



THE FEMALE ATHLETE HEALTH REPORT

**PROJECT
RED—S**

KYNISKA 
ADVOCACY

769 UK athletes representing a wide range of abilities and activities took part in The Athlete Health Survey. This report summarises findings from the sample population and presents evidence-based recommendations for UK sports stakeholders.

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INTRODUCTION

The past three decades have seen a rise in female participation in exercise following increasing development of, and investment in, professional women's sport. However, it is well documented that the trend towards gender equality, from recreational to elite levels, has yet to impact performance-based research. Significant concern has been raised over the extrapolation of findings from male athlete data to their female counterparts without due consideration of the consequences.

Some of the most prevalent and potentially harmful ways in which female athlete health has been overlooked include the menstrual cycle and its four distinct phases; the effects of natural versus hormonal methods of contraception on athletic performance; and how nutrition, training and recovery methods can be tailored to help female athletes prevent injury, illness, and optimise performance.

As a consequence, female athletes are at greater risk of health conditions such as Relative Energy Deficiency in Sport (RED-S), which is caused by chronic underfueling (intentionally or otherwise) and presents serious and long-lasting consequences. While almost any athlete can experience RED-S, the lack of female-specific nutrition and training recommendations in sports settings presents a unique risk factor.

The Athlete Health Survey was developed and distributed by Pippa Woolven (founder of Project RED-S and former elite athlete), Kate Seary and Mhairi Maclennan (co-founders of Kyniska Advocacy and current elite athletes). Their athlete-led organisations advocate for progressive policies and safe, sustainable practices in sport. Support was received from Dr Rachel Langbein (Behavioural Scientist with a doctorate in RED-S) and Gemma Bridge (Public Health Scholar).

The following report uses findings to discuss specific areas of concern, highlight misinformation, and suggest how sports institutions and support staff may contribute to improved female athlete health and wellbeing in the UK.



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OVERVIEW

The 32-question survey comprised six sections covering: participant demographics; current athlete and coach understanding of female athlete health topics (including menstrual cycles and contraception); body image; eating behaviours; and incidence and impact of Relative Energy Deficiency in Sport (RED-S).

Demographics

The survey was open to athletes of any age, gender, activity level, ability, or location, yet the overwhelming majority of responses came from UK-based athletes, aged 18 or over, who were assigned the female sex at birth (769/988 respondents). The project team therefore decided to focus this report specifically on this demographic.

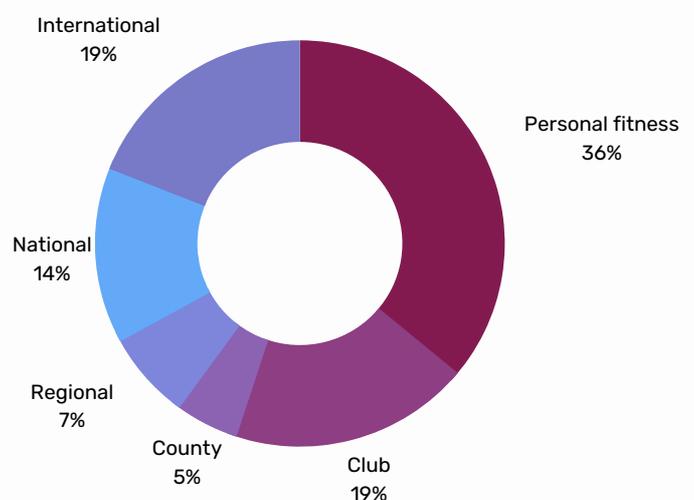
52% of the sample participants completed the survey in response to our social media campaign shared by the project team which advertised the aims and importance of the research. The remaining 47% responded purposively to the same survey on the paid online platform, [Prolific](#). The team used the paid online survey platform to diversify our respondents, and ensure we limited bias from our sample.

The mean age of participants was 32 years old and the majority (76%) were from England.

Of the 769 respondents, 36% participated in personal fitness, 19% represented a club in their chosen sport, 5% represented their county, 7% their region, 14% their nation and 19% competed at an international level.

While a wide range of sports and physical activities were represented, the majority were endurance activities (distance running, cycling, rowing), with a smaller proportion of team-based activities (hockey, rugby, netball), aesthetic sports (gymnastics, dance, ballet), and strength-based activities (gym workouts, cross-fit, weightlifting). Other activities included pilates, basketball, horse riding, golf and boxing.

Sporting Level of Competition



MENSTRUAL CYCLES

Female athletes and their coaches rated feeling informed about female athlete health 3/5 on average, with 1 being not at all informed, and 5 being very informed.

While the majority of respondents (43%) declared they had a regular natural menstrual cycle, 14% had an irregular natural menstrual cycle (oligomenorrhea) and 10% were missing their natural menstrual cycle altogether (amenorrhea). Such findings are concerning given the wide-ranging implications of menstrual dysfunction with regards to hormonal, bone, and overall health, alongside athletic performance. For example, low oestrogen levels among females with missing or irregular menstrual cycles has been associated with rapid losses in bone mass and strength, which may be irreversible and lead to serious health conditions such as osteoporosis in later life (Altayar et al., 2017).

Interestingly, while 28% athletes declared use of hormonal contraceptives (such as the Combined Oral Contraceptive Pill, the Mirena Coil and the Implant) and 8% used non-hormonal contraceptives (such as the Copper Coil, Condoms or the Withdrawal Method), some participants declared use of hormonal contraceptives while also having a natural, regular menstrual cycle, the two of which are mutually exclusive. This finding demonstrates a lack of understanding around the role of hormonal contraceptives - the purpose of which is typically to suppress the hormones within the natural ovarian cycle.

Alarming, misunderstanding of the female menstrual cycle appeared to extend to medical professionals.

30% of respondents having been told by a medical professional that it was normal to miss their period, or start it later, because of their activity level.

Common reasons for menstrual dysfunction can range from low energy availability (the cause of RED-S) to polycystic ovary syndrome (PCOS), an overactive thyroid, or heart disease. Yet, despite being an essential indicator of a female athlete's health status, many medical professionals appear not to be sufficiently informed about the potentially serious health implications of irregular/missed periods.

Qualitative questions revealed how some medical professionals even described menstrual dysfunction as a 'natural' consequence of exercise training.

36% of respondents declared that they knowingly ignored missed periods in the belief that this was normal for an active person, while 19% thought that missing period(s) might benefit their performance.

In combination, these findings inform our subsequent recommendation to increase education on the importance of menstrual cycles among female athletes, healthcare professionals, coaches, and wider sports support staff.

BODY IMAGE

Previous research has revealed how low body image can be a risk factor in the development of RED-S and eating disorders among athletes, particularly those participating in weight-sensitive sports (e.g. rowing, boxing), 'aesthetic' sports (e.g. dance, gymnastics), or endurance sports (e.g. running, rowing), where lower body weight is associated with performance gains. Such factors can contribute to the expectation that an athlete must look a particular way in order to succeed, or 'fit in', and can lead to harmful and misguided attempts to alter body composition.

In order to understand participants' body image in relation to their understanding of what an athlete 'should' look like, they were invited to respond to a number of statements asking to what extent they agreed or disagreed.

One example revealed 74% of respondents agreed that they had "felt as though [they] do not look like an athlete".



A further 43% agreed that they have had less enjoyment from exercise because they were worried about how they looked.

Similarly, we wanted to understand participants' eating behaviour in relation to their body image and any pressure they felt to look or behave a certain way.

50% agreed that they have consciously restricted their food intake in order to improve their performance, while 52% did so in order "to fit in or look the part in their sport".

91% agreed with the statement: "I have worried about how many calories I am eating", with 16% stating that these worries occurred "all the time".

These findings are particularly concerning given the high incidence of clinical and subclinical eating disorders among athletes and the terrifying mortality rates they present.

Although high-profile athletes frequently alert on the negative long-term health consequences of dietary or weight restrictions, it is evident that much more must be done to address how sporting organisations, coaches, and cultures shape aspiring athletes' health.

Such changes could include increasing research and understanding of female athletes' specific nutritional needs; awareness of the harmful effects of chronic low energy availability; promotion of positive role models; and challenging toxic training environments which encourage manipulation of body weight and/or shape among female athletes.

RELATIVE ENERGY DEFICIENCY IN SPORT

The term Relative Energy Deficiency in Sport (RED-S) was introduced by the International Olympic Committee in 2014 to update its precursory condition, The Female Athlete Triad (1992), which described a complex interplay between menstrual dysfunction, low energy availability (with or without an eating disorder), and decreased bone mineral density among female athletes. The new term, RED-S, reflected research revealing how low energy availability impacts all genders and those who don't necessarily define themselves as 'athletes' too. In addition, RED-S describes a far wider range of serious and systemic health and performance impacts, including: gastrointestinal, cardiovascular, immune, and cognitive dysfunction; compromised bone health; impaired training adaptation; and increased risk of injury or illness.

Despite advances in research and understanding of this complex condition, one enduring challenge concerns the subtle nature of the initial symptoms and lack of education and awareness among sports and medical communities. As a result, RED-S often goes unrecognised and untreated.

Our survey reflected these concerns with less than 50% of our sample population having heard of the term 'RED-S' before taking part in the survey. Given how treatment outcomes are significantly improved with early identification and treatment, this finding is concerning and highlights the urgent need for increased awareness and conversation regarding RED-S among exercising populations.

Alongside ascertaining athletes' awareness of RED-S, we were keen to discover how many displayed any number of its common symptoms.

51% of our sample had experienced at least two symptoms of RED-S; 37% experienced 3 or more symptoms; and 18% experienced 5 or more symptoms.

Considering the wide range of activities and abilities represented, such findings support recent data regarding the prevalence and consequences of RED-S across multiple sports (Logue et al., 2020).

In response to qualitative questions, athletes cited a lack of early insight into the dangers of RED-S as a common cause of their condition. "If more information had been available earlier, I may have been able to avoid a slow decline into the 'danger zone'."

Athletes also cited common falsehoods about the condition, such as, "I needed to know that you don't necessarily have to be under-eating to experience RED-S", while a number of others also highlighted the consequences a lack of understanding among healthcare professionals and coaches can have:

"My GP told me it was normal to miss my period. I had every RED-S symptom, but because none of them were 'that bad', my doctors and coach just let me carry on. I thought it was just part of being an athlete".

EDUCATION

Availability of educational resources about female athlete health is improving, but sport stakeholders too often provide or publish them without paying specific attention to *who* is receiving *what* education, *when*, and whether it is even effective at preventing female athlete health related illness/injury.

While we would expect that the more education and support an athlete receives regarding female athlete health and RED-S, the fewer RED-S symptoms they might present, our findings showed that this was not the case, with symptoms actually seeming to increase in line with the level of perceived support.

The data indicates that athletes may be receiving support for RED-S related issues too late, once they are *already* suffering from symptoms. This suggests that work is being done reactively, and on an athlete-by-athlete basis, rather than using a consistent, preventative strategy to educate all female athletes on such important matters.

Although it is positive that athletes appear to receive some support when they become unwell, we believe the focus should be on ensuring fewer athletes reach acute illness and injury in the first place.

The survey findings may also indicate that athletes who report having a good level of knowledge about female athlete health are misinformed and have been receiving incorrect or misleading education.

This misinformation may be a result of inconsistent and unstructured education.

49% of participants had received specific female athlete health support from the internet (31%) and/or social media (35%), compared with 16% from a General Practitioner, only 4% from a sports National Governing Body, and 0.12% from an educational institution.

With only 4% of participants receiving structured support from sports National Governing Bodies, it is clear that athletes are not finding the education they need through their sport, and are instead being forced to seek information elsewhere.

Although some useful resources do exist online, there is often no guarantee that the information is tailored to the needs of the athlete, or the sport in which they participate, potentially leading to a piecemeal education or misinformation.

A centralised, consistent education, suitable for individuals participating in different sports, delivered by healthcare professionals, would go some way to closing this knowledge gap and ensuring a consistent baseline of education for *all* athletes. Such education is crucial from the moment an athlete enters a sport if it is to be an effective tool for preventing illness and injury, and facilitating lifelong enjoyment and participation in sport.

COACH EDUCATION & COMMUNICATION

Our findings revealed that female athlete health education levels do not improve as athletes reach higher levels of competition, whether for themselves or for their coach.

Coaches are typically responsible for setting athletes' training loads, imparting their knowledge, and shaping the culture of a training group. It is, therefore, unsurprising that our data indicates that the better informed a coach is about female athlete health issues, the fewer RED-S symptoms athletes in their care experience.

An athlete who strongly agreed that their coach was well informed about female athlete health suffered an average of 3.2 RED-S symptoms, while an athlete who strongly disagreed that their coach was well informed suffered an average of 4.3. An athlete with an uninformed coach can, therefore, be expected to suffer 36% more RED-S symptoms.

However, it is not just coaches and athletes who should receive information regarding female athlete health and sensitive topics such as body image. Participants were also invited to indicate to what extent they agreed or disagreed with statements regarding comments about their body, received by anyone in a sporting context.

53% said they received comments about their body that made them feel uncomfortable in a sporting context. Worryingly, those who had received a comment about their body shape or weight were over four times as likely to have changed their eating behaviour in order to 'fit in' (7% vs. 33%).

Similarly, these athletes were four times as likely (6% vs. 28%) to have changed their eating habits in order to improve performance. Further data shows a strong correlation between athletes who have restricted their food in an effort to improve their performance and the number of RED-S symptoms they experience(d).

Given the concerning and potentially life-long consequences of RED-S and/or any degree of disordered eating among athletes, the language used to set the culture within sport settings is an area of key concern and importance.

53% of athletes have received comments about their body that made them feel uncomfortable



Athletes who received comments were 4x more likely to restrict their food intake to 'fit in' and 'improve performance'



Athletes who restrict their food intake to improve performance suffer from 34% more RED-S symptoms

ATHLETE ASKS

To be truly change-driven in sport, it is essential to listen to those who participate in it. The athletes in our survey highlight the crucial need for support and education to reduce female athlete health issues. But what, specifically, do athletes want to learn?

It is clear from our findings that athletes want robust support and education around all aspects of female athlete health, and that this support should be holistic and multifaceted.

Our respondents specifically stated the need for better education around female anatomy and physiology, including the pelvic floor, musculoskeletal system, development of strength and injury prevention. They wished for more education on the menstrual cycle, including the four phases, common impacts women experience, and how to adjust training and nutrition to mitigate symptoms and better support their training.

In their qualitative answers, respondents also emphasised the need for specific emotional and psychological support for their mental health, RED-S, and more generally for educators and sports support staff to take a more holistic approach in recognising that those participating in sport at any level are not just medal-winning machines, but humans first and foremost.

Further calls for education surrounded a general understanding of female athlete health issues and RED-S from GPs, coaches, personal trainers, gym staff and teachers. Coaches seem to want this too, with one coach summarising, “I would like support in how to handle athletes with symptoms [of RED-S] and to learn how to support them better”. Respondents also cited a need for return-to-sport guidance for pregnancy, menopause, perimenopause and RED-S.

To help sports organisations and staff interpret and implement these asks, we also asked participants *how* they would like to receive support and education.

56% said they would use a website with resources and advice; 35% said they would like to see more information on social media; 34% would like online workshops and courses, while 27% would prefer in-person workshops. 30% said mentoring would be a useful way to receive information; 30% said via podcasts; and 17% would prefer to use support groups.

What has been made clear is that athletes' voices are powerful and could be instrumental in initiating change. Athletes can use their platforms to share information on social media, speak with journalists and politicians, provide peer support, serve as positive role models, hold national governing bodies to account, and set up advisory boards.

RECOMMENDATIONS

01 Coach Education

Mandatory, centralised, and comprehensive female athlete health education to be embedded within all coaching qualifications, at all levels.

Why? Because athletes with uninformed coaches suffered 36% more RED-S symptoms.

02 Athlete Support Network

Creation of an athlete-led female health, body image, eating disorder and RED-S support network.

Why? Because 61% of athletes want more athlete health workshops & 30% stated mentoring as a useful way to receive information.

03 Female Athlete Toolkit

Widespread distribution of an online female athlete health toolkit for athletes and parents to be used from an athlete's first entry into sport.

Why? Because only 4% of athletes received any type of support from their sporting NGB and 56% said they would use a website with resources and advice.

04 GP Education

Creation of a resource for GPs to better understand specific female athlete health concerns, including RED-S.

Why? Because 30% of respondents had been told by a medical professional that it was normal to miss their period, or start it later, because of their activity level.

THE ATHLETE VOICE

We are grateful to the athletes for sharing their experiences with us. Here are some of their thoughts.

“When I was deep in anorexia, someone actually said to me ‘you’re looking like a real runner these days’. I was so unwell and so underweight, yet someone felt the need to make that comment.”

“I think feeling fatigued is very normalised whilst training hard, especially at a competitive level in running. Almost to the point of being applauded for showing commitment or ‘grinding’.”

“Deeply ingrained beliefs about body shape and performance have left me with severe body image issues and exercise compensation issues. We must do better for our next generation.”

“I recovered from RED-S and have had a regular period for around three years now. I would have really benefited from a mentor/support group for athletes at the time.”

“I’m a coach and feel UK coaching should offer CPDs on RED-S and other issues affecting performance. like menopause. Many coaches don’t see symptoms or understand the need to address these issues and support athletes.”

“As a runner the ‘stereotype’ figure is skinny and this has caused me to stop running for a period of time as I wanted to be more inline with this idea of ‘attractiveness’.”

“I feel that, currently, support is only available to those at the highest level who don’t have to pay for it. There is a lack of support available for others who often can’t afford private treatment and have to go through NHS services that take far too long and are often not helpful as they are not sport specific.”

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