

## **Nutritional Impact on High School Athletes**

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### **Abstract**

Sports injuries are very prevalent in today's society. It is perplexing as to why so many student athletes experience an injury throughout their athletic career. A lot of that has to do with inadequate nutritional intake. While athletes in college or professional leagues get adequate information from nutritionists and dietitians, high school students do not receive the same information leading to inadequate nutritional intake and injuries. Many athletes miss the fact that daily functions revolve around three main things: macronutrients, hydration, and sleep. Macronutrients, coming from proteins, fats, and carbohydrates, are what allows the body to properly function and develop into a healthy body. Although macronutrients are a vital component, hydration from water and replenished electrolytes are also very crucial to an athlete's performance and well being. Sleep is another crucial component that is often overlooked and not taken into consideration. Sleep allows the body to rest, restore, and re-energize, and lots of student athletes miss the crucial amount of hours needed to do this. Athletes' bodies should be taken very seriously and should be treated well. High school athletes can be and will be better equipped and more successful once they receive the right information to help them.

### **Introduction**

It is not a secret that many student athletes experience some sort of injury throughout their athletic career, but would it not be so much easier if high school athletes were told information that could help prevent this? High school athletes lack the knowledge of what should and should not be put into their body. While college athletes and professionals have meal plans and access to nutritionists and dietitians, high schoolers eat almost whatever is put in front of them, good and bad. While adhering to high school athletes who have a distinct body algorithm, many go under intense physical work (training, academics, and competitions) which brings injury risk. One vital component that can help with injury prevention is adequate nutrition. Athletes that fall short on sufficient calorie intake or miss essential nutrients risk undergoing relative energy deficiency in sports (RED-S) or low energy availability (LEA), likely leading to stress fractures, delayed recovery, and hormonal disruptions (Springer, 2021). For example, "a 2024 study of Boston Marathon runners found that athletes with LEA had an increased relative risk of experiencing a

medical issue during the race. The risk was 1.99 times higher for an encounter of any severity and 2.86 times higher for a major medical encounter” (BMJ Journal, 2025). As a result, their dietary choices significantly influence future health outcomes and especially their athletic performance. Adequate nutrition can enhance performance, aid in injury prevention, and even contribute to academic achievements. This paper will explore how macronutrients, hydration, and other factors in the daily lives of high school athletes will allow students, families, and schools to more effectively support athletic progression.

## **A. Macronutrients**

Macronutrients are the essential nutrients that bodies require to function properly. The main three macronutrients are proteins, fats, and carbohydrates, which form the basis of an athlete's diet. Each plays a distinct role in providing energy for activity and aiding recovery. Proteins and carbohydrates have around 4kcal per gram while fats have about 9kcal per gram (Avita Health System 2019). One source claims that “current studies suggest that female athletes’ diets are often not optimal for the types and amounts of carbohydrates, fats and total energy intake” (Zielinski, 2020). This suggests that athletes who have diets might be missing essential nutrients or those who do not are continuing to miss the correct habits needed to sustain an athlete’s healthy body.

### **I. Protein**

Protein, a molecule consisting of about 20 different types of amino acids, is critical for muscle development and recovery, which is particularly significant for athletes following intense training sessions (BetterHealth, 2024). Studies suggest that athletes enhance their recovery by distributing protein consumption evenly throughout the day, targeting around 20–30 grams per meal based on their body weight (Springer, 2021). Protein is also crucial for enhancing performance and strength. According to an article, “The Impact Protein Has on Our Bodies”, adequate protein intake supports strength gains and enhances overall athletic performance (Bramlish 2024). Protein sources can come from both plants and animals. Foods like chicken, fish, eggs, and beans are excellent sources that can facilitate a faster recovery and muscle development. Several professional organizations have proposed equations to assist people in determining how much protein they need. Below is a culmination of these recommendations from these following organizations: US Recommended Dietary Allowance (RDA), The American College of Sports Medicine, the Academy of Nutrition and Dietetics, and the Dietitians of Canada recommend, International Society of Sports Nutrition (ISSN) (Table 1).

The equation for calculating protein intake is:

$$\text{Protein intake (g)} = \text{Body weight (kg)} \times \text{Protein intake factor}$$

Protein intake factors:

- Sedentary: 0.8 g/kg
- Active: 1.2-1.4 g/kg
- Highly active: 1.6-2.0 g/kg

Example: A 70 kg sedentary adult would need:

$$\text{Protein intake} = 70 \text{ kg} \times 0.8 \text{ g/kg} = 56 \text{ g}$$

**Note:**

- These are general guidelines, and individual needs may vary.
- Protein intake should be distributed throughout the day in meals and snacks.

**Table 1: Recommended protein intake in grams based on physical activity**

<b>Weight</b>	<b>Sedentary (g)</b>	<b>Active (g)</b>	<b>Highly Active (g)</b>
36 kg (~80 lb)	29	43-50	58-72
45 kg (~100 lb)	36	54-63	72-90
55 kg (~120 lb)	44	66-77	88-110
65 kg (~140 lb)	52	78-91	104-130
73 kg (~160 lb)	58	87-102	116-146
82 kg (~180 lb)	66	98-115	131-164

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91 kg (~200 lb)	73	109-127	145-182
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## II. Fats

Fats, which are often misunderstood, hold equal importance. Saturated and unsaturated fats are the two types of fats. The main difference is that unsaturated fats have at least one double bond between carbon atoms, making them less saturated with hydrogen, hence the name (health 2024). Unsaturated fats are often thought of as healthy fats, while saturated and trans fats are thought of as unhealthy and should be avoided. Healthy fats can be found in avocados, nuts, and olive oil and are vital for sustained energy and for the absorption of essential vitamins (Nutrients, 2021). These fats can also help reduce inflammation, assisting athletes in decreasing overuse injuries.

## III. Carbohydrates

Carbohydrates, or sugar molecules composed of carbon, hydrogen, and oxygen, serve as the main source of energy for the body (MedicalNewsToday 2024). Improper carbohydrate intake can lead to fatigue, reduced focus, or extended recovery times for athletes. Properly executed carbohydrate-loading can provide athletes with the stamina necessary for lengthy practices or competitions. Yet, this approach is most effective when tailored according to specific sports and activity intensity (PMC, 2025). Whole grains, fruits, and vegetables not only offer carbohydrates in their basic forms but also more complex forms such as fiber, which promotes digestion and overall well-being. In addition, these specific sources of carbohydrates also offer electrolytes and other micronutrients, such as vitamins.

Below is a general meal plan catering to high school athletes, including a specific amount of adequate calorie intake for females and males.

**Table 2: General Meal Plan**

Meal	Foods	Nutritional Factors
Breakfast	<ul style="list-style-type: none"><li>• 3 scrambled eggs with spinach and tomatoes</li><li>• 2 slices of whole grain toast with natural peanut butter</li><li>• 1 banana</li><li>• 1 glass low-fat milk</li></ul>	<p>~25–30 g protein Complex carbs for morning energy Healthy fats from peanut butter</p>
Snack	Greek yogurt (1 cup) with berries and granola	Protein + fiber to sustain energy



Lunch	<ul style="list-style-type: none"><li>• Grilled chicken breast (120 g)</li><li>• Brown rice (1 cup cooked)</li><li>• Roasted vegetables (broccoli, carrots, zucchini)</li><li>• Small avocado</li></ul>	Lean protein + complex carbs + unsaturated fats
Pre-Workout	Whole grain bagel with almond butter and honey <ul style="list-style-type: none"><li>• 500 mL water or sports drink (for electrolytes)</li></ul>	Quick energy + hydration support
Post-Workout	<ul style="list-style-type: none"><li>• Protein shake (25–30 g protein) with banana and milk</li></ul>	Rapid muscle repair and glycogen replenishment
Dinner	<ul style="list-style-type: none"><li>• Baked salmon (150 g)</li><li>• Quinoa (1 cup)</li><li>• Mixed green salad with olive oil dressing</li><li>• Steamed asparagus</li></ul>	Omega-3s for inflammation + recovery carbs

**Profile: Female**

- Age: 15–17 years
- Weight: ~60–65 kg (130–145 lb)
- Activity: Active–Highly active (1.4–1.8 g/kg protein)
- Total calories/day: ~2,400–2,700 kcal

**Profile: Male**

- Age: 16–18 years
- Weight: ~73–80 kg (160–175 lb)



- Activity: Highly active (1.6–2.0 g/kg protein)
- Total calories/day: ~3,000–3,400 kcal

## **B. Hydration and Electrolytes**

While the importance of hydration is often emphasized, electrolytes are equally crucial. This is because a person's volume status is regulated by the kidneys through water and electrolytes. The National Kidney Foundation reports that “severe dehydration can lead to kidney damage. So, it's important to drink enough when you work or exercise very hard, and especially in hot and humid weather” (National Kidney Foundation 2024). To maintain hydration and prevent severe dehydration, it is crucial to incorporate water and electrolytes into an athlete's day to day, especially when it can affect the kidneys. Electrolytes such as sodium, potassium, calcium, and magnesium are essential for regulating muscle contractions and recovery. A lack of these can lead athletes to experience cramping, fatigue, or even severe health complications (Nutrients, 2021). Just a few years ago, a “Duke sophomore Kelly Chen was flat on her back on the blue hard courts, suffering from severe, full-body cramps due to extreme dehydration and electrolyte imbalance” (USTA 2019). For general activities, water often suffices for hydration; however, during extended or strenuous activities, electrolyte supplementation via food, beverage, tablet, or powder can replenish what is lost through sweating. Athletes should proceed with caution though, as not all electrolyte supplementation is created equally. Many popular drinks, such as Gatorade and Powerade, have excessive amounts of sugar (advised that women do not consume more than 6 teaspoons a day and men do not consume more than 9 teaspoons a day) which can hinder recovery, but finding the ones with an appropriate amount will benefit one significantly (Medical Mutual 2025). The appropriate amount of intake and replenishment for athletes varies depending on the activity. For example, endurance athletes may need 30-60 grams per hour of exercise (Jeukendrup 2014).

## **C. Beyond Food: Sleep and Mental Health**

Nutrition influences more than just muscle fueling and injury prevention- it also affects sleep and mental health.

### **I. Sleep**

Sleep and nutrition have a bidirectional relationship. What and when you eat/drink can affect your sleep. It is warned by the National Sleep Foundation that “diets low in fiber and high in saturated fat may decrease the amount of deep, restorative sleep you'll get. Excess sugar can

cause you to awaken more frequently. Consuming certain foods and beverages close to bedtime can also lead to poor sleep” (National Sleep Foundation 2020). Sleep is also the period during which the body processes macronutrients and recuperates from physical exertion. Research suggests that high school students require approximately 8–10 hours of sleep, yet many students only average only 6–7 hours, adversely impacting both their athletic performance and academic focus (Sage Journals, 2005).

## II. Mental Health

Eating disorders pose another critical issue, particularly in sports where weight is emphasized, such as wrestling, gymnastics, or figure skating. Recent research indicates that athletes engaged in these sports experience higher incidences of disordered eating, which not only influences performance but also has lasting implications for their health (Whole Foods Nutrition PDF, 2021). Excessive stress or major depression disorder may result in disordered eating as well. For example, people suffering from these conditions may consume excess calories from unhealthy sources as a coping mechanism (i.e. stress eating).

## **Conclusion**

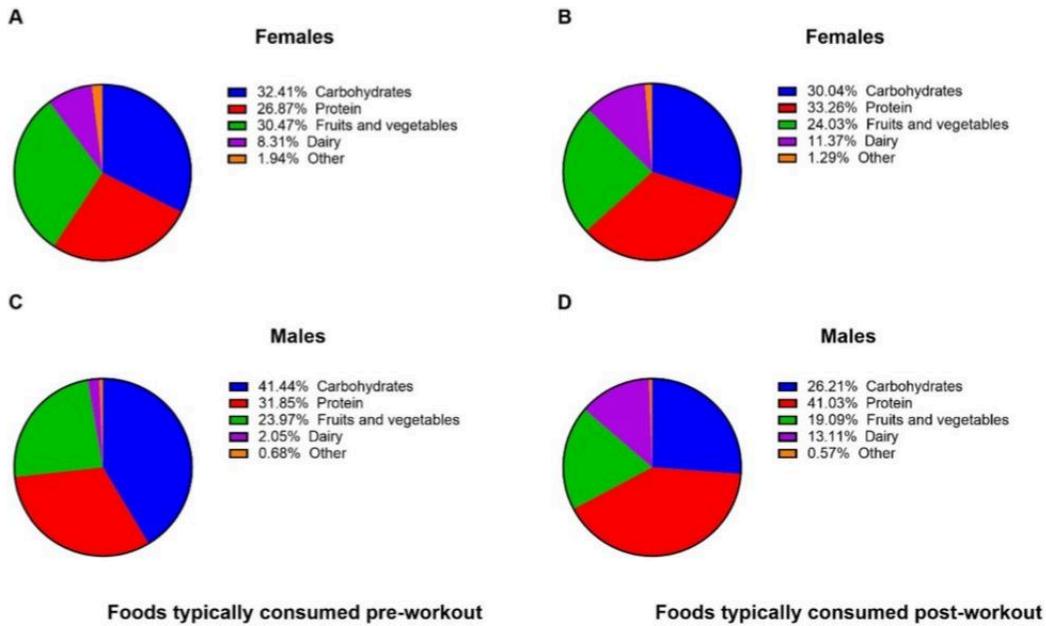
For high school athletes, nutrition surpasses solely being meals on their plates; it serves as the foundation for their performance, recovery, and overall health. Protein is essential for muscle growth and repair, carbohydrates are crucial for energy, fats contribute to long-term wellness, and hydration, along with electrolytes, is vital for maintaining physical activity. In addition to supporting training sessions, nutrition significantly contributes to injury prevention, mental well-being, and enhanced sleep quality. Planning ahead, resources such as nutrition tracking apps (like MyFitnessPal, Lifesum, etc) can aid students in keeping track of their food intake, hydration levels, and sleep patterns.

Current research appears overall unanimous in regards to the importance of nutrition in athletic performance and overall health. Future research regarding high school athletes who do or do not receive adequate nutritional education and their transition to college athletics is an area that should be explored, especially in sports injury rates. In addition, further investigation into how



puberty and social economic status may affect nutritional intake should be considered. Overall, athlete supporters, such as families and school administrations, play an enormous contribution by offering nutritious meal choices, educating about balanced eating, and discouraging the misuse of unhealthy options like energy drinks. Ultimately, the more athletes comprehend and implement effective nutrition practices, the better equipped they will be not only for high school sports but also for succeeding in college athletics and beyond.

## Appendix



**TABLE 2: Sample 1-Day Meal Plan for Injury Recovery**

Breakfast	Morning Snack	Lunch	Afternoon Snack	Dinner	Evening Snack
2 slices whole-wheat bread	1 large apple	Chicken wrap with whole-wheat tortilla and cheese	6 oz low-fat vanilla yogurt	1 cup cooked brown rice	8 large strawberries drizzled with 1 Tbsp chocolate syrup
1 banana	¼ cup almonds	1 fresh pear	¼ cup cranberries	6 oz grilled salmon	
2 Tbsp peanut butter	16 oz water	½ cup carrot sticks	¼ cup low-fat granola	1 cup broccoli sautéed in 1 tsp olive oil	
16 oz water		16 oz water	16 oz water	16 oz water	
			12 oz low-fat chocolate milk after workout		



**TABLE 1: Case Scenario—Estimated Energy and Macronutrient Needs for Injury Recovery**

Case: TK is a 20-year old, 5'10" tall, 150-lb (68 kg) male runner recovering from knee surgery

Resting energy expenditure: ~1,700 kcal/day (based on Mifflin–St. Jeor equation)

Total daily estimated energy: ~2,550 kcal/day using a currently “light” activity factor of 1.3 and a 20% increase above resting metabolism for surgery recovery

Protein: 1.5 to 2.0 g/kg body weight ~102 to 136 g/day (16% to 21% of kilocalories)

Carbohydrate: 5.0 g/kg body weight ~340 g/day (53% of kilocalories)

Fat: 73 to 88 g/day body weight (26% to 31% of kilocalories)

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