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Lifestyle Approaches to Promoting Healthy Eating for Children



Abstract: *Healthy eating habits are vital to establish during childhood and sustain thereafter. Nourishing, well-balanced diets are essential for proper growth, immunity, physical and mental development, health and well-being, and reduced risk of chronic diseases later in life. Health care professionals, parents, and teachers should be aware of common nutrition-related concerns in children and teens, such as dental caries, allergies, anemia, growth retardation, eating disorders, and obesity, and watch for indicators that a child may be at risk for these. Foods that comprise a healthy diet for children include vegetables, fruits, whole grains, legumes, low-fat dairy products, and lean sources of protein. Foods and beverages with low nutrient density and high energy density should be consumed in moderation only, within a child's discretionary calorie allowance. Although children may need to eat more frequently than adults, they should be taught healthy snacking practices. Role modeling and nutrition education from adults in children's lives are critical in promoting lifelong healthy eating. Resources to facilitate these include Web sites from the American Academy of Pediatrics, American Dietetics Association, MyPyramid.gov/kids, and the US Dietary Guidelines.*

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The importance of healthy diets for children should not be underestimated. Growth and physical development require not only ample energy but also essential vitamins, minerals, and amino acids.¹ Brain and nervous system development during childhood requires a balance of micronutrients, particularly sufficient iron, vitamin B12, and omega-3 fatty acids.^{2,3} Abundant evidence

habits track over time.⁵ Therefore, appropriate dietary practices should be strongly encouraged in the first decade of life and reinforced thereafter.⁶

Common nutrition-related concerns in children, adolescents, and teens include dental caries, allergies, anemia, growth retardation, eating disorders, and obesity.¹ Prevention of these conditions should be incorporated into a child's nutritional plan and intervention taken if they are diagnosed.⁴ Indicators of nutritional risk for children and

 **Age-appropriate nutrition education throughout childhood is critical for the development of lifelong healthy eating habits.** 

demonstrates that proper nutrition enhances academic performance.¹ In addition, population data in children have shown that healthful dietary intakes are associated with lower risks of illness not only during childhood but also later, during adulthood.⁴ Furthermore, establishing healthy eating patterns in young children, as early as 3 to 4 years, is critical for lifelong health promotion because these

adolescents include meal skipping 3 or more times weekly, frequent breakfast skipping, fast-food consumption 3 or more times weekly, eating from only 1 food group, poor appetite, and frequently eating without family supervision.^{1,4,7} Parents and health care providers of young children should watch for such signs and be ready to address them if necessary.

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Table 1.Food Plan for Preschool Children, School-Age Children, and Teenagers Based on MyPyramid^a

Food Group	Serving Size	Age 2 ^b	Age 5 ^c	Age 8 ^d	Ages 12-14 ^{c,d}	Ages 16-18 ^{c,d}
Grains	Ounce	3	5	5	6-7	6-10
Vegetables	Cup	1	1.5	2	2.5-3	2.5-3.5
Fruits	Cup	1	1.5	1.5	2	2-2.5
Milk	Cup	2	2	3	3	3
Meat and beans	Ounce	2	4	5	5.5-6	5.5-7
Oil	Teaspoon	3	4	5	6	6-8
Discretionary calories	kcal	Up to 165	Up to 170	Up to 130	Up to 265-290	Up to 265-425

a. www.mypyramid.gov

b. Based on less than 30 minutes of physical activity.

c. Based on 30 to 60 minutes of physical activity.

d. The lower amounts refer to girls.

Healthy Diets for Children

Naturally nutrient-dense foods should comprise the majority of a child's diet, including vegetables, fruits, whole grains, low-fat dairy, and other protein sources such as lean meats, skinless poultry, and legumes.^{1,4} The serving number and sizes of each of these food groups, as provided by the 2005 US Department of Agriculture (USDA) Food Guide Pyramid (MyPyramid.gov), are presented in Table 1. Variety should be emphasized for vegetables and fruits, aiming for a rainbow of colors, including dark green, red, white, orange, yellow, blue, and purple vegetables and fruits. This makes fruit and vegetable consumption fun and interesting for children, as it provides a variety of vitamins, minerals, fibers, and beneficial phytonutrients.

Currently in the United States and many other Westernized societies, nutrients of concern for excess in the diets of young people include saturated and trans fats, cholesterol, sodium, and added sugars.^{1,4,8,9} Although very young children require higher amounts of total fat to meet needs for energy and central nervous system development, their total fat intake can gradually be reduced as they grow over 4 years, so that it comes to resemble the fat intake recommendations for adults.¹ Saturated

fats should fall below 10% of total energy intake, and trans fats should be minimized.^{4,8}

Nutrients that tend to be insufficient in the diets of many children in the United States and other Westernized societies include fiber, calcium, iron, potassium, vitamin A, and omega-3 fatty acids.^{1,4,9} Daily dietary fiber recommendations for the age groups of 1 to 3 years and 4 to 8 years are 19 grams and 25 grams, respectively.^{1,4,10} The best sources of fibers include whole grains, legumes, vegetables, and fruits, which tend to be underconsumed by children in the United States.^{1,4,9} As discussed below, ample intake of dairy products can ensure sufficient calcium intake. The meal plans outlined by the Food Guide Pyramid and US Dietary Guidelines, as shown in Table 1, should provide a proper balance of macro- and micronutrients.

The most recent nutrition review by the American Academy of Pediatrics (AAP) has placed an emphasis on the understanding and proper use of discretionary calories.⁴ The amounts of discretionary calories for children of different ages are listed in Table 1. According to the US Dietary Guidelines, one's Discretionary Calorie Allowance is "the balance of calories remaining in a person's energy allowance after accounting for the number of calories

needed to meet recommended nutrient intakes through consumption of foods in low-fat or no added sugar forms. The discretionary calorie allowance may be used in selecting forms of foods that are not the most nutrient-dense (e.g., whole milk rather than fat-free milk) or may be additions to foods (e.g., salad dressing, sugar, butter)."¹⁰ Discretionary calories are directly proportional to physical activity, in so much as energy needs increase as one becomes more active. According to the AAP, discretionary calories should be filled with nourishing sources as often as possible and only occasionally filled with calorie-dense foods and beverages that have minimal nutritional content.⁴ This will teach a child the art of making healthy food choices on a regular basis and practicing moderation as appropriate.

Children and Beverages

According to the AAP and the American Dietetic Association (ADA), changes in beverage consumption patterns by children in recent decades are a cause of nutritional concern.^{1,4} In particular, soft drinks and other sweetened beverages such as fruit drinks, which provide energy without significant nutrient contribution, have displaced milk and 100% fruit juices. High intakes of soft drinks have been associated with low

Table 2.**Nourishing Snack Ideas for Children**

Air-popped popcorn
Ants on a log (celery sticks filled with peanut butter and raisins lined up as ants) ^a
Assorted fresh fruits
Baby carrots/veggies dipped in salsa or low-fat cottage cheese
Cheese on whole-grain crackers
Finger sandwiches on whole-grain bread or pitas
Fruit or veggie kabobs dipped in low-fat yogurt
Fruit smoothie made with fresh whole fruit and low-fat milk
Low-fat fruited yogurt
No-sugar applesauce sprinkled with cinnamon
Peanut butter on apple wedges ^a
Rice cakes or popcorn cakes
Trail mix with whole-grain cereal, whole-grain pretzels, and dried fruits or nuts ^a
Whole-grain bagels with cheese or peanut butter and dried fruit or bananas
Whole-grain cereals in baggies, with a spill-proof container of milk
Whole-grain muffins or breads
Whole-grain tortilla wraps with refried beans, salsa, and/or cheese

a. Use appropriate caution for children with nut allergies.

intakes of vitamins A and C, some B vitamins, calcium, and phosphorus, most likely due to the displacement of more nutrient-dense energy sources, such as dairy products, fruits, and vegetables.⁹

Recommended intakes of milk and other dairy products for children are listed in Table 1. Babies younger than 1 year of age should consume breast milk or formula, and then whole milk can then be introduced. After 2 years of age, the fat content of the milk can be gradually reduced.⁴ Children who cannot drink milk due to lactose intolerance or milk allergy can consume calcium-rich alternatives such as dairy products that have been treated with lactase (for lactose-intolerant children) or fortified soy or rice milks. Although calcium-fortified juices provide bioavailable calcium, they do not provide protein or other nutrients provided by dairy sources. Current AAP recommendations for fruit juice consumption are that juices should not be consumed before 6 months of age, 1- to 6-year-olds should consume no more than 4 to 6 ounces daily, and 7- to

18-year-olds should consume no more than 8 to 12 ounces daily.^{4,11} Parents should be educated that 100% fruit juices can fulfill a fruit serving from a child's daily meal plan but that fruit drinks are not the nutritional equivalent to 100% fruit juices.¹¹ Proper hydration with water is also encouraged, especially in hot environments and/or when children are physically active.

Amount and Timing of Meals and Snacks

Infants should be able to feed on demand because they tend to respond accurately to physiological hunger and satiety cues.⁴ Young children need to eat every 2 to 4 hours because they have high energy and nutrient needs for their size, yet small stomachs.⁴ They may fill up quickly at a given meal or snack but need to refuel again relatively soon. However, they should not be allowed to graze or drink sweetened beverages throughout the day.⁴ Carefully snack planning is important to a child's overall

dietary quality because snacking can potentially result in excess consumption of nutrient-poor foods and beverages.⁴ Wholesome nutrient-dense snacks should be provided, to help fulfill children's micronutrient requirements in addition to their energy needs and to establish healthy snacking habits. Ideas for nourishing child-friendly snacks are listed in Table 2.

Very young children tend to eat according to internal physiological hunger and satiety cues, so they should be encouraged to eat as such, rather than responding to external cues.^{9,12} Thus, they should not be forced to finish everything on their plate, and food should never be used as a punishment or a reward.^{4,13} In addition, children often need to be taught to take small bites and chew thoroughly, both to reduce risk of choking and to develop focused, unrushed eating behaviors in the long run.⁴

Adults should not forbid highly palatable foods but instead train children to practice sensible moderation of foods that have low nutrient density and high energy density.^{13,14} Children should be taught to value foods that will help them to grow and stay healthy. Although excessively forbidding foods can lead to increased preference for those foods later, lack of moderation can also lead to general overconsumption.¹³

Developing Healthy Dietary Habits

Parents and other caregivers are critical role models for children's dietary practices because children mimic behaviors and adopt habits and attitudes from adults in their lives.^{19,13-15} As parents model healthy eating habits, they can teach children the importance of nutrition. Regular family mealtimes should allow for social interaction and the establishment of a wholesome relationship with food.^{1,4} Foods provided at school, and nutritional educational programs, also shape a child's diet in both the short and long term.^{12,15} Thus, both parents and schools can be seen as opportunities to promote healthy eating during youth.⁴ As children develop,

they should be taught the importance of proper food and beverages for growth, health, and well-being in ways they can relate to and understand, given their level of cognitive development. Wholesome foods should be identified with benefits that are tangible to children.¹³ For example, preschool children may identify with growing and becoming stronger; school children may identify with fighting germs, having strong bones, and seeing well; and adolescents and teens tend to focus on appearance.^{14,15}

A variety of healthy foods can be built up by introducing new foods several times in different ways. Children should be encouraged but not forced to try new foods. Serve them along with familiar foods. Research has shown that it may take 15 to 20 exposures to a new food before a child accepts it.⁹ Increased vegetable and fruit consumption by children has been associated with frequent exposure to these foods, consumption of them by adults in children's lives, education about their benefits, and ease of access to them.¹⁶

Although adolescents and teens start making more independent food choices, often influenced by peers, adults in their lives are still important for promoting proper nutrition.¹⁴ Among 11- to 16-year-olds, barriers to healthy eating include poor access to appropriate foods (including in schools) and easier access to (and taste preferences for) less healthier options, which also tend to be less expensive.¹⁵ Facilitators of healthy eating include support from family and physical appearance.¹⁵ Understanding such barriers and facilitators can enable health professionals, parents, and teachers to develop age-appropriate nutrition promotion programs for children.^{13,14}

Resources

The Web site from the AAP (www.healthychildcare.org) contains a wealth of information for the promotion of healthy eating in children. It includes detailed educational materials for health professionals, teachers, and parents. The ADA Web site (www.eatright.org)


is another valuable resource for childhood diet and nutrition information. It includes fact sheets, brochures, and other materials with childhood nutrition information in English and Spanish, along with reading lists on child and teen nutrition. A registered dietitian (RD) is also able to provide individualized advice to parents who may have specific nutrition-related questions. RDs can be located through the ADA Web site.

A children's version of the USDA Food Guide Pyramid is available at MyPyramid.gov/kids. This Web site, which is also available in Spanish, includes interactive games and coloring pages that provide nutritional education for children, as well as tips for families, kids' posters, meal-tracking worksheets, and classroom materials. Links are available from all these Web sites to other relevant sources of nutrition materials for children, including the most recent US Dietary Guidelines.

Conclusions

Types of foods that are healthful for adults are also healthful for children, including vegetables, fruits, legumes, whole grains, low-fat (or skim) dairy, and lean sources of protein. Thus, the US Dietary Guidelines for children are appropriate in making childhood nutritional recommendations.¹⁸ Age-appropriate nutrition education throughout childhood is critical for the development of lifelong healthy eating habits.

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References

1. Position of the American Dietetic Association: dietary guidance for healthy children ages 2 to 11 years. *J Am Diet Assoc.* 2004;104:660-677.
2. Malone SK. Improving the quality of students' dietary intake in the school setting. *J School Nurs.* 2005;21:70-76.

3. Stevenson J. Dietary influences on cognitive development and behavior in children. *Proc Nutr Soc.* 2006;65:361-365.
4. Gidding SS, Dennison BA, Birch LL, et al, and American Heart Association. Dietary recommendations for children and adolescents: a guide for practitioners. *Pediatrics.* 2006;117:544-559.
5. Singer MR, Moore LL, Garrahe EJ, Ellison RC. The tracking of nutrient intake in young children: The Framingham Children's Study. *Am J Public Health.* 1995;85:1673-1677.
6. Kelder SH, Perry CL, Knut-Inge K, Lytle LL. Longitudinal tracking of adolescent smoking, physical activity, and food choice behaviors. *Am J Public Health.* 1994;84:1121-1126.
7. Rodriguez G, Moreno LA. Is dietary intake able to explain differences in body fatness in children and adolescents? *Nutr Metab Cardiovasc.* 2006;16:294-301.
8. Dwyer J. Should dietary fat recommendations for children be changed? *J Am Diet Assoc.* 2000;100:36-37.
9. Johnson RK. Changing eating and physical activity patterns of US children. *Proc Nutr Soc.* 2000;59:295-301.
10. US Dietary Guidelines. Available at: <http://www.health.gov/dietaryguidelines/dga2005>.
11. Committee on Nutrition. American Academy of Pediatrics: the use and misuse of fruit juice in pediatrics. *Pediatrics.* 2001;107:1210-1213.
12. Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. *Pediatrics.* 1998;101:539-549.
13. Faith MS, Scanlon KS, Birch LL, Francis LA, Sherry B. Parent-child feeding strategies and their relationships to child eating and weight status. *Obes Res.* 2004;12:1711-1722.
14. Westenhoefer J. Establishing good dietary habits: capturing the minds of children. *Public Health Nutr.* 2001;4:125-129.
15. Shepherd J, Harden A, Rees R, et al. Young people and healthy eating: a systematic review of research on barriers and facilitators. *Health Educ Res.* 2006;21:239-257.
16. Knai C, Pomerleau J, Lock K, McKee M. Getting children to eat more fruit and vegetables: a systematic review. *Prev Med.* 2006;42:85-95.