



PROVIDER GUIDE

Relative Energy Deficiency in Sport (RED-S)

*RED-S, formerly known as the Female Athlete Triad is a **broader concept** that includes either sex of patients and recognizes the impact of low energy availability on other health and performance factors. The update to RED-S captures the **complexity** of the syndrome and the **applicability to both sexes of patient**.*

Female Athlete Triad characterizes the interrelationship between:

- Low Energy Availability with or without eating disorders
- Menstrual Status
- Bone Health

RED-S goes **beyond the Female Athlete Triad** as a broader concept that **focuses on energy availability** in a patient. Energy availability is defined as **dietary energy intake minus exercise energy expenditure**. It refers to the amount of energy available to support metabolic process and daily living activities after account for energy expended during exercise. Moving towards the broader approach of RED-S allows providers to reference RED-S in a way that does not simply refer to disordered eating, such as instances of **excessive exercise** (extreme energy expenditure) and captures diagnoses for any patient. RED-S awareness in military providers is important as it **affects performance and readiness in service members**.

PHYSIOLOGICAL IMPACTS OF RED-S

Low energy availability causes body systems to make adjustments to reduce energy expenditure. This leads to disruptions that can impact the body in the following ways:

- Decreased endurance performance
- Increased injury risk
- Decreased training response
- Impaired judgement
- Decreased coordination
- Decreased concentration
- Irritability
- Depression
- Decreased glycogen stores
- Decreased muscle strength

POPULATIONS AT RISK FOR RED-S

Females are at greater risk for RED-S, as are **military members with physical appearance expectations** and weight requirements. Athletes in sports that place emphasis on weight, such as dancers, rowers, and gymnasts, also undergo additional risk. **Military personnel with high levels of activity are at risk of RED-S**, even when attempting to eat appropriately, due to intense training. A 2019 study of Special Forces during Mountain Warfare and Cold Weather Operation trainings found that a **significant portion of service members had energy deficiencies** due to high energy expenditures, and a 2018 study of Basic Training showed **consistently inadequate energy intake** compared to energy expenditure.

STOPLIGHT RISK APPROACH TO RED-S

Service member **clearance for activities with high energy expenditures**, such as physical training or drills, can be based on a **stoplight approach** to RED-S.

High Risk – “Red Light” | No clearance for high energy expenditure activities.

Service members in this category have no clearance for participation in high energy expenditure activities due to severity of their clinical presentation. Patients with anorexia nervosa, other serious eating disorders, and other medical conditions related to low energy availability fall into this category.

Moderate Risk – “Yellow Light” | Cleared for participation in high energy expenditure activities only with supervised participation and a medical treatment plan.

Patients in this category may have abnormal menstrual cycles, abnormal hormonal profiles, or decreased bone density. Decisions to allow service members in yellow-light categories to return to full-duty must factor in health status, participation risk (such as a weight sensitive sport), mental readiness, the patient’s access to external support, and compliance with a treatment plan. Moderate risk service members should be under close supervision with regular re-evaluation of the risk assessment for participation in sports to track compliance with treatment plans and changes in clinical status.

Low Risk – “Green Light” | Cleared for full participation in high energy expenditure activities.

Service members in this category are cleared for full participation as they have healthy eating habits and normal energy availability.

RED-S TREATMENT

Patients in yellow- or red-light RED-S categories require **treatment plans from a multi-disciplinary team** of clinicians that specialize in sports medicine, diet, exercise physiology, and mental health. The goal of treatment plans is to **increase energy intake** while **decreasing energy output**. Service members must feel comfortable seeking care **without concerns of confidentiality** or being discharged.

Providers can use the RED-S framework to **communicate the importance of healthy eating and exercise to military members** so they can be in the green-light category, indicating peak mission readiness.

For more information, read the International Olympic Committee’s paper on RED-S [here](#).

Disclaimer: The above link is provided as a matter of common interest and is not an endorsement by the US Navy.