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# Child's Eating Behavior: A Difficulty that Needs be Known and Overcome

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## Abstract

Eating is one of the priorities of the body to stay alive, it is an instinctive act only in the first weeks of life and that, after that period, should become a learned behavior. During the first thousand days of life the child evolves through some stages related to feeding starting with nutrition through the umbilical cord in the intrauterine period, passing through a phase of exclusive liquid intake during the first six months of life, and then begin to receive other types of food that will challenge your senses and enhance your development until it is integrated into the family's food routine. In a short time, the child should learn how to eat, what to eat, and how much to eat to meet all of their physical and emotional needs. One of the problems that most often arise during childhood is the child that does not eat, leading to exaggerated concerns from family members. This article presents the main events related to feeding, from the characterization of hunger/appetite, the importance of chewing and swallowing processes during the child's neuromotor and emotional development, food selectivity and neophobia and the basic principles that must be observed to the child is fed correctly.

**Keywords:** Food Neophobia, Picky Eating, Eating Behavior, Child Nutrition

## Introduction

Eating is one of the priorities of the body to stay alive, it is an instinctive act only in the first weeks of life and that, after this period, should become a learned behavior, since it is the only bodily task that requires the participation of all organs and senses. Besides being an act of survival, it is also fundamental in the human and environment relational process and, in order to be fulfilled, requires neurological, emotional maturity and muscular coordination (Stevenson & Allaire 1991). The omnivore needs to learn what to eat when to eat and what foods can be combined, and although it needs a varied diet for its proper growth and development, the ingestion of certain substances can be harmful.

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in a short time, the child should learn how to eat, what to eat, and how much to eat to meet all of their physical and emotional needs. And this entire learning process requires the participation of parents/caregivers until the child becomes autonomous and is able to feed with adults in the context of family meals, incorporating the bases for future eating habits (Savage et al. 2007, Walton et al. 2007).

### **Hunger and appetite**

Hunger (latin *faminem*) is the name given to the physiological sensation by which the body perceives that needs food to maintain its inherent activities in life. Appetite can be defined as a behavioral act or a pleasant sensation linked to the act of eating, which is variable according to nutritional needs, age, physical and emotional conditions, room temperature and intake in the previous meal. Because it is linked to cognitive factors, besides the metabolic ones, the appetite is able to continue stimulating the individual to eat, even without hunger (Morley & Levine 1985, Marty et al., 2018).

While in adults the appetite has a strong emotional component manifested by intention to ingest food, in children nutritional needs and their digestive capacity play an important role in the amount of food to be eaten, which leads to the full development of digestive maturation and behavior until the end of the fourth year of life (Abrahamse et al. 2012).

The ingestion of food necessary for growth and development is regulated by complex cognitive and metabolic mechanisms involving the sense organs, different structures of the gastrointestinal tract and the central nervous system, enabling the individual to eat foods in quantity and quality necessary to satisfy their needs physical and/or emotional desires (Williams & Suchdev 2017). All integration of these mechanisms occurs at the brain level that determines both metabolic and cognitive satisfaction (Stevenson & Allaire 1991).

The simple thought about food, the observation of its appearance, odor and taste, associated to stimuli coming from other structures such as oral cavity, stomach, duodenum, pancreas and adipose tissue, characterizing the cephalic, gastric and intestinal phases of the appetite control, trigger stimuli directed to the hypothalamus, brain stem and cortex (limbic system and base nuclei) that produce, through hormonal, the activation of appetite-regulating neurons that determine if the individual will eat or feel sated (Damiani & Damiani 2011, Chambers et al. 2013, Anderson et al. 2016).

### **The senses and the feeding**

Children base their preferences on the sensory characteristics of food by creating a mental image of what should be acceptable food to be eaten, and those that do not fit into that creation are usually turned down (Maiz et al. 2018).

For the child, among the various senses, the vision is more important than the sensory process in deciding what to eat, which gives more participation of the visual aspect of the dish in their meals. To be stimulating foods should be presented on the plate in a separate manner, allowing the children to satisfy the desire to pick up the pieces and portions with their fingers, bringing them to their mouths as do the adults they are observing and imitating during the meal act (Lafraire et al. 2016).

As children show exploratory behavior for their development it should be allowed to touch, smell, play and put in the mouth the different foods, before completing the act of eating, since they are in the process of observation, imitation, exploration, and repetition during the which increases affective bonds and optimizes learning during the sensitive period, ideal for the development of preferences (Stenvenson & Allaire 1991, Marty et al. 2018, Cashdan 1994, Stoica & Alexe 2016).

The palate is the sensation produced by placing a food in the mouth while the taste describes the chemoreception of the gustatory cells located in the taste buds, mediated by nerve endings. The palate is composed of a sensitive system that captures information and sends it to the central nervous system. The taste buds are found in greater number in the epithelium of the tongue, although they are also present in the palate and the oropharynx. In

humans, the distribution of the taste buds of the palate and oropharynx occurs in a greater number in neonates and children than in adults. The tongue is the largest sensory organ and, in addition to the taste buds, also has the Krause corpuscles, structures that can capture tactile sensations (Stoica & Alexe 2016, De Cosmi et al. 2017).

The perception of taste is mainly a function of the taste buds, although the odor strongly contributes to this sense. Also, the texture of the food, detected by the tactile sense of the mouth, and the presence of substances that stimulate the nerve endings can significantly alter this perception (Demattè et al. 2014). Smell has an important role in food serving as an alert to the body about potential harmful elements in the environment and recognizing foods useful for survival (Nicklaus 2017, Demattè et al. 2014). The sense of taste plays an important role in the life and nutritional condition of the human being. The sensations of sweet and salty can be identified on the tip of the tongue, the sensation of sour, in the portions lateral, while the sensation of bitter, on the posterior region of the tongue and soft palate.

Children start to be exposed to the different flavors of food from the prenatal period, when the amniotic fluid presents the feeding experiences of the pregnant woman, and continues during breastfeeding, offering the infant the stimuli to develop a wide spectrum of flavors. This fact explains why breastfed children are less demanding and more predisposed to try new foods (Gregory et al. 2011, Lam 2015, Wadhera et al. 2015). Children are born with a preference for sweet taste while all other flavors need to be learned by exposure, which should preferably occur between 4 and 6 months of age (Harris & Mason 2017, Ross 2017).

At birth, the oral cavity exhibits the most organized sensory and motor integration of the human being, necessary for survival. While an innate preference for sweet taste from the prenatal stage is observed, rejection of the bitter flavors of vegetables can be considered as a natural protection factor, avoiding the consumption of harmful substances (poisons) and low energy content (vegetables with unpleasant taste and texture) (Lam 2015). On the other hand, more caloric foods are more accepted because of the greater palatability and sensation of satiety after ingestion and, when unknown foods are associated with sugar, they are more well accepted (Ramos & Stein 2000).

### **Chewing**

Chewing is the initial phase of the digestive process characterized by mechanical acts of biting, organizing, grinding and milling the food, modulated by neuromuscular activities, preparing it for swallowing. It arises as a result of the maturation and coordination of neuromuscular movements that were initiated during the first semester of life when the child feeds almost exclusively through the suctioning process. It provides functional stimuli that help the development of the maxillary bones, mandible, dental arches and other structures of the oral cavity, besides playing an important role in the speech, propitiating the articulation of words through the movement of the tongue and other structures of the oral cavity (Wickewire et al 1981, Green et al 1997).

The force of the jaw muscles determines the amount of energy available to chop or grind foods and prepares them for swallowing, which is a complex process that requires the work of 26 muscle groups and six cranial nerves. The first masticatory movements are uncoordinated and inaccurate, beginning between the sixth and seventh month of life, when the eruption of the lower and upper central incisor teeth occurs (Gavião et al. 2001).

In the fifth year of life, a fully developed mastication is expected, equivalent to the maturation of the masticatory apparatus since as the first dentition is completed, the chewing cycle becomes stable (Lucas et al. 2004).

The most suitable period for the introduction of foods with more complex textures is between 6 and 10 months. The introduction of more consistent foods after 10 months of age is associated with acceptance difficulties and eating problems at more advanced ages.

### **Neuromotor development**

During the different stages of its development, the child increasingly interacts and intervenes in the reality, and the environment that surrounds him and the food loses the exclusivity in his interest, which happens to be shared

with many other stimuli. From the seventh week of gestation, it is possible to observe important responses of the perioral region to the tactile stimuli. The innate reflex of suction appears from the 5th month of intrauterine life and is observed more clearly in the 29th week. However, its development will be complete during the 32nd week of gestation when the coordination between the sucking and swallowing reflexes appears, which aims to stimulate the child's motor-oral development and provide conditions for an efficient diet. The coordination between suction and deglutition with respiratory movements occurs between 32 and 34 weeks of gestational age, presenting interdependent structural and neurophysiological relationship, and its maturation is fundamental so that aspiration does not occur during feeding (Stevenson & Allaire 1991). The nutritive suction depends on the integration of several elements like reflex suction, lips, tongue, and mandible acting in coordination, oral cavity size and muscular strength of the cheeks (Harris & Mason 2017).

The child's neuromotor development evolves in the craniocaudal direction and provides conditions for the feeding process to occur naturally. While at birth, reflex suction, voracity and the so-called oropharyngeal reflex (all excitation of the posterior part of the mouth leads to the swallowing movement), there is also the extrusion reflex, which disappears after 3 months of age. At 4 months the extrusion reflex is no longer observed (expulsion of what is placed in the anterior part of the tongue) and the suction-swallow movements are better coordinated and are voluntary; until the 6th month of life there is improvement of the labial activity, begins the phase of bringing food and objects to the mouth and masticatory movements that, although rudimentary, play a fundamental role in this stage of life. From then on, the ability to move the liquid in the anterior part and swallow it with the tongue. Between 6 and 7 months of age, the child can sit without the support, which increases the stability and safety of eating. Up to one year of age fine motor skills are more developed and allows the child to pick and feed food with tweezers, use spoon, bring them to the mouth more accurately and chew more efficiently due to greater stability the jaw and the madibulolinguistic movements, as well as ingesting liquids in glasses and interacting more with the environment and with people, imitating the behaviors of adults observed during meals (Lam 2015, Largo et al 2003).

The child's tongue movements that do not chew solid foods during the first year of life are restricted and immature; therefore, foods tend not to be properly chewed and are more difficult to swallow.

Due to the adequate development, the introduction of complementary foods to breastfeeding can occur in the following sequence (Borowitz & Borowitz 2018):

- a) 4 to 6 months: homogeneous textures such as purees and potatoes, since the movements of the tongue are present and the closing of the lips to capture the food;
- b) 6 to 8 m: the texture of the food is increased, as it is already observed a greater movement of the tongue and the cheeks, with masticatory movements; the upper lips can clean the spoon;
- c) after 8 m: introduction of soft pieces to be kneaded with tongue and gums; the tongue already performs lateralisation movements that allow to take the food towards the dental arches for chewing;
- d) after 10 m: with the greatest movement of the tongue the child learns to organize and swallow foods that have been chewed from the lateral regions to the center of the tongue and from there to the pharynx;
- e) after 18 m: coordination for mastication is developed; can transport the food from the center of the tongue to the side, chews and moves back to the center, before swallowing, being able to determine if the food still needs to be chewed or can already be swallowed;
- f) 2 to 3 years: it presents total control of chewing being able to eat any food that requires different movements of the mouth at the same time.

Children that are breastfed have adequate development of oral motricity, because their respiration is predominantly nasal, physiological, whereas mouth breathing, by not exciting the nerve endings of the nasal fossa, compromises the development of the maxilla, nasal fossae and appendages, making it difficult to (Lefton-Greif et al. 2007).

### **Emotional development**

Breast milk is undoubtedly the best food for the child and should be offered exclusively in the first six months of life and supplemented until the child reaches the age of two. From the age of six months, or exceptionally sooner

when necessary, the infant's complementary feeding should be started, however considering its many particularities that are related to the act of feeding (Victora et al. 2016).

The child has the ability to regulate the amount of food that will be ingested according to his needs and the frequency of meals during the day (Smith et al. 2005, Cooke et al. 2017). Due to its decreasing rate of growth during the first two years of life, there is a decrease in appetite at the end of the first and during the second year, a period that must be understood as having a great influence on the eating behavior over the following years.

When this stage of life is elapsed without interurrences, that is, in a natural and harmonic way, the development of the child helps the consolidation of its diet, since at 15 months it already relates the food to the act of playing, between 17 and 20 months begins to select foods and already wants to eat alone; in about 3 years begins to appreciate the appearance of the food, the color, the form and the consistency that make the meal more pleasant and pleasurable. At 4 years of age, the child may express willingness to help prepare food, set the table and join the family group, reaching the age of five with an improvement in appetite, which will increase by 8 years (Madeira & Aquina 2003).

However, this is not always the case in everyday life. It is very common to hear references to the little appetite manifested by the children in their first years of life, mainly from the moment that it starts to have more autonomy and new alimentary practices are initiated.

### **Oral defense**

Sensory integration is a complex mechanism responsible for recording and transmitting peripheral sensations to the central nervous system, where they will be processed and give rise to a response that, although adequate, is variable among individuals (Lafraire et al. 2016). Some children present exacerbated reactions when stimulated mainly by touch, due to an inefficient processing of these stimuli, with negative interpretation of fear, protection, fight and flight (Weiss-Salinas & Williams 2001, Spira & Kupietzky 2005, Blisset & Foggel 2013). This exacerbated response, called tactile defensiveness, has two important components: the first, protective, which acts through receptors located on the skin, head, face and genitals; and the second, discrimination, due to receptors on the hands, fingers, soles of the feet, mouth, and tongue. Mouth and hand are the structures that have the greatest amount of receptors in the body.

At birth, the child presents some well-developed sensory behaviors, which are consequent to the maturation of responses to stimuli in the perioral region, which can be observed at seven weeks' gestation (Smith et al. 2005). To recognize child's oral defensiveness, it is necessary to check for signs such as: do not put fingers or objects in the mouth, refuse various types of food (due to taste, smell, texture), not chewing, have tactile sensitivity in others areas (discrimination of clothing, difficulties with bathing, etc.), avoiding spicy foods, nausea and vomiting (Spira & Kupietzky 2005, Yan 2017). Such behaviors can manifest with repercussions on food since the increased sensitivity to heat, textures, and condiments can trigger reactions of refusal and withdrawal of these foods. Treatment involves the reduction of sensory defense by stimulation of the most sensitive areas of the mouth, in order to increase the sensorimotor-oral comfort. To this end, teethers and brushes are used which, through touching and massaging, tend to facilitate the contact of the different regions of the oral cavity with food.

### **Food neophobia**

The term food neophobia is characterized by an overall reduction in appetite and refusal of new foods. It is defined as reluctance to eat or "avoid new foods" that usually starts between 6 and 12 months of age and can last up to 6 years, when decreases, but may remain some residual until the adult life (Wadhwa et al. 2015, Yan 2017). It occurs at the stage where the child has a slowing of growth, and the interest in the food is replaced by the stimuli of the environment. No triggers are identified, no nutritional status is impaired, and there are no emotional disturbances of the child, the mother or relevant family problems (Dovey et al. 2008, Kerzner et al. 2015, Cole et al. 2017).

The rejection of new foods, especially vegetables (bitter taste, low energy content, unpleasant texture), is related to sensorial characteristics such as odor, taste, touch, and appearance and can be considered as an efficient adaptive mechanism to avoid the risk of eating unknown foods and potentially dangerous (Lafraire et al 2016, Johnson et al 2015, Bamsbo-Sveden et al 2017). 78% of cases are hereditary (Rodriguez-Tadeo et al. 2015). It is usually a much bigger problem for parents than for the child that does not suffer nutritional repercussions.

### **Food selectivity**

A child with difficulty to eating can usually be identified when exhibits characteristics such as eating poorly, not expressing an interest in food, and frequently refusing them. This phase usually begins with the introduction of solid foods, around 8 months, and is understood as a common and characteristic fact of the normal development of the child (Field & Seiverling 2010). In the literature, such behaviors are called picky eating.

### **Picky eating (PE)**

It characterizes children that eat little, has great food preferences, and refuses mainly new foods (Walton et al. 2017, Lam 2015, Chao 2018). Such practice may lead to increased carbohydrate consumption and distortion in the nutritional composition of the diet, with a low intake of vegetables, fruits, and grains (Ong et al. 2014, Taylor et al. 2015). The prevalence is higher in preschool children and seems to disappear up to seven years (Steinsbekk et al. 2017). The development of PE can be caused by factors such as pressure to eat, practices and parental styles of feeding, short time or absent breastfeeding, the introduction of complementary foods before six months or late introduction of foods that require chewing (Taylor et al. 2019). For these children, the meal is not pleasurable, which causes them to eat slowly, to stir the food a lot, and to be satiated more quickly. As a consequence, these children are subject to small variety and imbalance in diet and low intake of some important micronutrients such as iron and zinc (Taylor et al. 2019).

The literature has pointed out some risk factors associated with PE: low birth weight, birthright, maternal negativity, young mother, family styles with behavioral changes (anxiety, low self-esteem) and low socioeconomic level (Cano et al. 2018). On the other hand, prolonged breastfeeding and the introduction of food after six months of age tend to act as protective factors. The conduct is mainly aimed at reducing maternal anxiety and continuing to expose the child to food since there is a great possibility that such behavior ceases to manifest itself after the age of seven (Samuel et al. 2018).

### **How to proceed**

The conduct of cases of children that don't eat should be considered under three fundamental points: the child, the adult, and the environment. Between the first two, a division of responsibilities must be established: parents provide and prepare food, decide what, when and where the child will eat, and the child decides whether and how much to eat (Cooke et al. 2017, Harada et al. 2019, Yan 2017, Ong et al. 2014).

#### **Environment**

The environment must take into account that social interactions that bring together food and pleasure increase affection and bonding. Therefore, family participation during meals, their relationships, and interaction with the child play a very important role in the feeding process of the child (Marty et al. 2018). The social context of food can be positive: when potentializing preference as in the case of parties, when sugar, fat, and salt are related to pleasurable events and have a comfortable feeling of satiety. On the other hand, the negative context, as in the case of vegetables, when offered with insistence and pressure, tend to trigger refusal (Lefton-Greif et al. 2007).

### **Role of adults in infant feeding**

Food can be understood as the most important form of communication between the child and his mother. Beginning with breastfeeding and evolving to the other stages of life, mother and child develop a complex system of emotional and behavioral relationship that will facilitate or hinder the child's attitudes towards food. Faced with the difficulties that may arise during the different stages of infant feeding, mothers may experience

feelings of loss of control, incompetence, frustration or guilt that lead to stress in their relationship with the child. Sometimes the child's food manifestations may be reflecting family maladjustments and/or personality changes and social conduct of those with whom lives. The exacerbated, coercive external control exercised by the parents prevents the child from learning about the sensation of hunger and satiety, greatly interfering in their capacity for self-control, since under normal conditions the child is competent to regulate the amount and interval of meals (Marty et al. 2018, Lefton-Greif et al. 2007, Orrel-Valente et al. 2007, Owen et al. 2010). Adults should, therefore, be role models for children, teaching behaviors, and offering protection against the risks associated with unhealthy or risky foods. The coercion for a child to eat, exercised as external control, ends up working only for a short time. Subsequently, there will appear a negative reaction of preference and aversion for food, even when offered as a reward (Lefton-Greif 2007).

### **The child**

Children are particularly reluctant to try new foods, having an innate preference for sweet, high-energy flavors (Savage et al. 2007, Marty et al. 2018, Cooke et al. 2017), and they tend to try new foods when they see adults ingesting them and not only when they are offered by them (Birch & Doub 2014). Therefore, in order to achieve the goal of having the child accept the meals, it must be verified whether the refusal to eat maybe a adults (Wadhwa et al 2015), to take advantage of the window of opportunity (Cooke et al 2017) and to repeat exposure to new foods 10 to 15 times (increases the sense of security, familiarizes the child with the food, relates flavor to the nutrient and different flavors) (Cooke et al 2017, Caton et al 2014).

Basic principles to achieve success (Walton et al. 2017, Ong et al. 2014, Leung et al. 2012, DeCosta et al. 2017, Brunk & Moller 2019, DeJesus et al. 2019)

1. to stimulate the appetite increasing the palatability of the foods
2. identify the child's preferences
3. avoid distractions
4. to stimulate independence
5. gradual introduction of food and textures (liquid, homogeneous, fine granulosa, coarse granulosa, coarse particles, and fragments)
6. limiting the time of meals
7. offer the food in containers and with cutlery appropriate to the conditions of the child
8. maintain neutral attitudes during meals
9. child should spend energy with physical activities.

### **Baby-Led Weaning**

The baby-led weaning (BLW) is a technique introduced about 15 years ago to aid in the process of feeding the child. It has as a basic principle that children from the sixth month of age have the motor capacity to guide their own intake and are able to start the consumption of food in pieces, with no substantial changes inconsistency. It allows children to choose the times when meals will be started, what will be consumed (among the options offered by caregivers), the pace of meals and the amount that will be eaten at each meal (Rapley et al. 2015). It can be considered a facilitator for self-feeding of the child (Arantes et al. 2018), which has as peculiarities the waste and dirt that accompany each meal.

The advantages of using this method may be longer duration of breastfeeding, children are more likely to consume the same family food and share mealtimes, saving tasks for mothers that do not need to prepare specific meals, higher consumption of fresh food and selected, lower requirement for food, satiety and less possibility of excessive weight gain (D'Auria et al. 2018). Also, in this way, it is observed that the textures of the foods favor the sensorial perception of the child and generate benefits to the orofacial growth, allowing more exploration, less time spent to take care of the child while eating and less anxiety (González & Fernández 2018). On the other hand, some concern has been highlighted as to the possibility of the child choking. In view of this, some authors suggest that the parents are well oriented and trained in first aid. In addition, one should always check that the child is sitting safely and monitor the amount ingested, in order to guarantee the necessary nutritional contribution to the age group.



## Conclusions

Eating habits are initiated in the first years of life when determining intake patterns and preferences (Lam 2015). During childhood, the child may present great diversity in eating patterns without any abnormal development (González & Fernández 2018). Knowledge of the physical and emotional particularities of different stages of life is needed to provide guidance to parents/caregivers on how to help the child feed and consume more nutritious foods.

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