumed, then their children showed less of a preference for high fat and sugar foods (Vollmer & Baietto, 2017). Findings from the study suggest that parental modeling (e.g., parents properly teaching their children about nutrition while also modeling healthy eating and providing nutritious foods at home) of healthy eating is associated with healthier eating in children (Vollmer & Baietto, 2017). In sum, parental

modeling is an important means of socializing children's own eating habits as it can encourage healthy eating habits by teaching children about proper food and nutrition until they can make their own decisions about food. Assuming parents have modeled healthy eating practices, this will lead to better health for children while lowering the risk of developing chronic diseases related to poor nutrition. This study solely relied on parent reported information even though the aim of the research was to understand children's food preferences in relation to parental modeling. It would have been more appropriate for the research to also include self-reported information from the child on their food preferences as well as an observational component in which the parent and child were overserved interacting in a situation where parents had to make healthy/unhealthy food choices. There is also no way of determining the directionality of the reported relationships between parental modeling and children's food and nutrition preferences. Only mothers were included in the parent-child dyads, which completely discounts any influence that other care-takers, such as fathers, could have on children.

**Parenting styles.**

How parents parent their children more generally, including their parenting behaviors around food, is a second central aspect of the socialization of children's food-related behaviors. Psychologists have been interested, for a long time, in the strategies parents use to raise their children (Morris, Cui, & Steinberg). Much of the early work studying what are now known as parenting styles showed that parents who provide their children with warmth and independence, but who also know how and when to exercise firm control of their children, raised competent children (Darling & ERIC Clearinghouse on

Elementary Early Childhood Education, (1999). Work by Baumrind and Mccandless (1971) identified three primary parenting styles that reflected differing levels of parental warmth and control. First, authoritarian parenting reflects a relational context characterized by higher levels of parental control, strict discipline, and negative affectivity (e.g., strictly enforcing rules about what a child can and cannot eat). Children with authoritarian parents are more likely to have anxiety and be depressed (Tashjian, 2018). Second, permissive parenting is characterized by positive affectivity but with minimal expectations regarding children's behavior and lower levels of control over children's behavior (e.g., letting the child decide what foods they will and will not eat). Children with permissive parents are usually bossy, dependent, and impulsive (Tashjian, 2018). Third, authoritative parenting is representative of higher levels of firm but flexible control over children, positive affectivity, and an emphasis on autonomy (e.g., the parent and child decided what dinner will consist of, together). Children with authoritative parents display high levels of moral reasoning, markers of moral conscience, and prosocial behaviors (Tashjian, 2018).

Evaluating parenting styles around food and eating is important to understanding how children develop their own dietary behaviors. The way children think about nutrition and their eating behaviors are primarily influenced by parents and their parenting styles (Lopez et al., 2018). As mentioned previously, Lopez and colleagues (2018) completed a systematic review to examine whether parenting styles (authoritative, permissive, authoritarian) were associated with three-specific food related practices (mealtime structural practices, parent modeling of healthy food, and household food rules) as a way of evaluating the association between parenting styles

and children's diet. There were 174 mother-child dyads that participated in a 90-minute data collection session involving anthropometric measures and paper questionnaires (Lopez et al., 2018). Mothers reported on demographic information, parenting style using the Parenting Style and Dimensions Questionnaire, food-related parenting practices using the 10-item Structure of Family Meals, parent modeling of healthy eating, and household food (Lopez et al., 2018). The children in the study completed two 24-hour dietary recalls so researchers were able to measure Healthy Eating Index-2010 Dietary Outcome (the quality of the children's usual diet), fruit and vegetable intake, and added sugars (Lopez et al., 2018). Lopez and colleagues (2018) concluded that the Healthy Eating Index score, a way to measure dietary outcomes, is affected through parents' use of mealtime structural practices (e.g., eating meals as a family) with indirect effects of parenting style (e.g., authoritative parenting style is characterized by structured guidance that incorporates the child's individual desires, permissive parenting style is characterized by indulgence with little structural guidance provided to the child, authoritarian parenting style is characterized as strict enforcement of parental rules with little promotion of child autonomy) seen when including meal-time structural practices as a mediator. Although there was a good sample size, this study only focused on parental reports coming from a mother, excluding any other life partner or additional care-giver that may be in the child's life whom serves as a parental figure and thus has their own parenting style which likely impacts the way children think about food and nutrition. Since all measures of parenting style, parental modeling, and food-related parenting practices were self-reported by the mothers, they are subject to the desire of wanting to report in a socially acceptable manner as opposed to a factual

one. Furthermore, because this study was looking for an association between parenting style and children's diet, there is no directionally that can be assigned to the results.

Similar to the systematic review by Lopez and colleagues (2018), Peters and colleagues (2013) conducted a study considering parenting styles as predictors of 2-5-year-old children's diets and whether general nutrition knowledge mediated those influences. 269 parents, with at least one child between the ages of 2 years-old and 5 years-old reported on demographic and lifestyle variables, family environment, parenting styles using the Parenting Scale and the Parental Authority Questionnaire-Revised, feeding practices using the Child Feeding Questionnaire, child diet using the Children's Dietary Questionnaire, and general nutrition knowledge using the General Nutrition Knowledge Questionnaire (Peters et al., 2013). Peters and colleagues (2013) found that authoritative parenting and restrictive feeding practices were associated with lower fruit/vegetable consumption. Permissive parenting was associated with poorer overall dietary outcomes for children (Peters et al., 2013). Their results also suggested that restrictions in certain contexts (i.e., healthy eating boundaries in addition to supportive and encouraging parenting), which is a function of authoritative parenting, and associated with higher fruit and vegetable consumption in children, may be needed to assist children in making healthier food choices (Peters et al., 2013). While the parents completed many informants, there is no data collected from any children even though the study is looking to see if children's diets are predicted by parenting styles, and all parent-reported measures used were open to desirability bias—reporting desirable behavior and underreporting behavior that doesn't align with their personal or cultural beliefs. Since participation in this study was voluntary, it is possible that

participants who decided to take part in the research had an interest in healthy child diet; thus, a selection bias. The study did not eliminate all potential confounders, nor did it provide any causal relationships.

Authoritarian parents are typically high in control and low in warmth, which often leads to parental demands that their children eat specific foods without explicitly creating household food rules (Lopez et al., 2018). Since permissive parents are high in warmth and low in control, they are less likely to impose any household food rules and instead allow children to decide what they will and will not eat (Lopez et al., 2018). Parenting defined both by high and low control (authoritarian and permissive parenting styles, respectively), have been linked to unhealthy eating in children (Lopez et al., 2018). Parents high in control and high in warmth, specifically authoritative parents, by contrast, tend to use supportive practices rather than restrictive practices as way to create clear expectations around food. As a result, the authoritative parenting style has been associated with higher fruit consumption among preschoolers. Among adolescents, those who reported having authoritative parents ate significantly more fruit compared to adolescents who reported that their parents had one of the other parenting styles (Lopez et al., 2018; Peters et al., 2013). Most of the research has shown that authoritative parenting has generally been associated with positive dietary or weight-related outcomes; in contrast, authoritarian and permissive parenting has been linked to unhealthy diets, eating habits and/or weight (Peters et al., 2013). In sum, parents' style of child rearing, in particular, how they balance warmth and control, is critical to many aspects of children's general development, and to their development of food and dietary behaviors more specifically.

## Children's Nutritional Knowledge and Food Related Behaviors

As the preceding sections suggest, children develop their own attitudes, beliefs, and behaviors around food and nutrition as they develop biologically and as they are socialized. Studies have shown that eating behaviors are typically established by 3- to 6-years of age, with preschool children as young as 3-years-old able to classify food as either healthy or "junk" (Nguyen, 2007). By the time most children reach kindergarten, they understand the relationship between food, nutrition, and health (Slaughter & Ting, 2010). By the time children reach preschool age, they are able to reliably and validly express knowledge about which foods are and are not good sources of nutrition; a few short years later, this knowledge guides eating related behaviors (Schultz & Danford, 2016). At present, however, only a limited amount of research has addressed the attitudes and beliefs of young children beyond the "good food/bad food" dichotomy (Nguyen, 2017), and even less work has addressed the early origins of food preferences before they are both difficult to change and strong determinants of unhealthy behavior.

Parents can only teach children what they themselves know; therefore, it is important to consider how, and what, knowledge about food and nutrition is passed from parent to offspring. The main research objective in the study conducted by Zarnowiecki and colleagues (2012) was to understand how parent's nutritional knowledge and attitudes around food predicted young children's knowledge of healthy foods because parents have a major influence on the development of children's knowledge about healthy food, which may influence the formation of the child's eating behaviors. In the study, parents were measured on lifestyle variables, nutrition knowledge and attitudes about food via questionnaire, and children's nutritional

knowledge was assessed using the Healthy Food Knowledge Activity (Zarnowiecki et al., 2012). Zarnowiecki and colleagues (2012) found that parents' nutrition knowledge independently predicted children's own nutrition knowledge; children of parents with greater nutrition knowledge were likely to have a better recognition of healthy versus unhealthy foods. Likewise, when parents model healthy food practices, their children are more likely to make nutritious choices—as was the result in the analysis by Lopez and colleagues (2018) that also concluded parental modeling of healthy eating was positively associated with children's fruit and fruit/vegetable juice consumption. Children develop positive attitudes toward food and nutrition when parents model positive food related behaviors, including eating healthy meals, discussing what constitutes healthy vs. unhealthy foods, and by promoting positive family meal times. When children observe fruits and vegetables being eaten by their parents, they become familiar with these as a key component of their diet (Zarnowiecki et al., 2012). The study conducted by Zarnowiecki and colleagues included self-reported data from parents and use of stimulus materials as a way for the children to categorize photo-based food cards as healthy or unhealthy. This study would benefit from adding additional ways to measure children's nutritional knowledge that goes beyond the good food, bad food dichotomy. The study was a good size; however, there could have been some self-selection bias since participants volunteered to take part in the research. Although there was a correlation between parental nutritional knowledge and their child's nutritional knowledge, there was no explanation of any sort of causation.

Children of different ages reason the choices they make in regard to food and nutrition differently because of the varying degrees of knowledge children have on food

and nutrition. Throughout their lives, children's knowledge on food and nutrition expands as they are exposed to information about food, eating, nutrition, and health by their parents, their peers, media, and school (Slaughter & Ting, 2010). This is not to say that young children are unable to report on food and nutrition knowledge, rather it is to say that younger children explain their reasoning about food and nutrition differently than older children (Slaughter & Ting, 2010). Slaughter and Ting (2010) conducted a study with the aim of understanding how children of different ages reason spontaneously about food and nutrition. Slaughter and Ting (2010) developed a new set of interview questions for this study covering four components of food and nutrition including the purpose of eating (e.g., Why do we need to eat food?), quantity of food (e.g., What happens if you eat too much food every day?), effects of specific foods (e.g., Are carrots good for you? Why/why not?), and effects of an unbalanced diet (e.g., What would happen to a person is they only ever ate chicken?). 100 participants from preschool to university students were interviewed one-on-one with the experimenter (Slaughter & Ting, 2010). Researchers coded the responses according to 6 naïve theories: biological associationism (e.g., we need to eat food because it makes us grow), psychological (e.g., we need to eat food because it's good for you), vitalistic (e.g., we need to eat food so we have energy to play and live), mechanical (e.g., we need to eat food to sustain our body), physiological (e.g., we need to eat food to give us energy), and uncodable (e.g., carrots are good for you because they're a vegetable (Slaughter & Ting, 2010). Slaughter and Ting (2010) found that 5-year-olds, unlike older children and adults, referred to growing and shrinking as an important factor in eating behavior and food choices; thus, across all four components, 5-year-olds' responses were

typically coded as biological associationism. There was a shift in reasoning as the children got older, and by age 8, a majority of the children reasoned vitalistically, mechanistically, or both on at least one component of food and nutrition (Slaughter & Ting, 2010). Starting at 11-years-old children began to reason physiologically, similar to adults, and both, the 11-year-olds and the 14-year-olds typically justified their choices of good versus bad foods with reference to specific constituents (Slaughter & Ting, 2010). Since the age-range for this study was so wide, there were only 19-21 participants in each age-group (19 preschoolers, 20 third graders, 21 sixth graders, 20 ninth graders, 20 adult university students), which makes each sample small, and the sample was drawn from a single school in a middle- to high- socioeconomic status neighborhood. The study used coders who were blind to the age and gender of each participant, which provided relatively unbiased coded results. The open-ended interview methodology allowed for the researchers to gather multiple, simultaneous forms of reasoning.

## Age-Appropriate Research Methods

Historically, children were viewed as objects of research rather than active agents able to advocate their own beliefs (Kirk, 2007). Research methods have heavily relied on parental reports of the child's thoughts and behaviors, excluding the child's own narrative from data collection measures because of the belief that children lacked the cognitive, verbal, and social skills necessary to provide good-quality responses.

Measuring children's knowledge of food and nutrition, especially by means of self-report is an emergent area of research. In a systematic review, Wiseman and Harris (2015) examined data collection techniques used to measure preschool children's (3- to 5-years-old) knowledge of food and nutrition. Wiseman and Harris (2015) reported that there are three main research methods used when assessing preschool-aged children: interviews, use of stimulus material and prompts, and structured play-based activities; however, it is important that regardless of the strategy employed, the technique must be in line with the cognitive and communication capabilities specific to preschool children. Interviews involved both open- and close-ended questions read aloud to the children (Wiseman & Harris, 2015). Stimuli such as photographs, storybooks, and plastic food replicas and prompts were used as a way to stimulate children's responses and encourage participation (Wiseman & Harris, 2015). Structured play-based activities included meal creation tasks, play kitchen observations, board games, and role-play (Wiseman & Harris, 2015). Wiseman and Harris (2015) concluded that there are three key factors that should be taken into consideration when developing tools to assess preschool children's knowledge of food and nutrition: (1) picture-based multiple choice or sorting activities can be reliable data collection techniques but should include food

items of varying degrees of difficulty and discriminability, (2) preschool children are engaged when multiple phases of interactive data collection techniques are used, and (3) more research needs to be done to develop more valid and reliable measures to assess preschool children's knowledge of food and nutrition. The review demonstrated that to date, there have been a lot of attempts to incorporate a way for preschool children to report on measures of their own food and nutritional knowledge; however, since the measures that have been created are not wide-spread they are not yet used to their full potential. All of the studies reviewed were developed with the developmental capabilities of preschool aged children in mind.

While there are issues associated with measuring preschool children, such as brief attention spans and limited verbal skills, there is now ample evidence that young children can provide valid and reliable self-reports in a variety of areas with real-world significance (Measelle, Ablow, Cowan & Cowan, 1998). Nevertheless, young children are typically assessed via caregiver report (Huguet, et al., 2010). Parent-reported information has traditionally been used by researchers because many adults don't believe young children have the communication skills or knowledge necessary to accurately report on attitudes and beliefs that shape behavior. In a study by Baranowski and colleagues (1991), researchers investigated the accuracy of maternal dietary recalls for preschool children. 66 mothers of 3- to 5-year-old children were asked to report on their child's food consumption for the previous day which was then compared to a detailed record of the previous day's consumption obtained through observation (Baranowski et al., 1991). Participants were classified as "at-home" or "not-at-home" with children who spent 4.5 hours or more per day in day care or school falling into the

"not-at-home" category. Baranowski and colleagues (1991) found that there was only a 64.8% complete agreement between the observer and the mother on foods consumed by the child. Although there was some room for observer error, because of the training the observers received, it's assumed that their reported estimates are closer to the true values than those of the parents who received no training (Baranowski et al., 1991). The researchers attributed the differences in reports by the mother and the observer to a disagreement on what foods were consumed (Baranowski et al., 1991). Importantly, Baranowski and colleagues found that mothers in the not-at-home group were less likely to be able to report on their child's diet for a notable part of the day or for the full day; yet, when they were able to report, they were as accurate as the mother's in the at-home group. They also concluded that underreporting food consumption was more common than overreporting (Baranowski et al., 1991). This study succeeded in using parent-reported measures as well as observations to show that parent-reported data is not always the most reliable. The study would have benefited from having children report on their own dietary recall, since they were the ones being observed and reported on by their parents and the researchers.

## Recommendations for the Field

Most of the research previously conducted on young children has relied on parental reports and questionnaires to learn about young children's nutritional health, rather than involving children directly. Children, especially younger children, are rarely asked to describe how they feel about nutrition, or about the ideas and beliefs they might hold about what food is healthy and unhealthy, and why. Child-reports on measures of parental modeling are absent in the field because of the lack of methodology and belief that young children are not valid reporters. Thus, I propose that future research in the field investigate preschool aged children's perceptions related to food with the aim of understanding how socialization and biological preferences impact their attitudes and beliefs through self-reports by parents and children, 24-hour dietary recalls, and observations of parent-child interaction during meal times. Potential research should also include the data produced by the various informants from all parental figures in the child's life (e.g., mother and father, mother and mother, father and father).

I am proposing two new ways, adapted from previously validated measures using self- reports by preschool aged children in different context, as better methods to be used in future research when trying to obtain the child's reported nutritional health in regard to parenting style and parental role modeling. First, the Child Nutrition Q-sort: based on the well validated q-sort methods (Akhtar-Danesh, Dehghan, Morrison, & Fonseka, 2011). Parents' perceptions and attitudes on childhood obesity: A Q-methodology study. *Journal of the American Academy of Nurse Practitioners, 23*(2), 67-75.) we will create picture cards with different foods pictured on them. Children will be asked to complete an initial

sort based on their preferences (from “always want to eat” to “never want to eat” as well as a “middle” category). Each card will have a number on it and the researcher will record the numbers on each card in the same order that the child has arranged them. The cards will be shuffled and handed to the child again but this time they will sort the cards in to piles based on what they believe to be healthy and unhealthy (from “healthy” to “unhealthy” and an “in-between” category). The researcher will again record the numbers on each card in the same order that the child arranged them. The researcher will be able to code child’s preferred pallet, ranging from salty, sour, bitter, or sweet. The Child-Nutrition Q-sort is a great way to use stimulus materials to engage preschool aged children and meet them at their level of cognitive ability understand what the researcher is asking for, food preferences and a distinction between their perception of healthy and unhealthy foods. Second, the Berkeley Puppet Interview (BPI): the BPI is considered a gold-standard in the field of child assessment (Measelle, Ablow, Cowan, & Cowan, 1998), and has been used effectively to obtain young children’s attitudes and beliefs about a range of issues (e.g., mental health symptomatology, marital conflict, parent-child relationship dynamics). More importantly, child self-reports using the BPI have been linked to relevant behavioral outcomes, both concurrently and prospectively (Measelle et al., 1998). For the purpose of this research, a new set of food-related questions will be created. BPI items will ask children about their food neophobia (e.g., Iggy: “If I don’t know what is in a food, I won’t try it.” Ziggy: “If I don’t know what is in a food, I will try it.” Iggy and Ziggy: “How about you?”) and mindful eating (e.g., Iggy: “When I am sad I eat to feel better.” Ziggy: “When I am sad I don’t eat to feel better.” Iggy and Ziggy: “How about you?”). The questions to be created for the BPI

will be adapted from previous questionnaires such as the Food Neophobia Scale—Revised and the Mindful Eating Questionnaire for Children. The BPI combines two of the age-appropriate techniques best used when working with preschool age children, interviewing and use of stimulus materials (the puppets).

Since there is evidence, rooted in human-kind's evolutionary history that newborns have a biological preference for sweet tastes, there is some pressure placed on the primary care givers to steer their child's food preferences in the right direction as they grow. Children between the ages of 4- to 8-years-old are in a developmentally crucial place in life as their social network expands beyond that of just their home environment and they begin to interact with teachers, who have developed food preferences and ideas about food and nutrition that they bestow onto their students, and peers their own age, who are also trying to learn what their own food preferences are and how they define healthy and unhealthy food. I recommend that regardless of the primary care givers' relationship status (i.e., married, divorced, or seperated) that they work together to create a nutritional plan for their child, which they can both agree upon and stick to. The nutritional plan should include the daily recommended amount of fruits and vegetables set by the U.S. Department of Agriculture and the U.S. Department of Health and Human Services. The best parenting style for installing positive food and nutrition ideas in a child's head, the style that results in the healthiest kids, is equal parts enforcer and compromiser on behalf of the parent. Parents should try to achieve an authoritarian parenting style in which they set guidelines with their child about what food they need to eat, why there should be more vegetables than cookies on a dinner-plate, and how meal-times are going to look. Aside from co-creating a healthy

diet for and with their children, primary caregivers should be role-models of the kinds of eaters they want their children to be. Preschool aged children are very impressionable and watch what their primary caregivers do because they need someone to model off of as they navigate through the early developmental stages of their life. Thus, I propose that primary care givers follow a very similar nutrition plan to that of their child to exhibit positive parental role modeling and encourage similar eating practices. Parental modeling is an important means of socializing children's own eating habits as it can encourage healthy eating habits by teaching children about proper food and nutrition until they can make their own decisions about food. Assuming parents have modeled healthy eating practices, parental modeling will lead to better health for children while lowing the risk of developing chronic diseases related to poor nutrition.

# Conclusion

Through the socialization process, children acquire knowledge, attitudes, and beliefs about food and nutrition. As children develop, they begin to express thoughts around food and nutrition. Parenting styles and parental modeling are two methods by which parents guide their child's eating behavior and overall diet (Lopez et al., 2018). A child's diet is also shaped by their overall food preferences, which parents can influence; diet can be tracked through childhood into adolescence and adulthood, impacting ideas about food and nutrition over the course of an individual's life (Vollmer & Baietto, 2017). Research on the development of children's food preferences, which impact children's beliefs about food and nutrition, with a specific focus on the role of parental modeling, has not looked at the way children perceive their parents' nutrition. Parents are frequently asked to report on their own perception of their child's nutrition, but the reverse is not typically asked of the child, especially preschool-age children. Thus, the need for this review and future research in this field is apparent. Children develop food preferences based on the specific, interacting roles that biology and parental socialization play in shaping the type of eaters children become.

# Bibliography


Akhtar-Danesh, N., Dehghan, M., Morrison, K., & Fonseka, S. (2011). Parents' perceptions and attitudes on childhood obesity: A Q-methodology study. Journal of the American Academy of Nurse Practitioners, 23(2), 67-75.

Atik, D., & Ozdamar Ertekin, Z. (2013). Children's perception of food and healthy eating: Dynamics behind their food preferences. International Journal of Consumer Studies, 37(1), 59-65.

Bandura, A. (1977). Social learning theory. Englewood Cliffs, NJ: Prentice-Hall.

Baranowski, T, Sprague, D, Baranowski, Jh, & Harrison, Ja. (1991). ACCURACY OF MATERNAL DIETARY RECALL FOR PRESCHOOL-CHILDREN. Journal Of The American Dietetic Association, 91(6), 669-674.

Baumrind, D., & Mccandless, Boyd R. (1971). Current patterns of parental authority. Developmental Psychology, 4(1), 1-103.

Benton, D. (2004). Role of parents in the determination of the food preferences of children and the development of obesity. International Journal Of Obesity, 28(7), 858-869.

Birch, L. (1999). Development of food preferences. Annual Review of Nutrition, 19, 41-62.

Darling, N., & ERIC Clearinghouse on Elementary Early Childhood Education. (1999). *Parenting style and its correlates* (ERIC digest (Urbana, Ill.) ; EDO-PS-99-3). Champaign, IL: ERIC Clearinghouse on Elementary and Early Childhood Education, University of Illinois.

Draxten, Fulkerson, Friend, Flattum, & Schow. (2014). Parental role modeling of fruits and vegetables at meals and snacks is associated with children's adequate consumption. Appetite, 78, 1-7.

Fildes, A., Van Jaarsveld, C., Llewellyn, C., Fisher, A., Cooke, L., & Wardle, J. (2014). Nature and nurture in children's food preferences. The American Journal of Clinical Nutrition, 99(4), 911-7.

Garcia-Bailo, B., Toguri, C., Eny, K., & El-Sohemy, A. (2009). Genetic Variation in Taste and Its Influence on Food Selection. Omics-A Journal Of Integrative Biology, 13(1), 69-80.

Grantham-McGregor, S., Fernald, L., Kagawa, R., & 2m, S. (2014). Effects of integrated child development and nutrition interventions on child development and nutritional status. Annals of the New York Academy of Sciences, 13081(1), 11-32.

Hanfling, O. (2003). Learning About Right and Wrong: Ethics and Language. Philosophy, 78(1), 25-41.

Harte, S., Theobald, M., & Trost, S. (2018). Lessons learned at children's mealtimes: Educator, caregiver and children's perspectives of eating in early education and care services. *International Society of Behavioral Nutrition and Physical Activity*.

Huguet, A., Mcgrath, P. J., & Pardos, J. (2011). Development and Preliminary Testing of a Scale to Assess Pain-Related Fear in Children and Adolescents. *The Journal of Pain,12*(8), 840-848. doi:10.1016/j.jpain.2011.01.005

InformedHealth.org [Internet]. Cologne, Germany: Institute for Quality and Efficiency in Health Care (IQWiG); 2006-. How does our sense of taste work? 2011 Dec 20 [Updated 2016 Aug 17]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK279408/

Kirk, S. (2007). Methodological and ethical issues in conducting qualitative research with children and young people: A literature review. International Journal of Nursing Studies, 44(7), 1250-1260.

Lopez, Schembre, Belcher, O'Connor, Maher, Arbel, . . . Dunton. (2018). Parenting styles, food-related parenting practices, and children's healthy eating: A mediation analysis to examine relationships between parenting and child diet. Appetite, 128, 205-213.

Measelle, Jr, Ablow, Jc, Cowan, PA, & Cowan, CP. (1998). Assessing young children's views of their academic, social, and emotional lives: An evaluation of the self-perception scales of the Berkeley puppet interview. Child Development, 69(6), 1556-1576.

Moreno-Black, G., & Stockard, J. (2018). Salad bar selection patterns of elementary school children. *Appetite,120*, 136-144. doi:10.1016/j.appet.2017.08.034

Morris, A. S., Cui, L., & Steinberg, L. (n.d.). Parenting research and themes: What we have learned and where to go next. *Authoritative Parenting: Synthesizing Nurturance and Discipline for Optimal Child Development.,*35-58. doi:10.1037/13948-003

Nguyen, S. (2007). An apple a day keeps the doctor away: Children's evaluative categories of food. Appetite, 48(1), 114-118.b

Peters, J., Dollman, J., Petkov, J., & Parletta, N. (2013). Associations between parenting styles and nutrition knowledge and 2-5-year-old children's fruit, vegetable and non-core food consumption. Public Health Nutrition, 16(11), 1979-87.

Safan, M., Murillo, A., Wadhera, D., & Castillo-Chavez, C. (2018). Modeling the Diet Dynamics of Children: The Roles of Socialization and the School Environment. Letters in Biomathematics, 5(1), 275-306.

Schultz, C. M., & Danford, C. M. (2016). Children's knowledge of eating: An integrative review of the literature. *Appetite,107*, 534-548. doi:10.1016/j.appet.2016.08.120

Slaughter, & Ting. (2010). Development of ideas about food and nutrition from preschool to university. Appetite, 55(3), 556-564.

Tashjian, S. (2018, May 16). Parenting Styles and Child Behavior. Retrieved from https://www.psychologyinaction.org/psychology-in-action-1/2018/4/23/k17ziyfqt1vy9tlytr9l9k48epdnur

U.S. Department of Agriculture, & U.S. Department of Health and Human Services (2010). *Dietary guidelines for Americans* (7th ed.). Washington, DC: US Government Printing Office.

Ventura, A., & Worobey, J. (2013). Early Influences on the Development of Food Preferences. Current Biology, 23(9), R401-R408.

Vollmer, & Baietto. (2017). Practices and preferences: Exploring the relationships between food-related parenting practices and child food preferences for high fat and/or sugar foods, fruits, and vegetables. *Appetite, 113*, 134-140.

Wiseman, N., & Harris, N. (2015). A Systematic Review of Data Collection Techniques Used to Measure Preschool Children's Knowledge of Food and Nutrition. *Journal of Nutrition Education and Behavior,47*(4). doi:10.1016/j.jneb.2015.03.013

World Health Organization. (2018, October 23). *Healthy Diet*. Retrieved from https://www.who.int/news-room/fact-sheets/detail/healthy-diet

World Health Organization. (2019). *Healthy Diet*. Retrieved from https://www.who.int/nutrition/topics/vad/en/

Yee, A., Lwin, M., & Ho, S. (2017). The influence of parental practices on child promotive and preventive food consumption behaviors: A systematic review and meta-analysis. International Journal Of Behavioral Nutrition And Physical Activity, 14(1), 1-14.

Zarnowiecki, D., Sinn, N., Petkov, J., & Dollman, J. (2012). Parental nutrition knowledge and attitudes as predictors of 5–6-year-old children's healthy food knowledge. Public Health Nutrition, 15(7), 1284-1290.

Zonneveld, K., Neidert, P., Dozier, C., Gureghian, D., & Bayles, M. (2019). Assessing factors that influence young children's food preferences and choices. Journal of Applied Behavior Analysis, 52(1), 240-2.