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NUTRITION CONNECTION

CHILDHOOD NUTRITION:

WHAT FOODSERVICE PROFESSIONALS NEED TO KNOW

BY CHRISSY CARROLL, MPH, RD

NUTRITION AFFECTS a child's ability to grow, learn, and thrive. If you work in school food service, it can be gratifying to think about the impact you're making on each child's life through the nourishing meals you create. Learn more about key nutrients for children, special situations that may impact diet, and how nutrition affects not only health, but also academic performance.

KEY NUTRIENTS FOR CHILDREN

While all nutrients are essential, there are a few that are particularly important for growing minds and bodies. These include...

Protein

Protein is essential for the growth and repair of all the cells in our bodies, making it quite valuable during rapid periods of growth in childhood.

Luckily, most children in the United States meet their protein needs each day. However, in developing countries, protein insufficiency is far more common.

Good sources of protein include lean beef, chicken, turkey, beans, eggs, yogurt, milk, tofu, and nuts.

Omega-3 Fatty Acids

These polyunsaturated fatty acids are involved in brain health, cell development, and eye function. In children, research suggests omega-3s may help with symptoms of ADHD, may attenuate asthma symptoms, and may influence cognitive function (particularly in early childhood).

Omega-3s include three types of fatty acids – ALA, DHA, and EPA. ALA is found in plant foods like walnuts, flaxseed, and chia seeds. While the body can convert some ALA to DHA or EPA, the process is not incredibly efficient. As such, it's important to also get direct sources of DHA and EPA in the diet. Fatty fish is the best source of these omega-3s.

Iron

The body uses iron to make hemoglobin, a part of red blood cells that helps carry oxygen throughout the body. Because all cells need oxygen to function, iron is essential for growth, development, and learning.

Among young children in the United States, the prevalence of iron deficiency is around 7 percent. This number is higher globally. Iron deficiency can lead to anemia, symptoms of which include fatigue, weakness, poor appetite, and delayed growth.

You can help children get enough iron by serving foods like beef, chicken, turkey, beans, tofu, seeds, and fortified cereal.

Calcium

Calcium is a mineral that is necessary for bone development. Peak bone mass (the maximum amount of bone developed) is usually achieved by the late 20's, with most of that growth occurring during childhood and adolescence. Inadequate calcium intake in childhood may lead to lower bone mass and risk of osteoporosis later in life.

You're probably familiar with milk, cheese, and yogurt as excellent sources of calcium. This mineral can also be found in tofu, edamame, canned sardines, almonds, leafy greens, and fortified beverages (like certain orange juices or plant-based milks).

Vitamin D

Vitamin D helps the body absorb calcium, and as such is another key player in bone health. A deficiency can cause

weak bones and lead to a condition called rickets, which results in soft and distorted bones. Vitamin D also helps maintain a strong immune system.

To help children meet their Vitamin D needs, consider serving foods like fatty fish, egg yolks, fortified dairy, and fortified cereals.

Vitamin B12

Since it is involved in DNA synthesis, neural myelination, and neurotransmitter synthesis, Vitamin B12 is essential to brain health. Deficiencies can lead to cognitive impairment and neural damage in children.

Good sources of Vitamin B12 include fish, beef, dairy, eggs, and fortified cereals.

SPECIAL SITUATIONS

There are several situations—including medically necessary diets and voluntary diets—that may impact a child's ability to get key nutrients, or require changes to the meals they receive at school. As a foodservice professional, it's important to be aware of these four common scenarios:

LEARN ABOUT THE KEY NUTRIENTS for children, special situations that may impact diet, and how nutrition affects health and academic performance.

1. Food Allergies

A food allergy occurs when the body has an immune-mediated reaction to a particular food protein. These reactions can range from mild (itching and swelling) to severe (trouble breathing and life-threatening anaphylaxis).

At present, approximately 1 in 13 children has a food allergy. The most common food allergies are:

- peanuts
- fish
- soy
- dairy
- sesame
- eggs
- tree nuts
- shellfish
- wheat

Children with food allergies must avoid the allergenic food to stay safe. This can be difficult and requires consistent label reading. Food manufacturers can change formulations, so it's essential to check the ingredients every time a packaged food is served.

School foodservice professionals should be aware of students with food allergies and take steps to accommodate them. Legal rights are afforded to children with food allergies through the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act of 1973. These require that any public or private school receiving federal funding must provide a plan to accommodate children with disabilities, which includes life-threatening food allergies.

A 504 plan is a written plan to address a child's safety related to their food allergies. It may outline a variety of concerns and steps, like cafeteria accommodations, in-class food scenarios, and which school personnel will be trained in using an epinephrine autoinjector (EpiPen).

If you work in school food service, you should be aware of these regulations and work collaboratively with parents and school staff to properly prepare safe meals for children with food allergies.

SCHOOL FOODSERVICE PROFESSIONALS should be aware of students with food allergies... A 504 plan is a written plan to address a child's safety related to their food allergies.

2. Celiac Disease

Celiac disease is a medical condition in which gluten causes damage to the villi of the small intestine. Even small amounts of gluten can cause damage, leading to malabsorption of nutrients and poor growth. The prevalence of celiac disease is around 1 percent worldwide.

Children with celiac disease must follow a gluten-free diet. Gluten is a protein found in wheat, barley, triticale, and rye. Derivatives of these products are often found in surprising sources.

For example, did you know soy sauce contains gluten? Or that certain varieties of mustard may contain wheat starch (a source of gluten)?

Gluten is not required to be specifically labeled in an ingredient list (unless it is from wheat, which would be called out via food allergy labeling laws). As such, it is important to carefully read labels to identify any ingredients that could be derived from gluten-containing grains.

In schools, celiac disease may fall under the Section 504 regulations. If parents request a 504 plan and provide documentation of celiac disease as a disability, schools must provide reasonable accommodations which include gluten free meals. These meals must also be free of cross-contamination with gluten-containing items.

Note that the meal does not have to mirror the standard offering of the day, it simply must meet the child's needs. However, mirroring when possible helps support the student's inclusion with peers.

3. Vegetarian or Vegan Diets

Families may implement vegetarian or vegan diets for their children based on ethical principles or health beliefs. Teens may start this type of eating pattern on their own related to these beliefs.

When following a vegetarian diet, people do not eat meat or fish, but may consume dairy and eggs. A vegan diet eliminates all animal products, including dairy and eggs. Strict vegan diets restrict animal byproducts as well, like honey (made from bees) or even certain forms of granulated sugar (which goes through a bone char filtering process).

While these diets are voluntary choices, they can impact a child's nutrition status. Nutrients of concern include protein, iron, calcium, and Vitamin B12. It is easier to meet these needs on a vegetarian diet, while a vegan diet requires more planning.

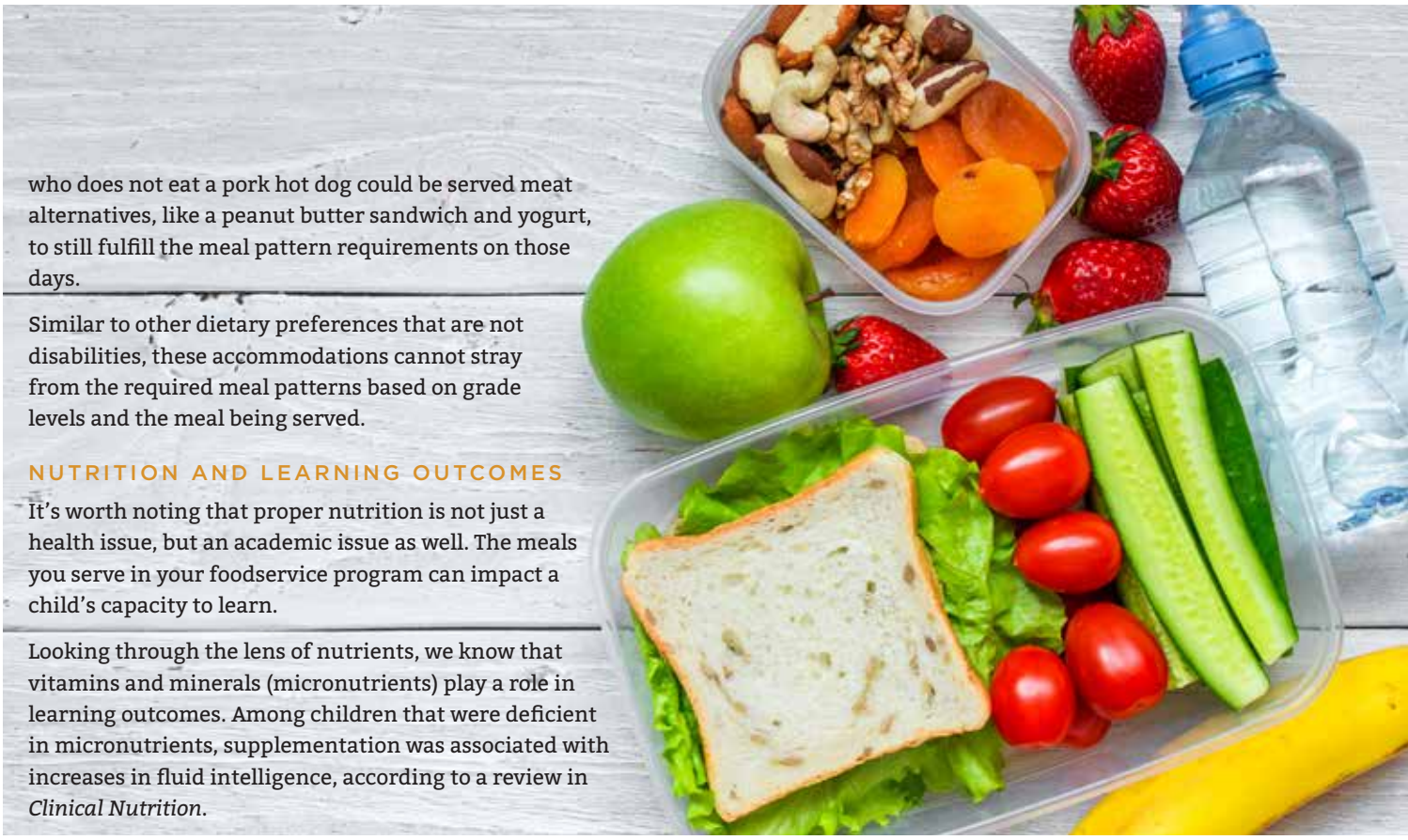
Under current regulations, school foodservice programs are not required to make meal modifications for vegetarian or vegan diets (unless medically prescribed for a disability). USDA allows programs to accommodate students if they wish, however, the meals still must comply with all applicable USDA meal pattern regulations.

4. Religious or Cultural Preferences

Many children make voluntary dietary choices for religious or cultural reasons. For example, some families may keep Kosher or Halal diets, while others may avoid a specific type of food like pork.

The USDA allows but does not require meal modifications for religious or cultural preferences. While it is not mandatory, families will likely appreciate any attempts a foodservice director makes to accommodate their children.

You may discover that there are easy adjustments for certain religious or cultural preferences. For example, a child



who does not eat a pork hot dog could be served meat alternatives, like a peanut butter sandwich and yogurt, to still fulfill the meal pattern requirements on those days.

Similar to other dietary preferences that are not disabilities, these accommodations cannot stray from the required meal patterns based on grade levels and the meal being served.

NUTRITION AND LEARNING OUTCOMES

It's worth noting that proper nutrition is not just a health issue, but an academic issue as well. The meals you serve in your foodservice program can impact a child's capacity to learn.

Looking through the lens of nutrients, we know that vitamins and minerals (micronutrients) play a role in learning outcomes. Among children that were deficient in micronutrients, supplementation was associated with increases in fluid intelligence, according to a review in *Clinical Nutrition*.

There is also research on specific micronutrients. For example, research in *Advances in Nutrition* found that children's Vitamin B12 status was linked to improved cognitive measures, academic performance, and developmental indexes across several studies. Similarly, a recent systematic review in *Nutrients* noted that 11 of 16 studies found a connection between iron status and academic performance.

At a big picture view, we can also examine the impact of broader dietary patterns. For example, breakfast and overall diet quality may influence academic performance. A 2017 systematic review in the *Journal of Human Nutrition and Dietetics* concluded that "moderate associations exist for dietary intakes characterized by regular breakfast consumption, lower intakes of energy-dense, nutrient-poor foods and overall diet quality with respect to outcomes of academic achievement."

Similarly, a 2020 review in the *International Journal of Environmental Research and Public Health* found that poor diet quality—characterized by low consumption of fish and produce and a high consumption of fast food, processed meat, and soft drinks—has been linked to poor cognitive health and lower academic achievement.

Several studies have also found positive associations between universal school meal programs and student outcomes. For example, some studies (but not all) have linked universal meals to better attendance and academic performance. These benefits may vary based on school meal quality, age, socioeconomic status, and the student's original nutrition status.

THE BOTTOM LINE

The future of our nation lies in the hands (and stomachs) of its children. Nutrient-dense food can help support growth, development, and learning. By understanding key nutrients and how to support children with different dietary needs, we put this generation on the path towards health and academic success, both now and later in life.

REFERENCES

Scan QR code to view the list of resources for this article.

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CE QUESTIONS | NUTRITION CONNECTION

II

This **Level II** article assumes that the reader has a thorough knowledge of the topic. The desired outcome is to facilitate application of knowledge into practice by drawing connections among ideas and using information in new situations.

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1. Which food is the best source of EPA and DHA omega-3 fatty acids?
   A. Walnuts
   B. Flaxseed
   C. Fatty fish
2. Which nutrient is involved in DNA synthesis and brain health, is linked to cognitive measures in several studies, and may fall short on a vegan diet?
   A. Calcium
   B. Vitamin B12
   C. Vitamin D
3. Which of the following is the primary function of iron in a child's body?
   A. Involved in carrying oxygen throughout the blood
   B. Helps prevent rickets (soft and distorted bones)
   C. Acts as the main building block for muscle growth
4. Which of the following would *not* fall under a 504 plan that would require meal modifications?
   A. The student has celiac disease
   B. The student has a life-threatening food allergy
   C. The student does not eat pork for religious reasons
5. You are woking on reasonable accommodations for a student with a 504 plan for a peanut allergy. Which of the following is true?
   A. You must eliminate peanut butter from the entire school
   B. You must provide individual meals for the child that are peanut free
   C. You do not have to make any special accommodations; the child must bring their own lunch
6. Which of the following diets would not allow honey?
   A. Vegan diet
   B. Gluten-free diet
   C. Dairy-free diet
7. Which best describes the relationship between poor diet quality and academic performance?
   A. Studies suggest poor diet quality may improve academic performance
   B. Studies suggest poor diet quality may worsen academic performance
   C. There is no relationship between diet quality and academic performance

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