



nutrition

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# Energy Availability & Relative Energy Deficiency in Sport

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Member

*Virgin* active

## **What is Energy Availability (EA)?**

EA is 'the amount of dietary energy available to sustain physiological function after subtracting the energetic cost of exercise'.

Or, put more simply, the amount of energy available to sustain all bodily functions outside of exercise.

### **EA Thresholds**

There are thresholds of EA, which relate to a certain level of energy intake, below which normal bodily functions such as hormonal balance, are impacted.

Calculating EA and EA thresholds is complicated, so we won't go into that. But it is important to know what the implications of low energy availability are, which we will discuss below.

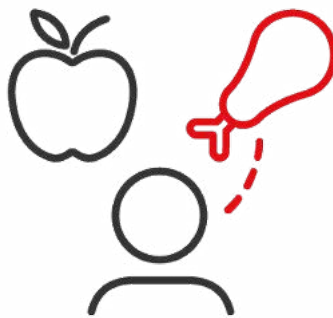
### **When Does Low Energy Availability (LEA) Occur?**

LEA occurs when an individual increases their physical activity levels, decreases their energy intake or a combination of both. This could be due to one or some of the following reasons;





- Poor education and knowledge of nutrition
  - If individuals do not have knowledge of how to eat a balanced, healthy diet, they may inadvertently be under nourishing themselves
  - Nutrition knowledge is more than knowing how to maintain a healthy weight. Individuals can be a healthy weight and consume adequate Calories but may not have a balanced diet, which can cause deficiencies
  - Some individuals may not understand that if they are very physically active, they need to consume more Calories to meet their energy needs, this lack of understanding commonly leads to undernutrition
  - There are a variety of diets advertised in popular culture that claim to be beneficial for health. But if they are followed without the correct level of understanding, they can lead to undernutrition



- Intentional dietary choices
  - An individual may restrict their diet or increase physical activity levels without altering food intake, to promote an energy deficit with the aim of losing weight. In extreme and/or chronic instances this can lead to undernutrition
  - Some individuals who follow a specific diet for health, cultural or ethical reasons may not consume all the nutrients they require. For example, if a vegan diet is not followed correctly, an individual may not consume enough micronutrients such as calcium or iron





- Lack of social support and time
  - Some individuals may have a lack of time to follow a healthy and balanced diet or eat regular meals. For example;
    - Individuals working long hours or shift work
    - Individuals with caring responsibilities may ensure their children, family or dependents eat but do not prioritise themselves



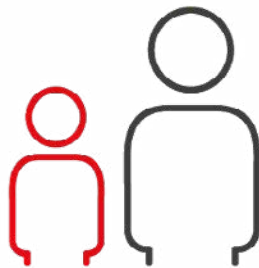
- Health issues that cause reduced appetite or food intake. For example;
  - IBS, IBD, Addison's Disease, COPD, diabetes, liver or kidney disease, thyroid dysfunction, stress, anxiety, depression and eating disorders





- Economic status

- Food poverty is defined as individuals not having enough money or accessibility to buy enough nutritious food
- Individuals in food poverty may only be able to afford the cheapest food which is lacking in nutrients
- Food deserts are areas with a population between 5,000 and 15,000 with access to two or fewer large supermarkets; there may be smaller convenience stores, but these have fewer fresh products and are more expensive



- Age

- Unintentional weight loss often occurs in the elderly population, as there is a higher prevalence of conditions such as IBS, COPD, liver and kidney disease
- Physiological changes to various systems and lifestyle factors can contribute to undernutrition in elderly individuals



## The Effects of Low Energy Availability (LEA)

A low EA should only be maintained short-term (if there is a weight loss aim), as long-term maintenance can cause serious health consequences.

A very low EA causes severe health problems such as hormonal, metabolic and physiological dysregulation after only 5 days, so should not be imposed.

'Low energy availability' may be used interchangeably with 'chronic energy deficit'.

### Energy deficiency

An individual with LEA is energy deficient, so cells are broken down in the body in order to gain energy which can be used to maintain bodily functions.

However, the breakdown of these cells has detrimental long-term consequences on the body.

**So, what are these consequences?**



## Consequences of LEA and Energy Deficiency

- Various hormones and bodily processes are reduced;
- Leptin (the satiety hormone)
- Thyroid hormones
- Growth hormone
- Oestrogen (in females)
- Testosterone (in males)
- Insulin and blood glucose levels
- Protein synthesis and therefore muscle mass
- Red and white blood cell production
- (Cortisol increases)

## The risk of various conditions increases;

- Osteoporosis
- Bone fractures and stress fractures
- Infertility
- Anaemia
- Regular illness and infection
- Micronutrient deficiencies
- Mental health issues
- Heart arrhythmias
- IBS and other gastrointestinal issues



## Athletes

LEA often occurs in athletes; if they increase their training load without altering their diet to match the increased energy expenditure.

This is known as Relative Energy Deficiency in Sport (RED-S).

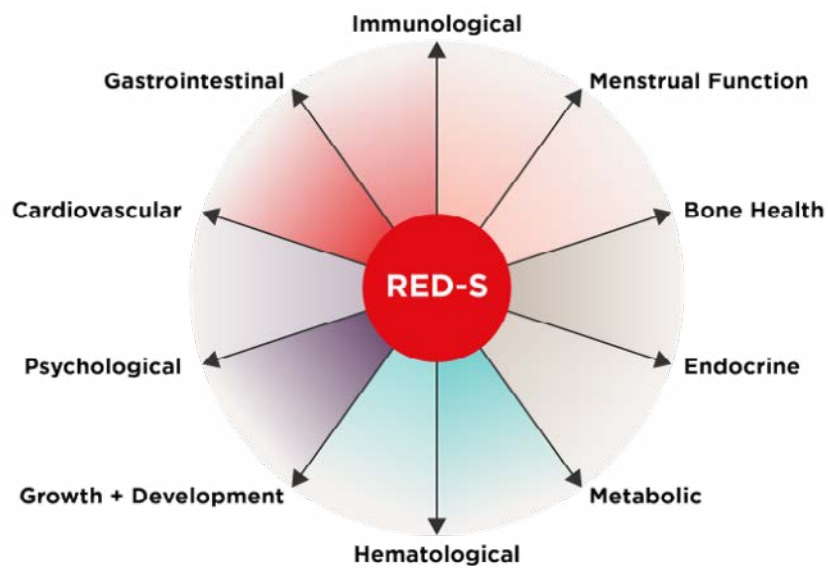




## Relative Energy Deficiency in Sport (RED-S)

RED-S occurs when athletes have a high energy expenditure due to their training loads and do not fuel their body adequately to balance their energy input and output, which leads to LEA.

RED-S can affect females and males equally and can negatively affect multiple physiological processes, as shown below.

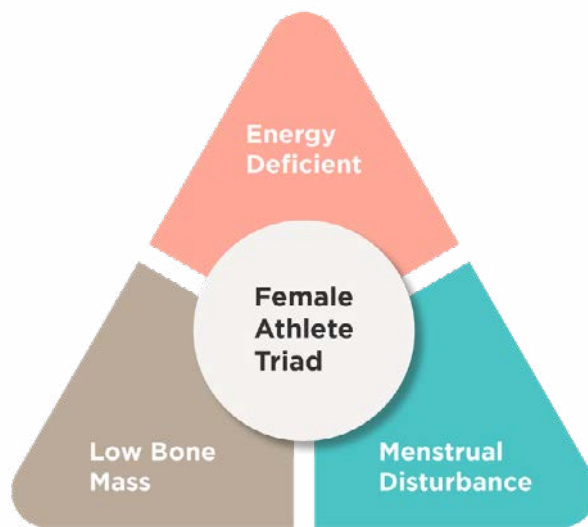


## Female athlete triad

Female athletes with insufficient nutritional intakes can acquire the female athlete triad: an interrelationship between LEA, menstrual dysfunction and decreased bone mineral density.

RED-S is now more commonly referred to compared to the female athlete triad, but historically they were used interchangeably.

If you have menstrual disturbance (e.g., irregular or missed periods) and/or are experiencing any bone injuries, please speak to your GP.



If you are concerned about any of the above information or conditions, speak to your Nutrition Coach who may make a referral to a Virgin Active nutritionist if appropriate.

