Symposium: The Effects of Childhood Diet on Adult Health and Disease

Psychological Influences on the Childhood Diet

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ABSTRACT Psychological influences on the childhood diet are addressed. The focus is on factors that influence the formation of children’s food preferences. Evidence for links among food preferences, dietary intake and children’s adiposity is presented, with an emphasis on dietary fat. Few food and flavor preferences are innate; most are learned via experience with food and eating and involve associative conditioning of food cues to aspects of the child’s eating environment, especially the social contexts and physiological consequences of eating. Parents’ child-feeding practices are central in this early feeding environment and affect children’s food preferences and their regulation of energy intake. An understanding of how children’s food preferences are acquired is essential in developing strategies to improve the quality of children’s dietary intake. J. Nutr. 128: 407S–410S, 1998.

KEY WORDS: • children • food preferences • dietary fat intake • adiposity

To enhance the nutritional quality of children’s diets, an understanding of the factors that influence children’s food preferences is essential. Children eat what they like and leave the rest, and they are blissfully ignorant of considerations that influence many adult eaters: the fat and cholesterol content, nutrient density of a food, and its cost and ease of preparation. Children’s food preferences are major determinants of food consumption patterns, and current evidence has begun to reveal that preferences are linked to dietary patterns, which in turn influence current and subsequent risk for obesity and chronic disease. However, there are no data to support or refute the idea that preferences and dietary patterns formed in childhood persist into adulthood.

What do we know about factors influencing the etiology of children’s food likes and dislikes? The preference for the sweet taste, probably the preference for salty tastes, and the rejection of sour and bitter tastes are innate and unlearned (Beauchamp et al. 1994), but nearly all food preferences are learned via children’s early experience with food and eating. Children’s preferences are shaped by the quantity and quality of children’s experience with food, and as a result of many eating occasions in which foods are associated with the social contexts of eating and with the physiological consequences of ingestion, children come to accept some foods and reject others, shaping their dietary intake.

EARLY EXPERIENCE, “NEOPHOBIA,” AND FOOD ACCEPTANCE

As omnivores, children must consume a variety of foods to obtain an adequate diet and to maintain growth and health. Omnivores can adapt to consuming a diet consisting of whatever set of edibles happens to be available in their environment. As mammals, we all begin life consuming only milk, and this exclusive milk diet provides a dramatic contrast to the variety that defines the omnivore’s diet. The transition from milk to an omnivorous diet begins during the latter part of the first year of life, when milk is no longer an adequate diet. However, probably because ingesting new substances is a risky business, most new foods are not immediately accepted.

Research conducted with infants and young children (Pliner and Pelchat 1986, Pliner et al. 1993), as well as with adults and other omnivores, confirms that repeated opportunities to sample a new food can reduce the neophobic response and can alter the response from rejection to acceptance (Birch and Marlin 1982, Sullivan and Birch 1994). Figure 1 also indicates that the effects of dietary experience are moderated by prior feeding method; breast-fed infants seem to more readily accept new foods than do formula-fed infants (Sullivan and Birch 1994).

By providing experience with some foods and flavors and not others, the feeding environment can produce individual differences in food preferences and dietary intake. Within subcultural groups, and even within families, individuals can have very different preferences and dietary intake patterns. We know that there are some genetic differences in taste sensitivity and in responses to basic tastes, but at this point, there is limited evidence for genetic effects on food preferences (Anliker et al. 1991, Drawnowski and Rock 1995). The question of how genetic factors and environment may interact to produce food preferences and in turn dietary intake is a complex one, because parents supply both the child’s genes and the environment.

PHYSIOLOGICAL CONSEQUENCES OF EATING: EFFECTS ON FOOD ACCEPTANCE

It is well known that there are familial patterns of obesity and that there are genetic effects on obesity; a child...
foods increased in the “mere exposure” condition, in which foods were tasted but not eaten. These findings indicate that children can learn to prefer high energy versions of foods over similar, lower energy foods. Learning to prefer foods that are the best energy sources could be adaptive in contexts where food is scarce. For middle-class Americans, where the food context is one of excess, learning to prefer energy-dense foods can be a liability.

Children’s preferences for high fat foods are predictors of dietary patterns, and there is now evidence that children’s fat intake can predict their adiposity (Gazzaniga and Burns 1993, Nguyen et al. 1996). We examined the links among children’s preferences for high fat foods, their consumption patterns, and children’s and parents’ adiposity. When 3- to 5-yr-olds were offered menus containing 32% of energy from fat over 6 d, their diets varied from 25% to 42% of energy from fat, and their preferences for high fat foods predicted these intakes (Fisher and Birch 1995).

With respect to links among fat preferences, fat intake, and adiposity, fatter children preferred high fat foods, consumed higher fat diets, and had parents with the highest body mass indices. These data suggest that the food environment with two obese parents is more likely to become obese than is a child with two thin parents. What is not clear is how genetics and environment interact to produce obesity in the developing child and whether obese parents might also provide “obesigenic” environments. For example, an environment that provides many opportunities to learn to like high fat, energy-dense foods and few opportunities to learn to like complex carbohydrates and fruits and vegetables could be obesigenic.

The physiological consequences of eating can have a powerful effect on our food preferences. These physiological effects can be negative or positive; if illness follows eating a food, especially a new food, a “conditioned aversion” results (Kalat 1985). If, as is usually the case, eating a food is followed by positive feelings of satiety, a learned preference for that food can result. Learning to associate foods’ flavors with the physiological consequences of eating can provide a mechanism for learned preferences for energy-dense foods (Sclafani 1991).

In experiments designed to investigate whether children can learn to prefer foods based on their energy content, children ate two different preparations of a food on different days (Johnson et al. 1991, Kern et al. 1993). On both days, the same fixed amount of a food was eaten, such as yogurt or soup, where the energy density was varied by varying the either the carbohydrate or fat content. The foods also contained different and distinct flavors. Before and after repeated opportunities to eat these foods, we obtained preference data to test for learned food preferences. Representative results from one experiment are shown in Figure 2 (Kern et al. 1993). The upper panel shows the results relating to learned, “conditioned” preferences for energy-dense foods. Prior to repeated opportunities to consume the high fat and fat-free versions (pretreatment), preferences for the two foods did not differ. However, following repeated opportunities to consume these foods (post-treatment), preference was significantly enhanced only for the high fat version, especially when the children were hungry. The bottom panel presents contrast data from a “mere exposure” control and indicates that preference for both versions of the initially unfamiliar

![Figure 1: Mean intake of exposed version of vegetables for breast-fed (n = 19) and formula-fed infants (n = 17). Infant intake was assessed at pre-exposure, post-exposure and delayed post-exposure trials.](https://example.com/figure1)

![Figure 2: Effects of conditioning (n = 12) or mere exposure (n = 15) treatment on 3- and 4-yr-olds’ preferences for fat-free (□) and high fat paired (■) flavors. After treatment, children’s preferences were assessed when they were both hungry and full. Preferences were assessed prior to conditioning trials, immediately after conditioning and after 8 wk (delayed assessment).](https://example.com/figure2)
environments of fatter children were systematically different from those of thinner children.

**CHILD FEEDING PRACTICES: EFFECT ON FOOD PREFERENCES, INTAKE AND ADIPOSITY**

The social environment of children’s eating is important in shaping children’s preferences and intake. A series of early experiments revealed that children learned to dislike foods eaten to obtain rewards, “eat your vegetables and you can watch TV” (Birch et al. 1984), and learned to prefer foods eaten in positive social contexts as rewards, “clean up your toys and you can have some cookies” or paired with positive interactions with a friendly adult (Birch et al. 1980).

In addition to shaping children’s preference patterns, child feeding practices that attempt to control what and how much children eat can also affect the child’s developing controls of food intake. For example, when parents focus the child on “cleaning your plate,” the child may learn that the amount of food remaining on the plate, not internal physiological cues signaling hunger or satiety, is most relevant to determining how much to eat. Perhaps by shifting the emphasis from internal to external cues, controlling child feeding practices can alter children’s responsiveness to hunger and satiety cues and to the energy density of the diet. We have investigated children’s responsiveness to energy density, using a protocol in which children consume two-course meals. On different days, the first course is either high or low in energy density. The child consumes a fixed portion of a first course, in which energy density has been manipulated by altering the fat or carbohydrate content. In the second course, the child is offered a variety of foods and self-selects a meal, and intake is measured (Birch et al. 1990). Results revealed that children consistently ate more in the second course following the low energy first course. Children adjusted their energy intake in the second course to compensate for the energy in the first course. Subsequent research indicates that children can regulate energy intake over 24-h periods. Over several-day periods, the CV for single meals are about 40%; CV for energy intake summed over 24-h periods are about 10%. Analysis revealed that meal-to-meal compensation in energy intake produced these patterns (Birch et al. 1991 and 1993). However, there were large individual differences in children’s ability to regulate intake, and we have been exploring the antecedents and consequences of these individual differences.

Recent research has explored individual differences in children’s ability to regulate energy intake (Johnson and Birch 1994). Findings indicated that children with the highest body fat showed the poorest energy regulation. We also noted a difference between sexes here, with boys regulating energy intake more accurately than girls, and this early sexual difference may be an early precursor of later sexual differences in the prevalence of dieting and problems of energy balance. Children whose parents exercised the most control over what, when, and how much children could eat showed the weakest evidence for regulating energy intake. Parental control of children’s eating can include both 1) restriction of certain “forbidden” foods, sweets and high fat foods, as well as 2) “encouraging” consumption of “healthy” foods.

We examined links between maternal reports of their restriction of 3- to 5-year-old children’s access to snack foods and children’s subsequent intake of snack foods in an unrestricted setting (Fisher and Birch 1996). We also explored predictors of parental control in child feeding, including maternal and

**SUMMARY**

Children’s food preferences and intake patterns are shaped via early experience with food and eating, and parents’ child-feeding practices are central features of the child’s early feeding experience. Infants and young children can be responsive to the energy content of food in regulating their food intake, but this responsiveness can be modified by child-feeding practices that attempt to control the child’s intake, thereby limiting opportunities for the child to exert self control. During infancy, eating is initially depletion driven, but the evidence indicates that even during the first few years of life, the controls of food intake become more complex, as we learn to eat in response to the presence of palatable food, the social setting, our emotional states, and our attitudes, knowledge and beliefs about nutrition, food and eating.

**LITERATURE CITED**


