The Importance of Nutrition and Physical Activity for Children

Linda Van Horn, PhD, RD; Laura Banks, MSc; Eileen Vincent, MS, RD; and Brian W. McCrindle, MD, MPH

A healthy lifestyle can be defined by the inclusion of nutritious foods to meet nutrient needs and sufficient physical activity to achieve energy balance and weight control, among other factors.

In growing children, achievement of these healthy behaviors can establish the roots for a lifetime of lower risk for developing cardiovascular and other chronic diseases. The avoidance of overweight and obesity alone can prevent early onset of the hypertension, dyslipidemias, insulin resistance, and metabolic syndrome that currently plague our society at increasingly younger ages.1 This article summarizes the role of nutrition and physical activity to optimal growth and development in childhood, and provides translational messages for practical approaches for incorporating these behaviors.

NUTRITION

Current Dietary Intake in Children

Recent data from the National Health and Nutrition Evaluation Survey (NHANES), 2003-2004, report that in general, US children and adolescents aged 2 to 18 years consume more fruit juice, starchy and non-nutrient dense vegetables, and non-whole grains than are recommended.2-6 They also under-consume the recommended amounts of fruits, dark green and orange vegetables, legumes, and whole grains.

Intake of snack foods, desserts, and pizza — foods that are generally nutrient-poor and energy-dense — has increased from about 18% of kcal in the 1970s to 1980s to current intakes of about one-quarter to one-third of the total dietary intake of adolescents.7-10 Likewise, sugar-sweetened beverages constitute approximately half of all beverages consumed by children and...

Linda Van Horn, PhD, RD, is a Professor of Preventive Medicine, Department of Preventive Medicine, Northwestern University, Feinberg School of Medicine, Chicago, IL. Laura Banks, MSc, is a PhD Candidate, Division of Cardiology, Department of Pediatrics, University of Toronto, The Labatt Family Heart Centre, The Hospital for Sick Children, Toronto, Ontario, Canada. Eileen Vincent, MS, RD, is Assistant Director of Clinical and Nutrition Research, Department of Preventive Medicine, Northwestern University, Feinberg School of Medicine, Chicago, IL. Brian W. McCrindle, MD, MPH, is a Staff Cardiologist, Division of Cardiology, Department of Pediatrics, University of Toronto, The Labatt Family Heart Centre, The Hospital for Sick Children, Toronto, Ontario, Canada.

Address correspondence to: Brian W. McCrindle, MD, MPH, via fax: 416-813-7860; or email: brian.mccrindle@sickkids.ca.

Dr. Van Horn, Ms. Banks, Ms. Vincent, and Dr. McCrindle have disclosed no relevant financial relationships.

doi: 10.3928/00904481-20120110-10
### Sidebar 1.

**Improving Food Choices and Preparation Approaches**

- Read the nutrition facts panel and ingredients list when choosing foods to buy.
- Always check the calorie content per serving.
- Eat fresh, frozen, and canned vegetables and fruits without high-calorie sauces, added sugars, or salt.
- Replace high-energy-dense (high-calorie), nutrient-poor foods with fruits and vegetables as often as possible.
- Increase dietary fiber (15 g/m/1,000 kcal/day) intake by eating more beans (dried beans, peas, lentils); whole-grain, high-fiber foods; fruits such as pears, plums, and berries; and vegetables such as broccoli, spinach, and carrots.
- Use liquid vegetable oils, especially olive oil, canola oil, safflower oil, or oil unsaturated oils in place of solid fats (such as butter, hydrogenated margarines, or shortening).
- Avoid beverages and foods with added sugars. Common forms/names of added sugars include sucrose, glucose, fructose, maltose, dextrose, corn syrups, concentrated fruit juice, and honey.
- Choose foods made with whole grains, especially those high in dietary fiber. Common forms of whole grains are whole wheat, oats/oatmeal, rye, corn, popcorn, brown rice, wild rice, buckwheat, triticale, bulgur (cracked wheat), millet, quinoa, and sorghum.
- Avoid pastries, cookies, cake, pie, and other high-calorie, high-fat bakery products (e.g., muffins, doughnuts).
- Choose milk and dairy products (yogurt, cheeses) that are either fat free or low fat.
- Reduce salt intake by limiting condiments and choosing low-sodium products.
- Choose fish more often, choose poultry without the skin and only lean cuts of meat.
- Minimize intake of processed meats that are high in saturated fat and sodium.
- Grill, bake, or broil fish, meat, and poultry (instead of frying).
- Incorporate vegetable protein foods (beans and legumes) and vegetable-based meat substitutes (usually soy-based) into favorite recipes.
- Encourage daily consumption of whole vegetables and fruits in place of juices.


#### RECOMMENDED DIET BEHAVIORS

Evidence suggests that eating breakfast can help curb total energy intake for the day and improve nutrient density. Also, it has been reported that eating meals together as a family is associated with reduced risk for overweight and obesity. Cooking with saturated fats, or deep-fat frying, adding high-fat, high-calorie sauces and gravies or incorporating added solid fats or sugars can undermine the overall nutrient quality of the diet. Sidebar 1 specifies supportive shopping and preparation techniques that can help avoid these behaviors.

#### Discussions with Patient Families

Physicians and health care providers can facilitate better diet behavior among their patients and families in a variety of ways. To maximize efficiency and target the most relevant strategies, assessment of the barriers that prevent a family from adhering to the recommended dietary behaviors can be a valuable use of time and provide clues for counseling on priority behaviors. Sidebar 2 (see page 69) suggests some of the most common behaviors associated with nonadherence to the recommended diet. Practitioners can review these lifestyle factors with the family and address those that appear most relevant, before offering specific dietary recommendations.

#### LIFESTYLE INTERVENTIONS

Once these barriers have been identified and addressed, health care providers can work with the patient and family to prioritize and select the priorities and goals best suited to them. Table 1 (see page 69) offers examples and approaches for targeting these behaviors.

Many families are unaware of their calorie needs or their calorie intake. Helping them understand that each person’s daily “quota” of calories is determined by height, weight, and physical activity level can help put energy balance into perspective. The physician...
can discuss with families specific goals for calorie reduction, including: daily calorie needs of each person in the family; proper portion sizes, especially in restaurants; balanced occasions of increased eating (eg, weekends, holidays, celebrations) against reduced calorie intake to maintain/lose weight.

**PHYSICAL ACTIVITY**

Physical activity is arguably the most powerful tool for healthy psychosocial and physical development; it is the primary prevention tool against obesity and cardiovascular-related comorbidities in children. Physical activity is associated with better risk profiles for cardiovascular disease (CVD) in children, including lower blood pressure, more favorable serum lipid and lipoprotein levels, and decreased adiposity. Therefore, it is of primary importance to promote physical activity participation and decrease sedentary behaviors to establish healthy physical activity behaviors and minimize the CVD risk profile starting in early childhood.

**Dimensions of Physical Activity**

Although physical activity in younger children should be focused primarily on active play and physical activity enjoyment, recommendations for older children also should incorporate information about the duration, frequency, intensity, and type of activities to be performed. Further research is required to determine the optimal exercise dose-response among children and adolescents; however, physical activity recommendations have been established and specify an exercise duration and frequency of 60 minutes of moderate- to high-intensity physical activity to be performed on each day of the week.

The type of physical activity recommended for children should also take into consideration the five main components of physical fitness: cardiorespiratory endurance; muscular endurance; muscular strength; flexibility; and body composition. An inverse relationship between physical activity level and adiposity is already established in early childhood, with less physically active preschool children acquiring increasing adiposity levels than highly active peers. Thus, primary care physicians have an important role in providing physical activity counseling starting in early childhood.

**Strategies to Increase Physical Activity**

Older children and females are associated with having lower physical activity levels and, therefore, require ad-
ditional counseling regarding physical activity promotion. Child self-efficacy, parental physical activity, parental support, physical education, school sports participation, family influences, and peer support have all been identified as determinants of physical activity. These additional physical activity determinants demonstrate the importance of family involvement in promoting physical activity behavior change in children.

The 5As model suggests that primary care physicians ask about children’s physical activity levels; advise children/families about the benefits of physical activity; assess and mutually agree with the children and family as to their realistic physical activity goals; assist families in accessing appropriate support materials and self-monitoring tools; and arrange for follow-up with any relevant multidisciplinary team members necessary to promote behavioral change (Table 2).

Effects of Sedentary Behavior

The AAP recommends limiting children’s total “screen time” to less than 120 minutes per day, children not meeting the physical activity or screen time recommendations are three to four times more likely to be overweight than those in compliance with both recommendations.

Targeting reductions in screen time may increase the time available for children to participate in physical activity and lead to reductions in levels of pediatric obesity and cardiovascular-related comorbidities. Targeted reductions in screen time have been proposed to encourage increases in physical activity: Limiting access to screen time, removing televisions and computers from the child’s bedroom; earning access to screen time through the completion of chores and physical activity; and through parental modeling of these same behaviors.

Parents of high screen-time users are more likely to have a less negative attitude toward excessive screen time; are less likely to control screen time; and are more likely to model sedentary behavior themselves. This suggests the importance of parental involvement in the establishment of physical activity and sedentary behavior interventions.

INTEGRATION OF NUTRITION AND PHYSICAL ACTIVITY

Although chronic disease has historically manifested during adulthood, the foundation for CVD, type 2 diabetes, and obesity is established during childhood. While obesity is arguably the most observable predictor of underlying CVD risk factors among children, the manifestation of comorbidities, including hypertension, dyslipidemia, insulin resistance, left ventricular hypertrophy, and the clustering of these CVD risk factors into what is known as metabolic syndrome, is now occurring in adolescents and young adults. A combination in childhood of increased physical activity level, decreased screen time, dietary energy intake modification based on physical activity levels, and family involvement is critical to the establishment of a healthy adulthood.

CONCLUSION

By taking on the goal of having better health together, families can reinforce and encourage each other to improve both their physical activity be-

### Table 2. The 5As Model of Physical Activity

<table>
<thead>
<tr>
<th>Model Component</th>
<th>Operational Definition</th>
<th>Examples for Implementing the Model and Potential Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ask</td>
<td>Document physical activity during annual visit.</td>
<td>Ask about involvement in active play and organized sports with emphasis on frequency, duration, and type of activity. Ask about exercise intensity: “How hard is the exercise? Can you ‘talk’ during exercise?”</td>
</tr>
<tr>
<td>2. Advise</td>
<td>Cite reasons to increase physical activity to the family.</td>
<td>Lowers CVD risk, etc.</td>
</tr>
<tr>
<td>3. Assess</td>
<td>Determine readiness to change.</td>
<td>“Do you think you will be able to increase your physical activity levels in the next month?”</td>
</tr>
<tr>
<td>4. Assist</td>
<td>Offer strategies for increasing physical activity.</td>
<td>Ask about what types of physical activities the child and family enjoy. Provide health promotion materials (ie, physical activity guides).</td>
</tr>
<tr>
<td>5. Arrange</td>
<td>Schedule follow-up appointments before patient leaves office.</td>
<td>Set goals to be discussed during the follow-up appointment.</td>
</tr>
</tbody>
</table>

behavior, and to make smart choices at the grocery store, restaurant, and kitchen table. The more a family collaborates on achieving these goals, offering each other the moral support and practical advice needed to maintain them, the better they are likely to do in avoiding weight gain or developing risk factors.

REFERENCES


