

**Persuading Children: A Framework for Understanding
Long-Lasting Influences on Children's Food Choices**

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Abstract

In this paper, we present a framework for understanding long-lasting influences on children's food-purchase choices and consumption. The framework interacts the characteristics of agents (i.e., children and parents/caretakers) with marketing-related effects to explain how these agents make short- and long-term decisions in the food category. We develop each of the components of our framework with different theories and multiple empirical examples, focusing on how children develop their food preferences and how their understanding of and resistance to persuasion and marketing messages may influence choices. Overall, the presented approach suggests firms, consumers, and parents can benefit from taking these factors into account when making choices that affect children and when allowing children to make their own choices.

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1. Introduction

Although the view that children have little spending money and no decision power is common, the size and importance of industries in the world today in which children have a decision role is in fact extensive. The global market for toys and games was well above US\$100 billion in 2013; in the United States alone, the food industry specifically targeted at children is expected to grow from \$23 billion in 2013 to \$30 billion in 2018; and, on average, children spend 57 minutes watching television each day, with exposure to an average of more than 100 ads per year for soft drinks alone (Statista, 2015). These examples provide ample motivation for the need to understand the multiple short- and long-term influences on children's product-related choices.

Broadly speaking, our goal for this piece is to advance the literature with the proposal of a framework that can be used to understand long-lasting influences on children's food-purchase choices and consumption. The framework interacts the characteristics of agents (i.e., children and parents or caretakers) with marketing-related effects to explain how these agents make choices. Once a choice is made, the children's experience and consequent familiarity with certain foods is likely to influence the way parents and children make subsequent decisions; hence, each decision and the marketing forces that influenced that decision have the potential for a long-term impact on children's and parents' behavior and choices.

We present several studies and approaches for each component of our framework, but we do not aim to be fully inclusive in terms of literature. Rather, we show through different theories and multiple empirical examples that children's understanding of and resistance to persuasion and marketing messaging is situation dependent. Both firms and consumers may benefit from considering these factors when making choices that affect children and when allowing children to make their own choices.

We focus our attention on food as a case in point, but the arguments we make in this paper are likely to apply to many product categories. We purposefully chose this food category because it is a category in which children have a dominant impact on choice and because research has shown the surrounding environment, early-life behavior and decisions, and persuasion of children in food categories have significant long-term consequences. In addition, one of the most important concerns in many countries is child obesity. In the United States, the average rates of obesity in children and teenagers increased from around 5% in 1971-1974 to around 18% in 2011-2012 (National Health and Nutrition Examination Survey, 2012). Although the numbers have recently fallen in some states, they have continued to increase in others, and the overall prevalence of childhood obesity remains alarming (Centers for Disease Control and Prevention, 2016). Given the current substantial rates of overweight and obesity in kids and implications for negative health outcomes, a better understanding of children's food choices is important.

The next section of this paper provides a general description of the framework. Sections 3 through 8 detail the different components of the framework. Section 9 concludes with a summary of main managerial implications and several directions for future research.

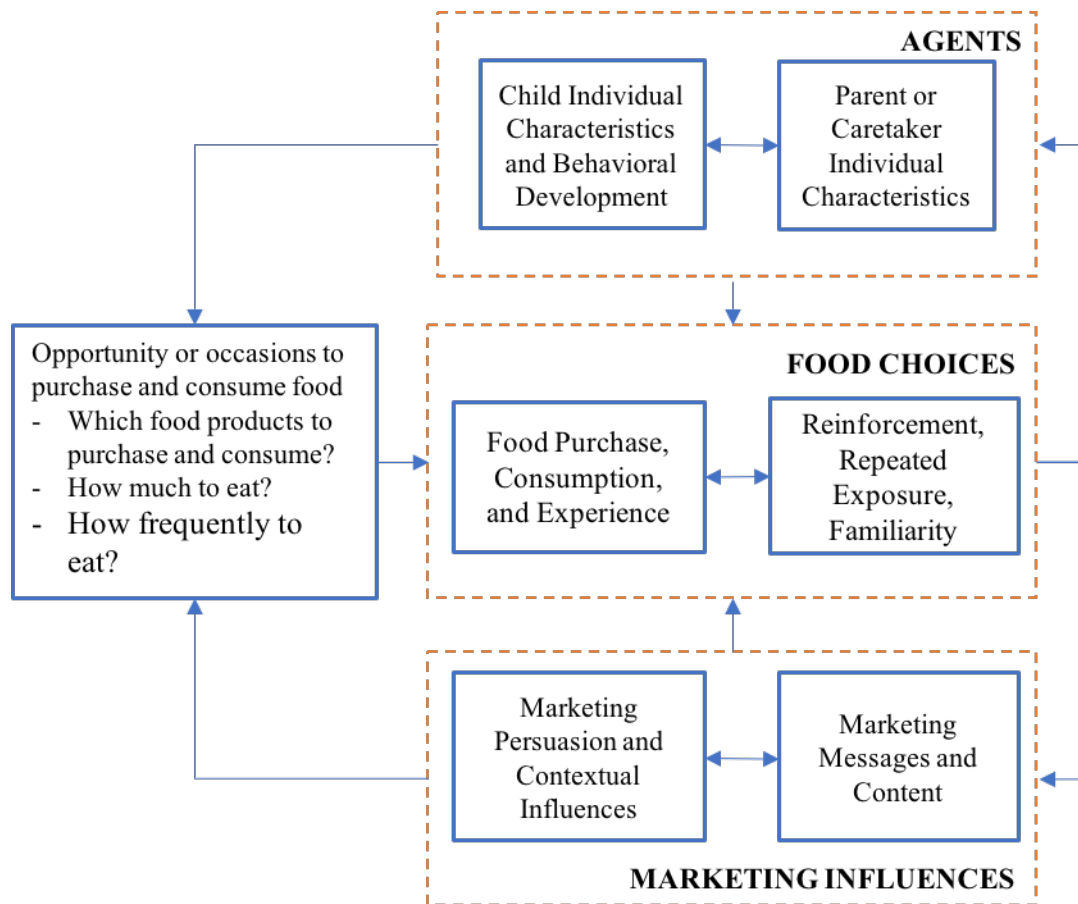
2. A Framework for Understanding Long-Lasting Influences on Children's Food Choices

To develop our framework, we assume the needs and wants of children lead them or their parents and caretakers to face decisions regarding products and services for children, such as food, toys, and education. In these situations, the child, parent, and/or caretaker decisions are likely not only to have an impact on the welfare of the child, but also to lead to a feedback loop that can have long-term effects on the child's decisions, development, and behavior in later stages of his or her life.

The proposed framework, which is designed to address decisions regarding children's products and services, has three different parts. The starting point is the emergence of an opportunity to make a food-related decision, such as which food product to buy, how much to eat, and how frequently. The emergence of these decision occasions is a function of the individual characteristics of the agents - child and parent or caretaker - and signals and content received from food companies' marketing.

The second and central step in the framework is the resulting food choices, experience, and the reinforcement of certain habits and behaviors. The following influence these choices: (1) individual characteristics of the agents and other factors such as the child behavioral development, parent personality and parenting style, beliefs, and early-life influences and (2) marketing-related influences that include the messages agents receive from companies regarding the products or services, which, with different content, attempt to persuade and influence the final choice.

Figure 1: A Framework for Understanding Long-Lasting Influences on Children’s Food Choices



With each choice, children experience the food, and parents and caretakers witness the overall setting. Food consumption can create familiarity with the product, lead to habits that last long into adulthood, or generate loyalty to brands or categories, especially in children because a child’s brain is more permeable to persuasion and marketing messages, as the paper discusses in the next section. This reinforcement effect from experience and familiarity creates a feedback loop that leads to updated individual characteristics and modifies how consumers react to future marketing signals and decision opportunities.

We present a graphical representation of the framework in Figure 1. The sections that follow develop each different component in more detail. As mentioned in the introduction, even though we focus on the food category, we believe this framework can be generalized to other children's products and services.

3. Child, Parent, and Caretaker Individual Factors

3.1. Child Individual Characteristics and Behavioral Development

At the beginning of life, children do not make decisions: caretakers make choices for young infants because they are physiologically dependent on their caretakers. However, experience received during this early period is essential for later choices and lasting eating habits; early childhood clearly appears as a window of opportunity for the development of healthy eating behavior (Schwartz, Scholtens, Lalanne, Weenen, & Nicklaus, 2011). More specifically, both experimental and epidemiological data suggest the first thousand days of life, from conception to the second birthday, constitute a critical period because the conditions in which the infant grows during this period are likely to have a strong impact on health outcomes later during childhood and into adulthood.

These findings have led to the development of the concept of developmental origins of health and diseases (DOHaD), which conceptualizes that the health status of an adult is rooted in developmental events, particularly related to nutrition (Garmendia, Corvalan, & Uauy, 2014). Interestingly, during early childhood, important maturation processes happen, with many transitions taking place in a very short time frame. For example, infants move from feeding from the cord in utero to milk feeding after

birth, and to the initiation of complementary feeding at about mid-course of the first year. At the end of the complementary feeding process, the child will ultimately eat food from his cultural and familial context.

Within a short period during the first thousand days of life, children learn many aspects of eating behavior: how, what, how much, when, with whom, and in what contexts to eat. This strong socialization process is influenced by parents and other caregivers, and their own personalities, habits, and behavior. Over the course of the second year, food neophobia, that is, the fear and avoidance of new foods, develops and may affect up to three quarters of children by two years of age (Cashdan, 1994; Dovey, Staples, Gibson, & Halford, 2008; Nicklaus, 2009). Neophobia can limit the expansion of consideration sets and decrease variety seeking (Nicklaus et al., 2005). Such behavior highlights the importance of understanding the mechanisms and individual factors at play during this period that contribute to early eating habits that will have a strong influence later in childhood.

For several decades, subsequent child development was assumed to progress through rigid stages. Using a Piagetian approach to understanding children's development, many researchers assumed preschool children were incapable of thinking about the thoughts of others, such as the intentions of an advertiser. For example, early literature assumed a child who viewed a commercial that employed a cartoon character was unable to differentiate the commercial from a cartoon (see John, 1999, for review), and numerous studies have highlighted the preschool years as a period in which children are "information sponges," ready to soak up information from their environments but not yet sophisticated enough in their development to employ cognitive defenses such as skepticism or critical thinking (e.g.,

Lapierre, 2015; McAlister & Bargh, 2016; McAlister & Cornwell, 2009, 2010; Moses & Baldwin, 2005).

In response to Moses and Baldwin's (2005) call for research to delve deeper into understanding children's cognitive development, several researchers began to examine the link between children's development in certain areas of socio-cognitive functioning and their market savviness. Of interest is the extent to which certain individual differences in children's theory of mind and executive-functioning development rather than strict, age-based developmental stages might explain consumer competencies, for example, the ability to detect selling intent, the ability to understand how collectible sets work, and the ability to understand the concept of branding. Theory of mind refers to an individual's ability to think about the thoughts of others and use mental representations of another person's thoughts and feelings to theorize about the other's likely future behaviors (Chaplin & Norton, 2015; McAlister & Peterson, 2013, 2007; Wellman, Cross, & Watson, 2001).¹

Given that the preschool years are a time during which theory of mind is mastered, the idea that children first show signs of recognizing selling intent in commercials during this period makes sense. Indeed, multiple researchers have confirmed this fact. McAlister and Cornwell (2009) reported that children ages three to five show emerging abilities to recognize persuasive intent in advertising. In

¹ As an example of theory of mind, suppose that if Zoe likes dogs but knows James fears dogs, Zoe can predict James might run away if he sees a dog. However, if Zoe's theory of mind is not yet developed, she might know James does not like dogs, but she would fail to employ that knowledge to successfully predict James's behavior around dogs. In the absence of a developed theory of mind, Zoe would expect James to pet a dog, because she would. Prior to developing theory of mind, such errors are common among young children. Around age three, however, children begin to show signs of emerging theory of mind, and by age five, many children will know others have different thoughts and attitudes (Wellman et al., 2001).

their sample of preschool children, the ones who were most successful at detecting persuasive intent in print advertisements were those with the most advanced theory of mind. These findings were not unlike those of Donahue, Henke, and Donahue (1980), who found preschool children could detect selling intent in television commercials.

In a separate study, McAlister and Cornwell (2010) also found theory of mind was a significant predictor of preschool children's ability to recognize the social symbolism of brands, controlling for language ability. When asked questions that tap their understanding that brands may serve to communicate an individual's social status, children with more advanced theory of mind development were more apt to understand the social symbolism. For example, when asked a question about popularity, children with more advanced theory-of-mind development would give answers reflecting their understanding that consumption of branded products conveys social meaning. For example, when asked "If another child has McDonald's for lunch will he have lots of friends or not a lot of friends?" children with more advanced theory of mind gave answers such as, "He won't have many friends because McDonald's makes you fat and nobody likes you" or "He will have lots of friends because McDonald's has a playground and all your friends can play." Children with less advanced theory of mind development were more likely to give answers reflecting their lack of understanding of the social symbolism of branding (e.g., "He won't have friends because he doesn't like them.").

Children who are most adept at understanding the concept of branding are those with more advanced theory of mind and more advanced executive functions. For example, when given a deck of cards with images of McDonald's products and merchandise, Burger King products and merchandise, and other items, preschoolers with more advanced executive functions can sort the cards into three piles:

McDonald's items, Burger King items, and "other" items (McAlister & Cornwell, 2010). Executive functions include a set of cognitive skills including impulse control, working memory, planned behavior, and categorization skills (Garon, Bryson, & Smith, 2008; Moses & Baldwin, 2005). The idea that advanced executive functions would enable children to sort products and merchandise per their brands makes sense. Likewise, the relationship of theory of mind to the understanding of branding as a concept makes sense because the development of theory of mind is a form of development that involves mental representations as does understanding the concept of brands. Similarly, both theory of mind and executive function have been found to play unique roles in children's collecting behavior and their motivations to pursue completion of collectible sets of toys (McAlister, Cornwell, & Cornain, 2011). Taken together, these findings across multiple studies highlight the fact that numerous areas of socio-cognitive competencies and consumer competencies are budding during the preschool years (see, e.g., McAlister & Peterson, 2013; Moses & Baldwin, 2005).

However, Moses and Baldwin (2005) and McAlister and Cornwell (2009) note find no evidence that critical thinking skills are mastered at this early age. McAlister and Cornwell (2013) suggest the opposite in describing preschool children as "information sponges," and argue children ages three to five are particularly vulnerable to the persuasive influence of marketers. Moses and Baldwin (2005) articulate this vulnerability clearly by explaining that children's social skills develop much more rapidly than their executive functioning skills. In fact, children's understanding of the social symbolism of brands develops later, such that they begin connecting brands to their self-concepts in middle childhood and increasingly connect and use brands to communicate their self-concepts through adolescence (Chaplin & John 2005). Because advanced executive functioning is needed to fully develop skepticism and to resist persuasive calls to action from others, the protracted development of

these functions, which typically don't mature fully until late adolescence or early adulthood, can render children vulnerable to persuasion for most of their childhood years.

3.2. Parent or Caretaker Individual Characteristics

In terms of individual factors related to parents, the literature frequently discusses the preference for breastfeeding versus bottle-feeding—a likely marker of healthy lifestyle, and the method of milk feeding (breast vs. bottle) can influence the acceptance of foods at the initiation of the complementary feeding period. Breastfeeding or bottle-feeding can influence acceptance of foods in a variety of ways; the feeding method may modify the development of food and flavor acceptance, of oral feeding skills, and of infant control of energy intake (Nicklaus, 2016a).

Acceptance of different foods, including fruits and vegetables, may be learned in interaction with signals from the eating environment. Because infants and young children are not able to self-feed or to make appropriate food choices by themselves, all their meals take place in a social context with at least one caregiver present. Caregivers thus determine the types of foods children are exposed to, and thus caregivers' choices and feeding practices shape early learning through the mechanisms previously described.

Parents' emotional signals as well as verbal instructions are likely to influence the child's eating behavior and possibly enjoyment of the food consumed (Satter, 1990). For instance, parenting style is as likely to influence the child's enjoyment of eating as the food itself: a survey conducted in France showed parents who were the most permissive in terms of child feeding had young children with

higher levels of pickiness and neophobia, lower appetite, and enjoyment of foods (Rigal, Chabanet, Issanchou, & Monnery-Patris, 2012). Past reviews have synthesized the role of parenting style (Vollmer & Mobley, 2013; Faith & Kerns, 2005) and other feeding practices on the development of eating behavior (Issanchou & Nicklaus, 2014), focusing on the role of external reward given by parents on food acceptance in children according to the type of rewards (Cooke, Chambers, Añez, & Wardle, 2011) and on the association between parenting style and fruit and vegetable consumption (Blissett, 2011).

The importance of child and parent characteristics and their interaction in choice decision-making feeding situations has long been recognized by Satter in the “Division of Responsibility” approach, which states that “parents manage the what, when, and where of feeding and allow children to determine the how much and whether of eating” (Satter, 1990; Satter, 2014). This social aspect of eating is further considered in the concept of responsive parenting, a style of parenting that emphasizes positive affection, with high levels of warmth and care, and responds to children’s signals. It was expanded in the concept of responsive feeding, which reflects reciprocity between the child and the caregiver, and is now viewed as a promising way to promote healthy eating habits (Black & Aboud, 2011). Intervention trials recently showed that providing parents with an educational approach to promote responsive parenting² is associated with healthier (slower) weight gain in the first year (Savage, Birch, Marini, Anzman-Frasca, & Paul, 2016). Thus, responsive parenting practices may be a promising way to promote healthy learning.

² Responsive parenting is defined as parenting that is developmentally appropriate, prompt, and contingent of the child’s needs (Savage, Birch, Marini, Anzman-Frasca, & Paul, 2016).

Moreover, in terms of healthy food choices and child obesity, several papers have demonstrated the influence of family demographics (Mei et al., 1998) and parenting beliefs and practices (Birch & Fisher, 1995; Johnson & Birch, 1994). The size and composition of the household also matters: single-parent households and households in which both parents work full time tend to more often choose the consumption of prepared food items, which in most cases are high in fat and sodium (Crockett & Sims, 1995). Income is also an explanatory variable for food availability and can indirectly influence children's eating habits and weight (Anderson et al., 1998; Mei et al., 1998), and lower-income families are more likely to have obese children (Gable & Lutz, 2000). Finally, parent knowledge and expectations of child nutrition also play a key role in children's decisions and future development. For example, parents of obese children reported a greater tendency toward inappropriate expectations of child nutrition; these parents are more likely to agree with statements such as "it doesn't matter which foods my child eats. As long as they eat enough, they will grow properly" and "the study child is old enough to take care of feeding him/herself" (Gable & Lutz, 2000).

4. Marketing Persuasion and Contextual Influences

Understanding how young children respond to persuasion—from parents and other caretakers as well as from brands and firms—and to the context surrounding their decisions is crucial, given the importance of learning to make healthy choices from an early age (John, 1999). We have partly discussed in section 3.1 the influence of children’s behavioral development and theory of the mind on how much a child understands and absorbs of a marketing message. The increased exposure of children to food and non-food advertising only increases the importance of understanding such influence (Desrochers & Holt, 2007; John, 1999; Powell, Szczypka, & Chaloupka, 2007).

At pre-school age, children start receiving messages that frame products as having more than just a unique function - for example, food having a role of improving health, strength, or intelligence - or messages related to scarcity of resources and the size of the choice set. Building on the distinction between instrumental and experiential benefits and the means-goal dilution phenomenon (Fishbach & Choi, 2013; Zhang, Fishbach, & Kruglanski, 2007), Maimaran and Fishbach (2014) show that presenting food as instrumental to achieving a certain goal (e.g., making children healthier, helping them count better, or helping them read better) casts doubt on an obvious goal the food needs to serve (i.e., being tasty), and, in turn, decreases consumption of that food. For example, in one of the studies, children in the “goal” condition heard a story about a girl who likes to eat carrots and thinks carrots will help her count better. In the “control” condition, children were just told the girl likes to eat carrots. When later offered carrots, the three- and four-year-old children in the “goal” condition ate about half the amount compared to children in the “control” condition.

Different cues can increase consumption of healthy food. For example, Maimaran and Salant (2017, working paper) show that presenting items as scarce can increase the desirability of these items. In one study, the authors served four- and five-year-old children a bowl with carrots and found that merely telling these children only a limited amount of carrots was available increased how many carrots these children ate compared to a control condition in which children were not told the scarcity message.

The food children choose to eat, as well as the activities they choose to engage in, affect children's health. Maimaran (2017) finds children are more engaged with an activity they choose from a small rather than a large set of options. Ample research with adults shows choosing from a large, compared to a small, set is more difficult, and can lead to decreased satisfaction with the chosen option (e.g., Botti & Iyengar, 2004; Iyengar & Lepper, 2000), though not much research has looked at the effect of the size of the choice set on engagement, and especially not among young children. Maimaran (2017) finds that children, too, think choosing from the large set is more difficult yet more fun. In another study, Maimaran finds that when choosing a book to read, or a game to play with, children spend more time looking at the book and playing with the game after choosing from among two options than from when choosing from among six or seven options. The size of the choice set did not affect the amount of food the child consumes, when offered a choice among different flavors of yogurt. Possibly, the size of the choice set affects consumption when the choice set contrasts healthy and unhealthy items.

In terms of the contextual dimension, research has shown children are susceptible to a variety of context effects, such as social norms and interactions. Social interactions can influence children's behavior quite early: an experimental study conducted with American participants showed that the

volume of formula ingested by infants aged 7 to 14 weeks was higher in situations with social interactions (Lumeng, Patil, & Blass, 2007). The quality of social interactions is also likely to be associated with a differential acceptance of foods (Nestle et al., 1998). Recently, several studies have shown similar social influences on children's eating behavior (for a review of these studies, see Marty et al., 2017).

Research has also found evidence of early stereotype building because of contextual factors and social interactions. Body-based stereotypes begin to appear between three and five years of age, with children developing a series of physically based stereotypes about the role of gender (Signorella, Bigler, & Liben, 1993), associations with racial group (Brand, Ruiz, & Padilla, 1974), and attitudes and associations with certain body builds (Cramer & Steinwert, 1998; White, Maura, & Spindler, 1985) during this period of development. Campbell et al. (2016) examined the impact of the presence of "overweight" make-believe cartoon characters on the eating choices of children 5 to 14 years old. Importantly, children exposed to images of apparently overweight characters chose and consumed more energy-dense, low-nutrient food (e.g., cookies) than those exposed to non-overweight characters (Campbell et al., 2016).

Knowledge and information may also play a role in these contextual effects. Primary school (8 to 11 years old) children's food choices may be modified by relevant information about health (Marette et al., 2016). Although this finding is encouraging, note that young children have processing limitations; for example, children (9 year olds) do not use persuasion knowledge unless it is cognitively accessible at the time (Brucks, Armstrong, & Goldberg, 1988). In line with this finding, priming children's pre-existing health knowledge limited the impact of overweight characters on consumption of low-

nutrition-value food (Campbell et al., 2016). When kids were exposed to an overweight cartoon character, they chose and ate more high-energy, low-nutrition food, but priming pre-existing health knowledge prior to exposure to the cartoon character buffered this effect on children's choices such that children with accessible health knowledge did not eat more cookies than children who saw a normal-weight character (Campbell et al., 2016).

In another demonstration of the role of priming on food choice and consumption, Wansink, Shimizu, and Camps (2012) find that when children of ages 6-12 are primed to think what an admirable role model such as Batman would eat, they are more likely to choose the healthy snack (i.e., apple slices) over the unhealthy snack (i.e., the fries). By contrast, when children are primed to think about the healthiness of the food, by being asked to classify which food items are healthy and which are less healthy, their choice of the healthy snack is no different than in the control condition. Thus, in this case, priming through health knowledge seems to be less effective compared to priming through admirable role models.

5. Marketing Messages and Content

Marketing messages and content use the general motivation theories of hedonic consumption and external rewards to convince both children and adults to buy products. The use of external rewards especially happens when food products are bundled with toys or games to create a larger appeal. In addition, products that offer engaging reward systems and loyalty programs to parents and caretakers based on consumption or purchase targets appear to work well to motivate the long-term usage of

products (e.g., Nevskaya & Albuquerque, 2016, working paper; Akchurina & Albuquerque, 2017 working paper).

A large and increasing amount of the marketing to children uses licensed characters, such as Sponge Bob Square Pants, Dora the Explorer, Mickey Mouse, and so on, in advertising, on packaging, on websites, and more. Roberto et al. (2010), in a within-subject design, found that four- to six-year-old children rate a snack higher when it is presented in a bag with a sticker of a licensed character than when it is not. In a between-subjects experiment with four- to six-year-old children, unhealthy cereal from a package without a character was rated as less tasty than the unhealthy cereal with a character or the cereal when they were told it was healthy, regardless of the presence of the character (Lapierre, Vaala, & Linebarger, 2011). Neither study examined consumption. Thus, the relationship between characters and children's food preferences and/or consumption remains uncertain.

Leonard, Campbell, and Manning (2017, working paper) examine multiple hypotheses relating a licensed character and the impact on choice and consumption: (1) affect transfer, whereby kids like the character, they associate it with the food, and so they like the food more and thus consume more; (2) the character could change the perception of the food, which could then influence liking/consumption; and (3) the character increases the desire to have the food but does not influence liking for the food, such that choice, but not consumption, is affected. This research finds strong effects of a licensed character on choice of both healthy (e.g., apricots or raisins) and unhealthy (e.g., cookies or gummy chews) foods. However, although the authors find an increase in choice of the product with the character, they find little to no impact on taste evaluations or, importantly, consumption. These results suggest children want the product with the licensed character, but the character does not

influence their liking for the product itself. The fact that liking does not change raises the question of the impact on future decisions, but because liking builds over repeated exposure, children may still develop a preference for the food over time even if the character has no direct or short-term effect on liking.

Various studies have examined how food promotion could influence teenagers' consumption behavior (Cairns, Angus, & Hastings, 2009). For example, two studies investigated adolescents' receptivity to different types of appeals used in social marketing advertisements advocating healthy eating, and found news and fear appeals are more effective than love or popularity (Chan, Prendergast, Grønhøj, & Bech-Larsen, 2009; Chan & Tsang, 2011). In addition, an experimental study found that an advertisement using a threat appeal was more effective than one using a fun appeal in promoting healthy eating among pre-adolescent participants (Charry & Demoulin, 2012).

A qualitative study conducted in Changsha, China, investigated how teenagers believe marketing communication influences their food-consumption behavior. Using focus groups, participants were asked to report their favorite food and beverage advertisements, and explain why they liked them. Participants were then requested to recall promotional tools that influence their food-consumption behavior. Teenagers reported that entertainment value of advertisements, memorable jingles and slogans, and use of celebrities were main attributes of the advertisements that generate communication effectiveness and encourage food trial (Chan et al., 2015). The participants frequently reported that popular Mainland Chinese and South Korean celebrities in food and beverage advertisements encourage them to try the endorsed brands. They could recall the names of the celebrities, the brand name of the food product, and how the celebrities interacted with the brand. The finding that using

celebrities in advertisements can trigger product trial was also found among adolescents in Hong Kong (Chan, Ng, & Luk, 2013). An open question is at what point adolescents develop the more nuanced and skeptical responses to celebrity endorsers seen in adults (e.g., Campbell & Warren, 2012).

Besides traditional advertising, teenagers reported that a variety of promotional tools also influenced their food consumption. Teenagers were attracted by offerings of food tasting at retail stores, sales discounts, on-pack premiums, and sales promotions such as buy-one-get-one free offers. They also appreciated food products in packaging with special designs (Chan et al., 2015).

6. Feedback Loop and Long-Lasting Influences

We end the discussion of each of the components by emphasizing the feedback loop that exists when a decision is made or a marketing signal is received. In Figure 1, the feedback loop is represented by the arrows on the right-hand side, from the consumption element to both agents' individual characteristics and marketing influences.

6.1. Repeated Exposure and Familiarity

Repeated exposure to a food is one of the main results of continued consumption and one of the primary determinants of food acceptance. Whatever the type of stimulation (auditory, visual, etc.), repeating exposure to a stimulus increases its familiarity, which is associated with a shift in hedonic judgment (Zajonc, 1968). The importance of repeated exposure holds true for foods; an increase in familiarity with a food reduces neophobic reactions and increases hedonic evaluation in children

(Birch, McPhee, Shoba, Pirok, & Steinberg, 1987) as well as in adults (Pliner, 1982). In infants, several studies have shown that a food is consumed more and is judged as more liked by an infant after several offers; an increase in acceptance of a new vegetable or a new fruit occurs after 8 to 10 exposures (Birch, Gunder, Grimm-Thomas, & Laing, 1998; Sullivan & Birch, 1994). The effect of repeated exposures is potent enough to increase even the acceptance of foods that the mother had previously identified as being refused by her infant (Maier, Chabanet, Schaal, Issanchou, & Leathwood, 2007).

Repeated exposures provide opportunities to become familiar with the sensory properties of the food. With repeated exposure, a liked sensory feature of the food may increase the hedonic reaction to another sensory feature of the food, through a conditioning mechanism; this is generally described as flavor-flavor learning. Additionally, the ingestion of a food may also improve the acceptance of its sensory properties; this is described as flavor-nutrient learning (Yeomans, 2012). In infants and young children, repeated exposures are as effective as associating a new vegetable with a liked flavor (e.g., sweetness) to increase its intake, whereas associating it with a higher energy content (e.g., addition of oil) did not increase its intake (Caton et al., 2013; Caton et al., 2014; Remy, Issanchou, Chabanet, & Nicklaus, 2013). This finding suggests the repeated-exposure mechanism is as effective as and simpler than implementing flavor-flavor learning and more effective than flavor-nutrient learning for increased vegetable acceptance.

Another factor that contributes highly to the acceptance of a new food and expands a child's consideration and choice sets at early stages of life is the extent to which the child has been exposed to a variety of foods. Six-month-old infants more readily accept a new food if they have been exposed to a variety of other foods differing from one day to the next than if they have been repeatedly exposed

to a single, previously familiar food (Gerrish & Mennella, 2001). Offering different pairs of foods from one day to the next also enhances acceptance of new foods (Mennella, Nicklaus, Jagolino, & Yourshaw, 2008). Variety in different foods both from one day to the next (Maier, Chabanet, Schaal, Leathwood, & Issanchou, 2008) or within a meal (Mennella, et al., 2008) has been shown to increase vegetable and fruit acceptance. Moreover, this benefit of introducing a variety of vegetables at early stages is long lasting and remains at least up to the age of six years old (Maier-Noth, Schaal, Leathwood, & Issanchou, 2016). Given children's overall preference for varied sets (Echelbarger & Gelman, 2017; Echelbarger, Gelman, & Maimaran, working paper), offering a variety of food items can be considered a potential strategy to encourage consumption of healthy food.

6.2. Early-Life Marketing Messages

Early-life marketing messages may influence teenager and adult decisions for several reasons: (1) brand names and category associations learned early in life are recognized more quickly and accurately than those acquired later in life (Ellis, Holmes, & Wright, 2009); (2) early-acquired concepts are more firmly embedded in semantic memory than are later-acquired concepts (Steyvers & Tenenbaum, 2005); and (3) early-acquired concepts shape neural networks into an efficient form for representing them, resisting attempts at reconfiguration by later-learned concepts (Ellis & Lambon, 2000).

Advertising to children typically includes fun and happiness as the most common primary appeals (Kunkel & Gantz, 1992) and, as we discussed before, young children are unlikely to consider advertiser motivations or to immediately integrate these understandings with multiple product dimensions into their processing of advertising messages (e.g., Bahn, 1989), leading to a positive bias

about brands and messages received. In addition, prior to age seven, even considering the theory of mind research previously discussed, some children still do not make relevant distinctions between advertisements and television programming (Butter et al., 1981; Palmer & McDowell 1979, Ward, 1972). In middle childhood, children acquire an understanding of the purpose of advertising, but do not spontaneously apply skepticism when faced with advertising (Brucks, Armstrong, & Goldberg, 1988). Children appear to begin to process advertisements in an adult-like, skeptical manner at about age 13 (Boush, Friestad, & Rose, 1994).

A child's extant abilities at the time of initial encoding of advertising into memory can affect how advertising is remembered and used throughout his or her lifetime because of early-acquisition effects with high repetition and hedonic associations and likely halo effects. Hence, brand beliefs and judgments in adulthood are likely to be biased in an affect-congruent direction, globally benefiting the product across many attributes (Batra & Stayman, 1990; Isen & Shalcker, 1982; Mackie & Worth, 1989). Biases accompanied by highly positive affect may be resistant to correction (Ahluwalia, Burnkrant, & Unnava, 1997). Corrections for biases are most likely to occur when people have the ability and motivation to reconsider beliefs (Wegener, Petty, & Smith 1995). Even when people develop the ability to reevaluate childish brand beliefs, the positive affect associated with some highly advertised brands leads to low motivation to reconsider those beliefs. In such cases, people tend to use the knowledge that is most accessible to them in forming judgments (Higgins, Bargh, & Lombardi, 1985; Feldman & Lynch, 1988; Smith, 1990; Wyer, 2008).

Connell, Brucks, and Nielsen (2014) find that exposure to advertisements in childhood can lead to biases in favor of the advertised product in adulthood. Moreover, positive affect toward advertising

elements (e.g., characters) causes biases to persist, and the biases can be traced to advertising, over and above fond memories of consumption. Connell et al. (2014) examine the resiliency of these biases in judgment by utilizing two known correction techniques: cognitive goal structures, that is, by making negative attributes of associated products accessible (Bargh et al., 2001), and activating advertising knowledge for cognitive defense against marketing communications (Brucks et al., 1988; Campbell & Kirmani, 2000).

Note that although these biases are resilient for people who have positive feelings about a product, they can be corrected for others when ability and motivation to correct are enhanced. Adults with high positive affect do not respond to known bias-correction techniques: priming cognitive goal structures, that is, by making negative attributes of associated products accessible (Bargh et al., 2001), and activating advertising knowledge for cognitive defense against marketing communications (Brucks et al., 1988; Campbell & Kirmani, 2000). Furthermore, Connell et al. (2014) demonstrate biases are not limited to the original product and can transfer to brand extensions. Building on this research, Connell, Nielsen, and Brucks (2017, working paper) find that distinctions between childhood advertising and entertainment are blurred in adults' memory structures, and these blurred distinctions are an independent mechanism that also leads to biased product evaluations.

The experience of consumption or product usage, which results in familiarity, reinforcement of certain behaviors, and variety seeking, will then influence the characteristics of children, parents, and caretakers, and may even change the needs and wants of children in future occasions. At the same time, early-life marketing messages also influence the susceptibility of children and parents to marketing messages when making similar decisions in the future. Hence, in our framework, this

feedback-loop effect endogenously explains the long-lasting influences of each of the discussed effects on the decision-making process of children, parents, and caretakers.

7. Conclusion and Future Research

In this paper, we propose a framework that can be used to understand long-lasting influences on children's food-purchase choices and consumption. Starting in infancy, the first 1,000 days are a window of opportunity to shape future choices, as infants offer little resistance to trying new food prior to the age of one to two years. Parents can use this time to create a liking for variety and the build-up of a large consideration set including healthy foods in infants that will likely last until adulthood. The main reason for children's low opposition to trying new products and food is the fact that neophobia—the fear of new things—does not become prominent until the second year of life. The development of choice sets that are varied and large during infancy is of significance because, for example, eating behavior, including food choices, at ages two and three predict eating behavior up to early adulthood (e.g., Nicklaus et al., 2004, 2005; Nicklaus & Remy, 2013).

Consequently, for future research, we believe more effort is needed with a focus on understanding the factors that influence the early development of eating behaviors, for example, in complementary feeding, beyond the ones described in this paper. Although significant literature has found that the pleasure of eating, variety, repeated exposures, sensory properties, and attitudes toward foods - in normal versus overweight children - increases the acceptance of new food in infants and young children (e.g., Maier et al., 2007; Remy et al., 2013; Caton et al., 2014), more research is needed to get closer to understanding the full impact of early decisions on later food choice and consumption,

and especially how choices early in life interact with the emergence of the representations of the foods, including, but not exclusively, branding aspects.

In addition, more intervention trials in measuring how child and parent characteristics and their interaction influence decision making in feeding situations are needed and could help us understand whether providing information about responsible parenting, marketing messages, and context and social effects affect feeding practices, children's preference for healthy foods, and ultimately the children's health status in a variety of cultural contexts.

At later developmental stages, children's choices may be influenced by a variety of factors, just like adult's choices are (Contento, Randell, & Basch, 2002), and cultural norms are likely to shape their attitudes about food (Monnery-Patris et al., 2016). Food choices are heavily grounded in biologically determined physiological predispositions, as well as strongly shaped by experience with food, thanks to learning mechanisms (Nicklaus, 2016b). These contributions from biology, learning, and memory are important to keep in mind when trying to address food decision-making in children, especially young children. Critically, we also see environmental factors significantly influence children's food choice and consumption (Campbell et al., 2016). Greater understanding of such factors and more research is needed to help parents and other caregivers create environments that help children learn to make healthy choices and exercise self-control (Marty et al., 2017).

Understanding how to increase children's choice and consumption of healthy food and the engagement with productive activities is especially critical given the increase in obesity rates and the generalized use - even by infants - of mobile devices for non-educational purposes (American Academy of

Pediatrics, 2013) and the effect that using these devices has on children's development of various skills such as self-regulation skills (Radesky, Schumacher, & Zuckerman, 2015). Studies that advance the knowledge of how to persuade children and parents to make better decisions will be useful here, especially to justify and select best public policies.

As mentioned in the main part of the paper, children have a developmental difficulty in effectively coping with advertising, which leads to memory representations that are based on childhood attitudes. In many cases, children confuse sponsored advertising with entertainment content, leading to a blurred distinction between advertising and entertainment in long-term memory. Furthermore, the strongly hedonic content of children's advertising creates affective associations in long-term memory, but without the skeptical thinking typical of adults. Material parenting by adults (Richins & Chaplin, 2015) reinforces powerful brand messages. Early evidence that these forces lead to a failure to fully apply developing advertising knowledge in later years, resulting in biases that can influence choices made as adults (Connell, Brucks, & Nielsen, 2014). In other words, the understandings and feelings of a gullible child exposed to sophisticated advertising can live on in the adult consumer. More future research on these topics would help clarify the extent to which both the frequency and the type of marketing messages influence children and their behavior in adulthood.

We conclude by saying that, given all the discussed literature and challenges, continuing efforts to develop measurements of the effects of food consumption and experience, early choice decisions, and exposure to advertisements, packaging, and other marketing factors during childhood on persistent food behaviors and judgment biases in adulthood is important. Only through the understanding of how

these simultaneous effects interact can researchers and policy makers help children and parents make better food decisions.

8. References

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