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Module 20

Sports Nutrition Brain-Fuel Guide

What active kids need before, during, and after exercise to protect both performance and cognitive function

Active adolescents face a double demand: fueling physical performance AND rapid brain development. The adolescent brain is still under heavy construction — pruning synapses, myelinating connections, developing executive function. Under-fueling doesn't just hurt athletic performance. It impairs learning, mood regulation, and brain maturation. Most young athletes are chronically under-eating, especially girls.

Daily Calorie & Macronutrient Needs

	MODERATELY ACTIVE	VERY ACTIVE (DAILY TRAINING)	COMPETITIVE/ELITE
Calories (girls 13-18)	2,000-2,200	2,400-2,800	2,800-3,200+
Calories (boys 13-18)	2,200-2,600	2,800-3,200	3,200-4,000+
Protein	1.0-1.2 g/kg/day	1.2-1.6 g/kg/day	1.4-2.0 g/kg/day
Carbs	3-5 g/kg/day	5-7 g/kg/day	6-10 g/kg/day
Fat	25-35% of calories	25-35% of calories	25-35% of calories (don't cut fat — brain needs it)

Pre-Exercise Fueling (1-3 Hours Before)

The goal: top off glycogen stores, provide steady energy, avoid GI distress. Carbohydrate-dominant with moderate protein. Low fat and low fiber close to game time.

TIMING	WHAT TO EAT	PORTION GUIDE	EXAMPLES
3 hours before	Full meal: carbs + protein + small amount of fat	Plate-sized meal	Pasta with chicken and marinara; rice bowl with salmon and veggies; turkey sandwich + fruit
1-2 hours before	Lighter meal: mostly carbs + some protein	Snack to small meal	Oatmeal with banana; PB&J on white bread; yogurt parfait with granola

TIMING	WHAT TO EAT	PORTION GUIDE	EXAMPLES
30-60 min before	Simple carbs only — easy to digest	Small snack	Banana; applesauce pouch; few crackers; dried fruit; sports drink

During Exercise

DURATION	HYDRATION	FUEL	NOTES
Under 60 min	Water: 4-8 oz every 15-20 min	None needed	Water is sufficient for short, moderate activity
60-90 min	Water or diluted sports drink	Optional: 15-30g carbs (half a banana, few orange slices)	Important in heat or high-intensity sport
90+ min	Sports drink: 4-8 oz every 15-20 min	30-60g carbs per hour (sports drink covers this, or add a bar, gels, fruit)	Critical for endurance sports, tournaments with multiple games

IMPORTANT

Avoid energy drinks (Monster, Red Bull, Bang). These contain 150-300 mg caffeine — the AAP recommends adolescents consume no more than 100 mg/day. Energy drinks also contain stimulants and sugars that cause crashes. Stick to water and real sports drinks for hydration.

Post-Exercise Recovery (Within 30-60 Minutes)

The recovery window matters. Glycogen replenishment is 50% more efficient within the first 30 minutes after exercise. Protein synthesis peaks in the 2 hours post-exercise. Don't let them skip post-workout nutrition.

RECOVERY GOAL	WHAT TO EAT	EXAMPLES
Replenish glycogen	0.5-0.8 g carbs per kg body weight	Chocolate milk (top research-backed recovery drink); banana + granola bar; rice + chicken
Repair muscle	15-25g protein	Greek yogurt (18g per cup); 3 oz chicken (24g); chocolate milk (8g per cup); 2 eggs (12g)
Reduce inflammation	Omega-3 fats + antioxidants	Salmon; berries; tart cherry juice (research-backed for muscle recovery); nuts

RECOVERY GOAL	WHAT TO EAT	EXAMPLES
Rehydrate	16–24 oz fluid per pound lost during exercise	Water + electrolytes. Weigh before and after practice to estimate sweat loss.

Brain-Specific Nutrients for Active Adolescents

NUTRIENT	WHY ATHLETES NEED MORE	DAILY TARGET	TOP SOURCES
Iron	Lost in sweat and foot-strike hemolysis (running). Female athletes are at highest risk. Low iron = brain fog, fatigue, poor concentration.	Girls: 15 mg/day; Boys: 11 mg/day	Red meat, liver, lentils, fortified cereal, dark leafy greens
Calcium & Vitamin D	Peak bone building happens NOW. Low intake = stress fractures + long-term osteoporosis risk.	1,300 mg calcium; 600+ IU vitamin D	Dairy, fortified alternatives, sardines, broccoli. Vitamin D: sunlight + supplement.
Magnesium	Lost in sweat. Involved in 300+ enzymatic reactions. Low = cramps, poor sleep, impaired recovery.	360–410 mg/day	Pumpkin seeds, almonds, dark chocolate, spinach, avocado, bananas
DHA/Omega-3	Anti-inflammatory, neuroprotective. Reduces exercise-induced brain inflammation and supports concussion recovery.	250–500 mg DHA/day	Fatty fish 2–3x/week, fish oil supplement, algae DHA
Zinc	Lost in sweat. Critical for growth hormone production, immune function, and wound healing.	8–11 mg/day	Red meat, oysters, pumpkin seeds, chickpeas, yogurt
B Vitamins	Increased demand for energy metabolism. B12 and folate needed for red blood cell production.	Varied by B vitamin	Meat, eggs, dairy, legumes, whole grains, leafy greens

Red Flags: Signs of Under-Fueling (RED-S)

Relative Energy Deficiency in Sport — affects brain, bones, hormones, and immune function

- [ ] Missed or irregular periods in girls — Any loss of period in an active girl is a medical concern — not normal "athletic amenorrhea"

- [ ] Stress fractures or frequent injuries — Low energy availability weakens bones
- [ ] Declining academic performance — The brain is the first organ to suffer from chronic under-fueling
- [ ] Constant fatigue despite adequate sleep
- [ ] Frequent illness (more than 3-4 colds per year) — Under-fueling suppresses immune function
- [ ] Mood changes: irritability, anxiety, depression
- [ ] Restrictive eating patterns or food rules — "Clean eating" in teen athletes frequently masks disordered eating
- [ ] Growth plateau or delayed puberty in younger athletes

THE CHOCOLATE MILK SECRET

Low-fat chocolate milk is one of the most research-validated recovery beverages available. It delivers the ideal 3:1 carb-to-protein ratio, electrolytes, fluid, and calcium. Multiple studies show it performs as well as or better than commercial recovery drinks. Cost: about $0.50 per serving. Keep it stocked.

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