

Assessment of Fueling Needs and Health Status in Competitive Athletes

IRB #: 26-134

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Laboratory: Exercise and Performance Nutrition Laboratory, Lindenwood University

Study Overview

The purpose of this study is to learn more about how adult competitive athletes are fueling their bodies to support training, performance, recovery, and overall health. Athletes often have greater energy and nutrition needs than non-athletes because of the demands of regular training and competition. When these needs are not met, it may affect energy levels, recovery, performance, bone health, immune function, and the body's ability to adapt to training. More research is needed to better understand the relationship between nutrition, energy availability, health, and performance across a diverse range of competitive athletes.

This study includes assessments of dietary intake, energy expenditure, energy availability, nutrition knowledge, body composition, bone density, resting metabolism, strength, lower-body power, and aerobic fitness. Participants will also provide information about their training, sleep, recovery, and other factors related to athletic performance. These results will help researchers better understand the nutritional and physiological demands of competitive sport and identify opportunities to improve fueling strategies, nutrition education, recovery, performance, and long-term health in adult athletes.

Participation at a Glance

- Total Study Duration: 1 week
- Number of Visits: 2
- Time per Visit: 30-60 min each
- Participant Pre-Visit Requirements:
 - 8-hour food and fluid fast
 - Refrain from exercise for 24 hours
 - Wear athletic clothing (without hard metal/plastic components or reflective logos) and shoes

How to Get Started

1. Complete the [screening form](#).
2. Our team will review your info and contact you with eligibility.
3. If eligible, we will schedule Visit 1 (see next section for details).
4. Visit 1 includes: informed consent, intake paperwork (health history, study questionnaires), strength and power testing, and instructions for diet and activity tracking (if opted in to Tier 2/3)

Study Visits Outline

	Visit 1 (Day 0)	Visit 2 (Day 5-7)
Visit Length	60-120 mins	~30-60 mins
Consent	X	
Screening	X	
Height & Body Mass	X	X
Resting Heart Rate & Blood Pressure	X	X
Body Composition (DEXA)	X	
Body Water Scan	X	
Sport Nutrition Knowledge Questionnaire	X	
Urine Sample Collection	X	
Lower Body Strength/Power Tests	X	
Equip with HR/Activity Monitor (Tier 2 only*)	X	
Diet Log (Tier 2 only*)	5-day continuous log between visits	
Activity Log (Tier 2 only*)	5-day continuous log between visits	
VO2Max Aerobic Assessment (Tier 3 only*)		X
Discuss Individual Results		X

*Tier 2 and Tier 3 are opt-in options. It is entirely optional - if you opt-in to Tier 2 you will complete Tier 1 and activity and dietary tracking between Visit 1 and 2, if you opt-in to Tier 3 you will not only complete all of Tier 1 and Tier 2, but also a VO2Max Assessment.

Procedure Details

- **DEXA Scan** – A DEXA scan is a low-dose X-ray that measures bone, muscle, and body fat. Participants lie still on a padded table while a scanner passes over the body. The scanner does not touch the body, and the participant will not feel anything. The test takes about 7 minutes.
- **Body Water Assessment** – This test estimates body water levels using a safe, very small electrical signal. Electrodes are placed on the wrist and ankle after cleaning the skin with alcohol. Participants are asked to remain still during the measurement. Participants do not feel the signal. The test will take a total of about 5 minutes.
- **Sport Nutrition Knowledge Questionnaire (A-SNKQ)** – Participants will complete a 37-question online survey that asks about general and sport-specific nutrition topics. This assessment helps the research team understand how much athletes currently know about fueling, hydration, and basic nutrition. The questionnaire includes 37 multiple-choice and true/false questions and is completed through a secure online survey platform (Qualtrics).
- **Urine Sample Collection** – Participants will provide a urine sample during the visit for hydration status. Participants should hydrate well the day before their first visit but should still follow the food and fluid fast for the 8 hours before.
- **5-day Logs and Tracking (Tier 2)** – If a participant opts-in to Tier 2 or 3, they will complete a set of food logs and activity logs, during the same 5-days between visits.
 - **Diet/Food Log:** If a participant opts-in to Tier 2 or 3, participants will record everything they eat and drink each day using the ASA24 online nutrition tracking system. This includes meals, snacks, beverages, and portion sizes. The goal is to get an accurate picture of usual eating habits across the five days.

- **Activity Log:** If a participant opts in to Tier 2 or 3, they will also track their physical activity for the same five days. This includes the type of activity (such as school, sleep, cleaning, practice, gym workouts, running, etc.), a brief description when needed, and how long the activity lasted. These logs help researchers understand daily energy intake and energy use during training.
- **HR/Activity Monitor:** If a participant opts in to Tier 2 or 3, we will fit them for an HR/Activity monitor strap across their chest or with a wrist-based monitor (watch). This monitor will be worn during the same five days that participants will be completing the diet and activity logs for.
- **Lower Body Strength and Power Assessments** – This assessment is used to measure lower body strength and jump power.
 - **Countermovement Jumps:** Participants perform 5 vertical jumps on force plates after a warm-up. The goal is for the participant to jump as high as possible and to stick the landing.
 - **Isometric Mid-Thigh Pull:** Participants stand on force plates and pull upward on a fixed bar as hard as possible for about 5 seconds. This movement is similar to a deadlift without the bar moving. Participants will repeat this movement for a total of 3 attempts.
- **VO₂Max Aerobic Capacity (Tier 3):** This test measures aerobic fitness and how efficiently the body uses oxygen during exercise. Participants walk or run on a treadmill while wearing a mask that measures breathing, with heart rate monitored throughout. The test begins with a brief one-minute warm-up, and then the treadmill gradually increases speed and incline every 2 minutes until the participant reaches their maximum effort. This test is supervised by trained staff, and participants may stop at any time if they feel uncomfortable.
- **Tier 2 and 3 Description:** The food and activity log with use of the activity monitor (Tier 2) and VO₂max assessment (Tier 3) is optional. Participants have the option to opt-in to Tier 1, Tier 2, or Tier 3 during the consent process. It adds approximately 20-30 minutes to the Visit 2 testing visit duration.

Compensation & Benefits

- Total Compensation Amount: No compensation is provided
- Non-monetary Benefits:
 - Body Composition Results
 - Strength and Power Results
 - Personalized feedback on your energy intake and energy use (if opted into Tier 2)
 - VO₂Max (aerobic/endurance capacity) testing results (if opted into Tier 3)

Risks & Safety

- *Loss of Privacy and Confidentiality:* Although every reasonable effort will be made to protect your privacy, there is a small risk that identifiable information collected during this study could be inadvertently disclosed. Identifiable information may include demographic information (e.g., age, sex), contact information, and physiological testing results. To minimize this risk, each participant will be assigned a unique study identification number, and research data will be de-identified whenever possible. The master list linking participant identities to study identification numbers will be maintained separately from study data and will only be accessible to authorized members of the research team. Results from this study may be presented at scientific meetings or published in research journals; however, no information that could identify you will be included.
- *Radiation Exposure:* You will undergo one dual-energy X-ray absorptiometry (DEXA) scan to assess body composition and bone mineral density. This scan exposes you to a very small amount of ionizing radiation. The radiation dose is considered minimal and is comparable to the amount of natural background radiation an individual receives over approximately one day of normal living. Pregnant individuals are not eligible to participate because of this procedure.
- *Risk of Injury:* Some study procedures involve maximal or near-maximal exercise testing, including strength, power, and aerobic fitness assessments. As with any vigorous physical activity, there is a small risk of muscle soreness, fatigue, dizziness, strains, sprains, or other minor musculoskeletal injuries. These risks are minimized because testing is supervised by trained research personnel, participants are screened for eligibility prior to participation, and all testing procedures are commonly performed in sports performance and exercise physiology laboratories.
- *Risk of Discomfort:* You may experience temporary discomfort from wearing a heart rate monitor or activity monitor during exercise and daily activities. Some individuals may experience mild skin irritation from the monitor or adhesive electrodes. Participants will also be asked to complete dietary records and questionnaires related to nutrition, body composition, and training. Some individuals may experience temporary discomfort or self-consciousness while answering these questions or reviewing their results. You may decline to answer any question or discontinue participation at any time without penalty.

Frequently Asked Questions (FAQs)

Q: Will I receive my test results?

A: Yes. You will be provided with a summary of your results for body composition, dietary intake and energy expenditure (how many calories you expend and consume), strength and power assessments, and maximal aerobic/endurance capacity (if you opted into Tier 3 testing which includes the Treadmill VO₂max assessment) at the end of your participation.

Q: What are the different study participation options?

A: The study offers three participation options. **Tier 1** includes one study visit. **Tier 2** includes two visits and adds five days of activity, heart rate, training, and dietary tracking. **Tier 3** includes two visits and all study procedures, including a VO₂max test. You can choose the tier that best fits your interests and availability.

Q: Will I need to fast before my study visit?

A: Yes. Participants will be asked to fast overnight and avoid exercise for 24 hours before Visit 1. Additional fasting and exercise instructions will depend on the tier you choose. Tier 3 participants will also need to follow these requirements before Visit 2.

Q: What is energy availability, and why is it being studied?

A: Energy availability describes how much dietary energy remains for your body's normal functions after accounting for the energy used during exercise. This study will help researchers better understand how energy availability relates to nutrition, body composition, metabolism, training, and athletic performance.

Q: Can I withdraw from the study at any time?

A: It is always your choice to participate in this study. You may withdraw at any time. You may choose not to answer any questions or perform tasks that make you uncomfortable. If you decide to withdraw, you will not receive any penalty or loss of benefits. If you would like to withdraw from a study, you can contact the research team at epnl@lindenwood.edu or (636) 949-4676; the Principal Investigator, Chad Kerksick, PhD directly at (636) 627-4629 or ckerkick@lindenwood.edu. You may also contact the laboratory coordinator, Anthony Hagele at (636) 949-4785 or ahagele@lindenwood.edu.

Q: Will my information be kept private?

A: We will do everything we can to protect your privacy. We do not intend to include information that could identify you in any publication or presentation. Any information we collect will be stored by the researcher in a secure location. The only people who will be able to see your data are: members of the research team, qualified staff of Lindenwood University, representatives of state or federal agencies.

Q: What if I miss a visit?

A: Contact the research team as soon as possible. We will attempt to reschedule within the study timeframe, when possible.

Q: Do I have to be an athlete or highly trained?

A: You do not need to be an elite or highly trained athlete to participate. You must currently participate in structured sport-specific training, practice, or competition and either be part of a sanctioned collegiate, club, amateur, or semi-professional team or regularly

compete in organized sporting competitions. You must also have participated in at least three organized competitions within the past 12 months, unless you are currently rostered on a sanctioned competitive team.

Q: Can I bring a friend or family member to visits?

A: Yes, you are welcome to bring a friend or family member to your visits. They will not take part in the study procedures, but they are welcome to wait in the designated areas during your appointment.

Location

Lindenwood University
Exercise and Performance Nutrition Laboratory (EPNL)
Fieldhouse, Rm 126
209 S Kingshighway St., Saint Charles, MO 63301

