

RELATIVE ENERGY DEFICIENCY IN SPORT (RED-S)

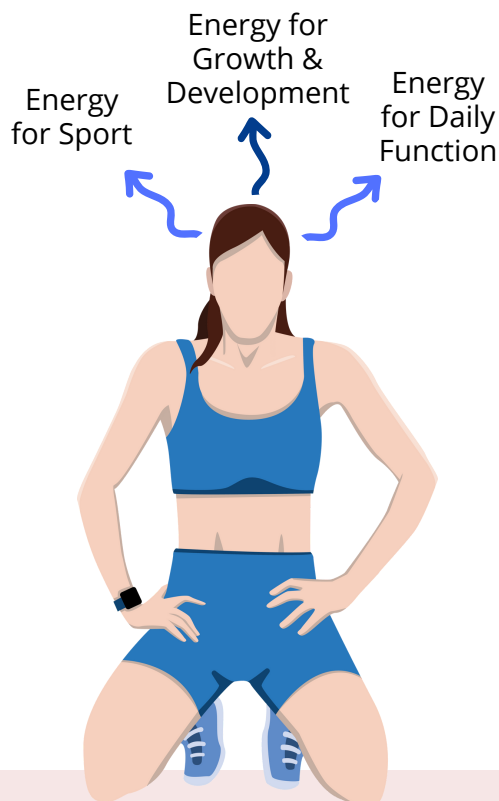
What is Relative Energy Deficiency in Sport (RED-S)?

Relative energy deficiency in sport (RED-S) is a syndrome in which an athlete experiences a decline in general health and sports performance due to inadequate fueling for the energy demands of their daily life and physical activity. RED-S has numerous health and performance impacts which stem from the athlete being in a state of low energy availability (LEA). When in LEA, an athlete uses more energy than they consume causing impairment in body systems in order to conserve energy or function improperly due to a lack of key nutrients (Montjoy 2018).

RED-S can occur when an athlete fuels inadequately for the energy demands of life and sport.



Youth female athletes require energy for multiple aspects of health and sport performance.



RED-S can be common in athletes due to elevated energy demands from sport. Athletes in middle school and high school can be at additional risk due to the energy requirements needed during this time for growth and development (Desbrow 2019). Athletes in certain sports can be at an elevated risk of RED-S due to false perceptions of weight loss as necessary for sport performance, beliefs of how the athlete should look for their sport or weight classification requirements to compete. Sports with an elevated risk of RED-S include, but are not limited to, distance running, distance cycling, rowing, gymnastics, figure skating, dance and wrestling.

It is important to point out that an energy deficit in athletes (subsequently leading to RED-S) can be caused by numerous factors. Many individuals may be led to believe that energy deficits only impact those with a clinical eating disorder - this is not true. While having an eating disorder will often lead to an energy deficit, athletes may also be in an energy deficit due to lack of access to the foods needed to fuel for their sport, lack of knowledge on how to fuel for their sport, poor guidance from an external source on fueling for sport or an underlying health condition that impacts energy balance.

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What is the connection between missing periods and RED-S?

When female athletes enter a state of energy deficit, certain body systems can become dysregulated. It is important to point out that our body does not know the difference between being in a food scarcity situation versus poor fueling for sport. Because of this the body will react by diverting energy away from certain organ systems to conserve energy for more critical organs such as the brain and heart.

Typically, one of the first body systems to show impaired function is the reproductive system. If your body has perceived you are in a food scarcity situation, reproduction becomes a minimal concern. Hence, energy that would generally be used to keep the reproductive system appropriately functioning is diverted elsewhere. This generally presents as the loss or irregularity of a female athlete's period.

At first glance, some female athletes may think this sounds great. No period means a lot less hassle right? The reality is that our period plays a significant role in the health of numerous other body systems and can also be one of the first indicators of RED-S (which can then lead to future health consequences).

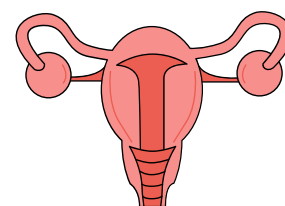
When we have regular periods, this usually means the hormones estrogen and progesterone are cycling normally in our bodies. Estrogen is a key hormone for promoting bone health. If a female athlete stops having her period, these two hormones are no longer released in regular amounts, and bone health is impaired. Overtime, this causes the density of the bones to decrease which increases risk of stress fractures and osteoporosis (Dave 2022).

Loss or irregularity of one's period is actually a common sign of RED-S, and generally, one of the first signs an athlete may notice. If you lose your period or experience irregular cycles, this may mean you are in an energy deficit and beginning to experience some of the first symptoms of RED-S. Catching RED-S at this stage and stopping it before it progresses to more critical health issues is essential.

The connection between poor energy intake, menstruation and bone health



Poor energy intake (not eating enough for energy demands)



Loss of menstrual cycle



Decreased bone density & increased risk of bone injury

What are signs and symptoms of RED-S?

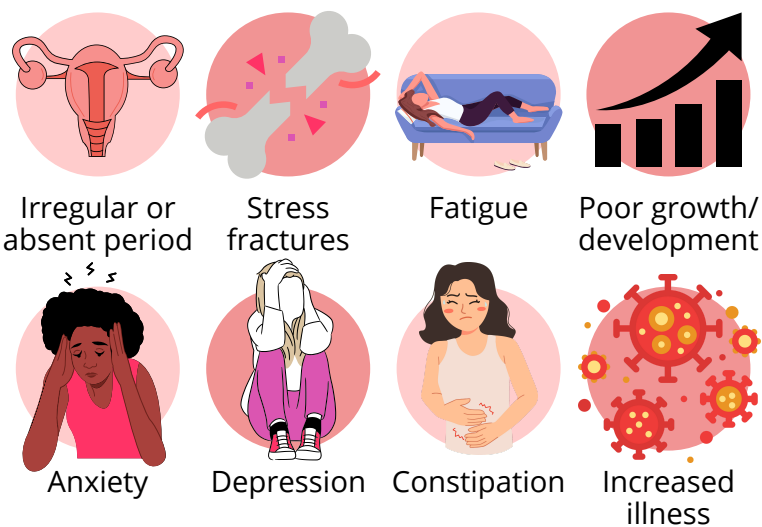
RED-S has both general health and sport performance consequences. Some of these outcomes are reversible upon restoration of energy balance whereas others are not (Montjoy 2018).

RED-S can impact the following aspects of health:

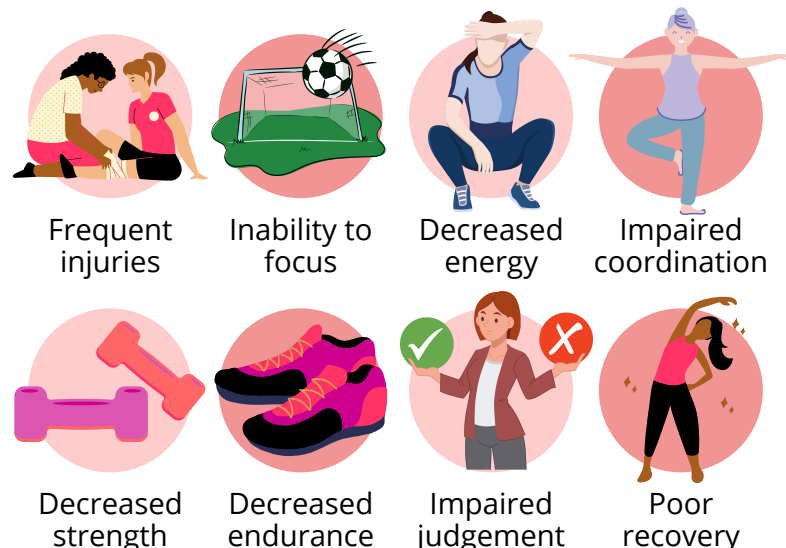
- Menstrual function
- Bone health
- Endocrine function
- Metabolic function
- Hematological (blood) health
- Growth and development (especially for younger athletes)
- Psychological health
- Cardiovascular function
- Gastrointestinal function
- Immune system function

RED-S can impair sport performance in the following ways:

- Decreased endurance
- Increased injury risk
- Decreased training response
- Impaired judgment
- Decreased coordination
- Decreased concentration
- Irritability
- Depression
- Decreased glycogen (energy) stores
- Decreased muscle strength



Health outcomes associated with RED-S



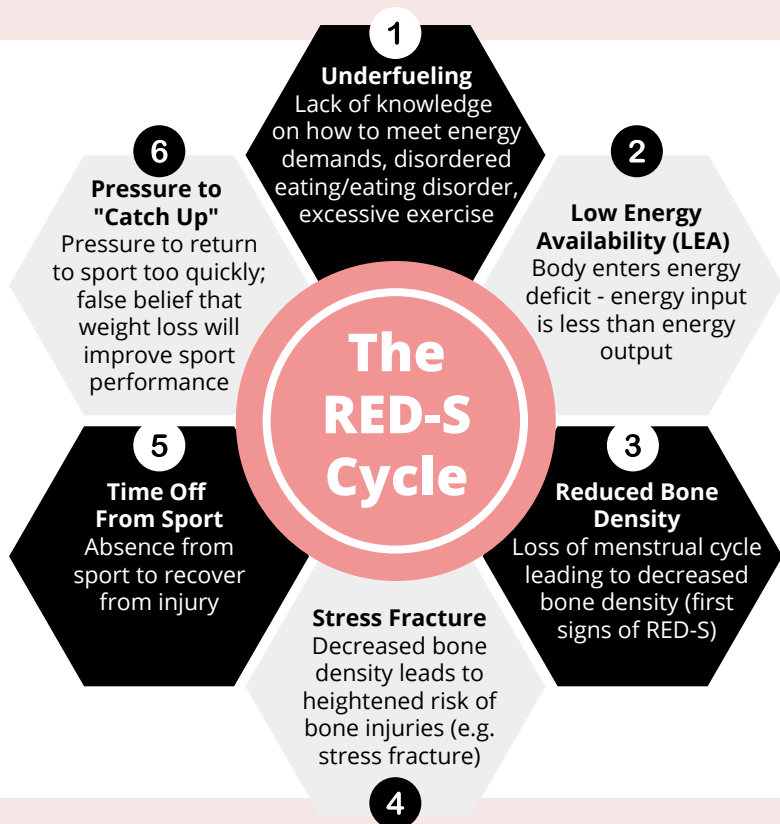
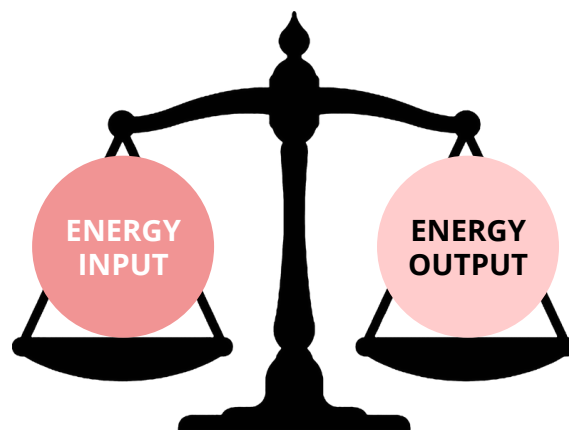
Athletic impacts associated with RED-S

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How do you treat RED-S?

Treatment of RED-S involves addressing the root issue - energy deficiency. When thinking of energy deficiency there are two factors to consider: energy input and energy output. Energy input can be increased by eating enough to fuel energy demands and engaging in more consistent fueling habits. If nutrition habits are not enough to address energy deficiency (e.g. an athlete works on improved nutrition but is still not having their period), energy output can be decreased by reducing physical activity and/or prioritizing rest. RED-S is caused because of an energy imbalance, and in order to appropriately treat RED-S, this energy imbalance must be addressed directly through nutrition and exercise habits.

Management of RED-S involves consideration of energy input (how much/what we eat) and energy output (the energy we burn for daily function, growth/development and sport)



It is important to note that individuals lacking medical background specifically on RED-S may recommend an athlete use birth control in order to regulate their menstrual cycles. This is NOT an appropriate way to treat RED-S. Birth control produces a synthetic period without addressing underlying energy imbalance issues. In effect, birth control induces a period but does not address energy imbalance issues which may lead the athlete to believe their problem with RED-S is solved when it is really not. Because energy imbalance is not addressed with birth control, the athlete may still experience negative health and sport performance issues despite having a birth control-induced period (Robertson 2018).

Overall, RED-S is treated by addressing energy deficit issues. If you are struggling with RED-S, reach out to a healthcare provider who is knowledgeable about RED-S in order to get connected with the appropriate resources.

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Citations

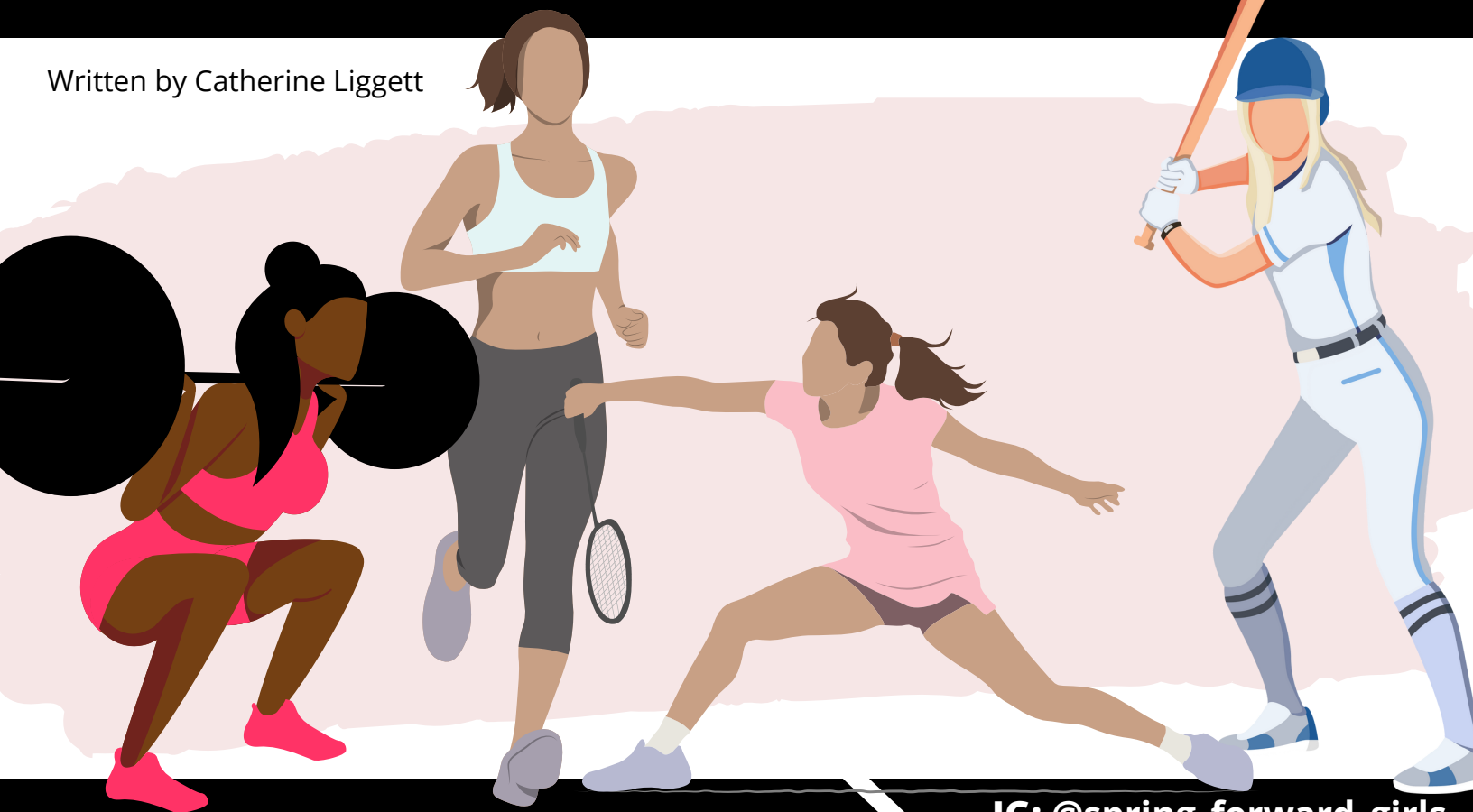
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