

The development of healthy performance athletes – avoiding the pitfalls of over-training and under fueling.

Introduction

This article outlines the issues of Relative Energy Deficiency in Sports (RED-S) and relates this to the successful use of the Long-Term Athlete Development (LTAD) model. It is intended as a guide for parents, athletes and coaches, with links to further reading provided in the footnotes, and recommendations if you feel you, your child, an athlete you work with, or someone you know may have RED-S.

Year after year in New Zealand we see talented youngsters at events like the Colgate Games and the New Zealand Secondary Schools Championships, talent that is the envy of many countries in the world. Sadly, many of these talented youngsters are not even participating in the sport once they hit their late teens, let alone performing at a high level.

The reasons for losing talent within our sport are varied and complex, but one significant and preventable factor is Relative Energy Deficiency in Sports, or RED-S.

RED-S is defined as an athlete having insufficient energy intake relative to the amount of training being undertaken. More technically RED-S refers to impaired physiological functioning caused by relative energy deficiency and includes, but is not limited to, impairments of metabolic rate, menstrual function, bone health, immunity, protein synthesis and cardiovascular health. It can affect both males and females, however it is more prevalent in females, and female endurance athletes are the most susceptible.

There is no strong consensus on the prevalence of RED-S, but there are some alarming incidents rates where it has been scientifically monitored. For example, within the endurance sport community the risk of Low Energy Availability (a key contributor to RED-S) ranges between 70 and 100 per cent in women and girls. But most cases go unreported. We are still not fully aware of the prevalence and impact that RED-S has had within our sport. This is possibly due to RED-S being a 'blind spot' or taboo topic.

RED-S and Low Energy Availability;

Relative Energy Deficiency in Sport (RED-S) is a relatively common, but poorly recognised condition, that can have a significant impact on a young athlete's sporting career and health.

The term 'energy availability' refers to the energy available to an athlete once the energy expended through exercise is subtracted from their energy intake through diet. This energy is needed for body systems to function. RED-S is a broader term which includes additional symptoms such as disordered eating, menstrual abnormalities and issues with low bone density.

RED-S can affect athletes of any gender and across all sports. It is more common in sports in which a lean figure or low body weight is encouraged. Whilst it may be associated with or driven by eating disorders, it

may also be the result of an athlete struggling to meet the high energy demands of their sport, through lack of understanding and nutritional education and may be impacted by social factors or financial constraints.

Athletes with RED-S are at increased risk of hormonal dysfunction which can affect their periods (loss of or reduced periods), and delay puberty in adolescents. When a young woman presents with irregular periods (oligomenorrhea) or absent periods (amenorrhea) the diagnosis of RED-S should always be considered. Reduced testosterone levels in male athletes can also occur. There is a potential impact on fertility and bone health if low energy availability is prolonged. These athletes are at risk for stress fractures, more frequent overuse injuries and illnesses (especially respiratory tract and gastrointestinal illnesses), iron-deficiency, anemia and gastrointestinal effects including constipation. RED-S can also have significant psychological consequences and poor mental health may either precede or be a result of RED-S.

For many athletes, a diagnosis of a stress fracture, recurrent injury or illness or poor training and competition performance is the presenting feature indicating a potential energy deficit and should serve as a warning sign for coaches, parents and medical practitioners that further specialist input and investigation is warranted. Early diagnosis and treatment are also essential for preventing the long-term impacts to health and sporting performance.

It's OK to talk about

For coaches, talking about an athlete's menstruation cycle can be a challenge, and this can be especially true when it comes to male coaches. However, it is a challenge we need to collectively overcome – as a regular period is a cornerstone of women's health, and period abnormalities almost always point towards some underlying health issues.

“Women are not just smaller men”

When working with younger athletes, it can be a good idea to have an initial conversation with the athlete's parents to explain the broader concepts of Low Energy Availability (LEA) and RED-S, and ask them to help you keep an eye out for any warning signs (more on those warning signs later). But ultimately it is part of a coach's responsibility to ensure athletes avoid RED-S, so some skillful conversations need to be had. It can be a good idea to set the scene early with any new athletes you work with, explaining the dangers of RED-S, and letting them know that it is not a 'taboo' topic.

Most importantly remember women are not just smaller men, they need to fuel and train differently from men in order to reach peak performance.

The good news (LTAD)

Within our sport of athletics, all parties, (athletes, parents & coaches), are chasing the same goal – improvement. Nobody sets out with the intent to injure an athlete or stifle their development. RED-S and other related issues are the unintended consequences of chasing improvement. It's a simple idea, but one worth dwelling on. In our quest to get better, we can compromise our own health and wellbeing, while ultimately stifling improvement. So how best to avoid these unintended consequences?

As previously identified, one of the major risk factors for RED-S is focusing too intently on a small number of training strategies – especially an over-emphasis on endurance training. This can be avoided by employing a well-established training approach called Long Term Athlete Development, or LTAD.

LTAD is a physiological framework that helps to manage the focus, volume and type of training applied to athletes as they develop through adolescence into adulthood. Or in other words, it's a blueprint of training types that can help to guide athletes, parents and coaches to ensure they are taking a long term and holistic view to getting the best out of an athlete.

The exact mix of which training element you use for any particular athlete is a matter of discussion and debate amongst coaches, but what is beyond doubt is that there is a role within the training programme of every athlete to touch upon and develop each aspect – whether it is addressed via athletics training, or training in other sports.

“RED-S and other related issues are the unintended consequences of chasing improvement.”

Some benefits of all-around athletic development for runners include;

- Increased bone mass via strength and agility training, reducing the risk of stress fractures
- Decreased total running volume reducing risk of overuse injury
- More time spent on mobility, agility and technique likely to improve performance and reduce injury risk
- Open the possibility of other event groups where success could be found eg. Steeplechase, hurdling, etc.
- World class performers have well rounded athleticism.

Warning signs of RED-S

Some warning signs to be aware of include;

- Pre-occupied with food, weight and/or body
- Gastrointestinal problems
- Iron deficiencies
- Intolerance to cold
- Mood swings
- Fatigue
- Weight loss
- Difficulty concentrating
- Refuse to eat with teammates
- Frequent Injury
- Obsession with body image

An athlete may show signs of restrictive eating, but not meet the clinical criteria for an eating disorder. They may also display subtle menstrual disturbances, such as a change in menstrual cycle length, but not yet have developed complete amenorrhea. Likewise, an athlete's bone density may decrease, but may not yet have dropped below her age-matched normal range.

What to do if you need help;

For coaches - If you're confident, address the issue skillfully. If in doubt, you are welcome to seek support from Athletics NZ coaching via coaching@athletics.org.nz

For parents – talk with your child's coach (if they have one) and talk to your child's G.P. about a referral to a nutritionist.

[Healthline](tel:0800611116) - 0800 611 116, available 24/7

[EDANZ](tel:08002EDANZ) - 0800 2 EDANZ - Support for those with loved ones dealing with an eating disorder

If you suspect you are suffering from an eating disorder, contact your GP. They can refer you to one of the specialist services in your region. In an emergency, call 111.

Recommended reads / viewing;

Women are Not Small Men: a paradigm shift in the science of nutrition, Stacy Sims.

<https://www.youtube.com/watch?v=e5LYGzKUPIE>

A good introductory article on RED-S.

<https://www.axissportsmedicine.co.nz/blog/archive/an-intro-to-relative-energy-deficiency-in-sport-red-s/>

Sport NZ advice – a series of informative and educational videos.

<https://balanceisbetter.org.nz/development-and-performance/>

Selected references;

<https://www.axissportsmedicine.co.nz/blog/archive/an-intro-to-relative-energy-deficiency-in-sport-red-s/>

<https://www.rnz.co.nz/national/programmes/ninetoon/audio/2018654942/when-training-hard-damages-young-women-athletes>

<https://balanceisbetter.org.nz/>

