# How the Menstrual Cycle and Menstruation affects Sporting Performance: Experiences and Perceptions of Elite Female Rugby Players.

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## ABSTRACT

**Objectives**:

To explore athletes' past and current experiences and perceptions of the menstrual cycle in relation to its impact on sporting performance.

**Methods**:

15 international female rugby players participated in individual semi-structured interviews (age: 24.5 ± 6.2 years). All interviews were recorded and transcribed *verbatim*, resulting in 37,376 words of text for descriptive and thematic analysis. Inter-rater reliability checks resulted in a concordance of agreement of 83%.

**Results**:

Almost all athletes (93%) reported menstruation-related symptoms. Thirty-three per cent perceived heavy menstrual bleeding and 67% considered these symptoms impaired their performances. Two-thirds of athletes self-medicated to alleviate symptoms. Thematic analysis generated 262 meaning units, 38 themes, ten categories, and four general dimensions. The four general dimensions were: 1. Symptoms: physiological and psychological menstrual cycle related symptoms such as dysmenorrhoea, flooding, reduced energy levels, worry, distraction, fluctuating emotions and reduced motivation; 2. Impact: perceived impact of menstruation on different aspects of daily lives and performance including negative and neutral responses; 3. Resolution: the methods/approaches in dealing with menstruation-related concerns including accepting, or adapting and managing symptoms with self-medication or expert treatment; 4. Support: available support and comfortability in discussing menstrual cycle related issues.

**Conclusions:**

This study provides the first in-depth insight into athlete's experiences of the menstrual cycle and perceived impact on training and competition. It highlights individual responses to menstrual 'issues' and emphasises the need for clinicians and support staff to undertake menstrual cycle profiling, monitoring and continue to develop awareness, openness, knowledge and understanding of the menstrual cycle.

**INTRODUCTION**

Complex relationships exist between the menstrual cycle, associated hormonal fluctuations, and various aspects/markers of health, wellbeing and sporting performance[1-4]. Within the general population, it has long since been reported that the menstrual cycle and its related physical and psychological symptomology can often impact negatively upon daily life and activities[3,5,6] including absenteeism from school or work[7]. From a sporting context, Martin *et al.* reported that 77% of elite athletes (n=430) not using hormonal contraception (HC) reported negative side-effects during their menstrual cycle; including pain (abdominal/back), cramps (abdominal/unspecified) and headaches/migraine[8]. In addition, Bruinvels *et al.* identified that half of elite British female runners and rowers (n=90) felt that their menstrual cycle had in some way impacted upon their training and sporting performances[9].

Historically, research in this area has often focused on amenorrhoea and the female athlete triad. More recently this work has evolved to include 'Relative Energy Deficiency in Sport' – RED-S'[2]. The prevalence of secondary amenorrhoea, the most commonly discussed menstrual abnormality in female athletes, has been repeatedly shown to occur at higher rates compared with the general population, especially in sports striving for leanness (e.g.[10]). Additionally, menstrual cycle dysfunctions such as heavy menstrual bleeding have also been found to impact upon health and thus athletic performance[11] with 36.7% of female elite runner and rowers reporting heavy menstrual bleeding[9].

Despite the importance of these studies in highlighting menstrual cycle symptomology and prevalence of menstrual cycle dysfunctions in female athletes, much of the published research has been physiologically-based and quantitative in nature. This research has also tended to be dominated by individual sports or sports which encourage 'leanness'[10]. However, none have considered the in-depth lived experiences and perceptions of elite athletes' and athletes in team sports. This highlights the importance of the call made by Bruinvels *et al.* to further research in the area of sport and the menstrual cycle[12]. Therefore, the aim of this study was to understand the current and historical menstrual cycle status, lived experiences, and perceptions of the menstrual cycle in relation to elite athletic performance. This should help to heighten awareness and understanding of female athletes and their menstrual cycle, alongside providing opportunities to resolve issues which improve health, wellbeing, and sporting performance.

## METHODS

### Study Design

Fifteen international female rugby players were identified through purposive sampling, and following the receipt of information, gave their written informed consent to participate in the study. They took part in semi-structured, individually audio-recorded interviews (age: 25 $\pm$ 6 years) (see Table 1 for interview guide). Summarised individual reports were sent to each athlete to check for accuracy prior to data analysis[13].

### Data Analysis

Following *verbatim* transcription, thematic analysis was conducted using Braun and Clarke's 6-step model[14], supported by NVivo software (Version 11.1.0; NVivo 11, QSR international Pty Ltd, Australia). Analysis was approached inductively by tagging meaning units which were then listed as themes, compared and clustered to form categories, then finally assigned as general dimensions. Inter-rater reliability checks were conducted by an external researcher, who coded a total of seven manuscripts, reaching 83% congruence of resulting themes. Differences between the researchers were resolved by discussion until consensus was reached. Descriptive statistics (mean ± SD and frequency) were used to outline menstrual cycle status and impact where appropriate. The investigation was approved by the School of Science and Sport Ethical Committee, University of the West of Scotland.

Table 1. Topic areas and key content covered in athlete interviews with example questions.

| Topic area | Content | Example Questions |
|---|---|---|
| **Related medical records** | Point of contact (if any) for gynaecological issues, check-up/investigation history, check-up regularity, iron status and supplementation. | *"Do you have a family practitioner, gynaecologist or someone else you can speak to about menstrual cycle related issues? Who would be your preference?"* |
| **Hormonal contraceptive history** | Current hormonal contraceptive used (if any), contraceptive type/name, duration of use, reason for use, side effects experienced, previous contraceptive history (contraceptive type/name, duration of use, reason for change). | *"Are you currently using any hormonal contraceptive, and if so why did you start on this?"* |
| **Menstrual cycle status** | Age at menarche, initial regularity of cycle, cycle irregularity (previous or current), current frequency of cycle*, current menses duration, menstrual bleeding heaviness.<br><br>*If infrequent: Family history (age of menarche and following regularity of cycle, current regularity, frequency and duration of mothers' menstrual cycle) and training history (training development – type, frequency, duration and intensity) if menstrual cycle disturbance suspected. | *"Have you ever had an irregular cycle? If so, can you think of any reason that may have led to this?"* |
| **Sanitary protection** | Sanitary protection type, changes of sanitary protection, double sanitary protection required, prone to blood clots, prone to flooding, impact on daily life, training or competition. | *"Do you or have you ever had to use double sanitary protection i.e. a towel and a tampon at the same time?"* |
| **Symptoms and discomforts** | Symptoms type (physical and psychological), duration of symptoms, medication used and effectiveness, symptoms during ovulation, impact of symptoms on performance, record keeping of hormonal changes and performance impacts. | *Do you feel that your symptoms have an impact on any aspect of your daily life, training or competition performance? If so, how?"* |

## RESULTS AND DISCUSSION

### Descriptive Menstrual Cycle Status Characteristics

A total of 273 minutes and 36 seconds of audio data was collected, resulting in a word document of approximately 37,376 words of transcribed text. Participants agreed the accuracy of their individual transcripts before analysis commenced. Descriptive menstrual cycle status data is displayed in Table 2. No athlete described themselves as amenorrhoeic. One athlete had been diagnosed with polycystic ovary syndrome.

Table 2. Participant menstrual cycle status characteristics (n=15)

| **Menstrual Cycle History** | |
|---|---|
| Mean age at menarche (years) | 14 ± 1 (12-17) |
| Cycle regular at menarche | 8 athletes |
| Previously noted irregular cycle | 7 athletes |
| Mean frequency of menses (days) | 28 ± 5 (21-35) |
| Mean duration of menses (days) | 5 ± 1 (3-7) |
| Heavy menstrual bleeding* | 5 athletes |
| **Hormonal Contraceptive History** | |
| Currently using hormonal contraceptive | 4 athletes |
| Type of contraceptive used | Oral=2, implant=2 |
| Previously used hormonal contraceptive | 10 athletes |
| **Sanitary Protection** | |
| Sanitary preference | towel=2, tampon=5, both=8 |
| Sanitary absorbency | regular=10, super=7, super plus=3 |
| Mean number of changes per day | 4 ± 2 (2-8) |
| Double sanitary protection (towel and tampon) | 5 athletes |
| Blood clots | 3 athletes |

| | |
|---|---|
| Flooding | 6 athletes |
| **Symptoms** | |
| Perceived negative impact on health, life or performance | 6 athletes |
| Self-medication (e.g. paracetamol) | 10 athletes |
| Prescribed medication | 3 athletes |
| Symptoms mid-cycle | 1 athlete |
| Perceived negative impact on health, life or performance | 10 athletes |
| Recording of symptoms throughout menstrual cycle | 3 athletes |

**Note: Heavy menstrual bleeding was based on athletes' perception and was not directly measured. Where mean data is presented, data expressed as mean ± SD (range)**

Almost all athletes (93%) reported having negative symptoms (physical or psychological) associated with their menstrual cycle. Although this is somewhat higher than the 77% of non-HC users previously stated by Martin *et al.* in a large elite athlete cohort, it is not largely beyond that noted in the general population whereby studies vary between 21-91%[8,15]. The higher prevalence in our study may, in part, be accounted for by the lower recorded HC use (27%; four athletes) as HC are often prescribed to females to reduce negative menstruation-related symptoms within athletic[8] and general populations[16].

Following thematic analysis of the interviews, 262 meaning units, 38 themes, 10 categories, and four general dimensions (*symptoms, impact, resolution and support)* were identified (Table 3).

## Symptoms: Physical

A range of symptoms were highlighted, most notably in the few days before and at the onset of menses. The most prevalent physical symptoms included stomach cramps/abdominal pain (80% of athletes) reduced energy levels, flooding and general discomfort. The high frequency of cramps concurs with findings in general population-based studies where over 70% of females often report dysmenorrhoea[17-21]. Pain was described as being severe by seven individuals with participant 14 recounting that she had: "*Really bad cramps, kind of [in] the worst times I'll be doubled over and be retching",* whilst others experienced: "S*light cramps, but … they only last about an hour and they're bearable*" (P13).

Six athletes reported menstrual flooding with most noting that it was due to perceived heavy menstrual bleeding (menorrhagia). Females with heavy menses often reported flooding during the night: *"I'd say it was probably worse during the night"* (P11). However, when flooding occurred during the day it would often occur *"when I misgauge how heavy"* (P6), or when menses arrived unexpectedly: "*Not because my periods were excessive, because… I don't know, I've not expected it or whatever"* (P3). The frequency of reported heavy menstrual bleeding, or flooding, is in concordance with the 37% of elite athletes by Bruinvels *et al.* and the 27% reported by Fraser *et al.* from a large-scale survey of European women aged 18-57 years[9,22].

Interestingly, only one athlete reported back pain in association with their menstrual cycle. Back pain is often cited as one of the most common symptoms within general[23] and athletic populations[8]. It is unclear why it is almost absent within this athlete group, however, the small sample size relative to the questionnaire-based approaches could have limited the response. Or, it may be possible that due to the contact nature of the sport, athletes are accustomed to back pain, therefore such symptoms have less impact on athletes when associated with the menstrual cycle.

### Symptoms: Psychological

Psychological symptoms manifested as worry, distraction, negative mood states, feeling tearful and emotional, reduced motivation, and feelings of agitation. These symptoms have been noted in the general population[24] and an elite athletic population[8], although this is not always the case[25]. The two most recurrent were 'worry' associated with menstruation and the 'distraction' it was perceived to cause. Concerns regarding unexpected menses, due to either cycle length, increased heaviness of bleeding, or being unprepared to manage their symptoms were also evident. For example, one athlete revealed: *"I'm definitely worried about being caught without [ibuprofen] because the pain is quite bad"* (P10).

Distraction, worry and/or fears frequently surrounded flooding or the lack of control of menses and associated symptoms with one player commenting: *"Yes I'd say a bit of a distraction from training, just in the sense of fear from flooding through"* (P8). This seemed particularly prevalent surrounding competition and training camps with one athlete recounting: *"We were at this marines training camp and it came on the last day of the camp and I was like oh my goodness I don't know how I'm going to get through this [be]'cause we were doing these crazy drills and stuff"* (P10). Some of the players linked the worry and distraction during times of menstrual bleeding as being a consequence of the clothing requirements: "Y*ou're obviously conscious [of menses], [when] wearing white shorts"* (P12), whilst

another noted that they were aware of menstruation in general and wearing white shorts distracted them from the task at hand, especially during a major event such as competition:

> *"I think they do in training, I think it's like always in the back of your mind, that you're on your period, especially if you got it at the same time as playing for [your country], you're obviously in white shorts and stuff, it's a big impact for some people but, it's always just in the back of your mind" (P1)*.

Contact sports such as rugby are not the only sports affected by the issue of regulated, pre-determined, standardised uniforms. Stewart *et al.* reported heightened anxiety, intrusive thoughts, and reduced attentional focus among female trampoline gymnasts who wore leotards during their menses[26]. Females often comply with the social pressures to conceal menstruation and thus females will change activities or clothing in order to manage and conceal symptoms, particularly excessive blood loss[27]. However this may not always be possible for athletes, thus feeding worries and distractions.

## Perceived Impact on Training, Competition and Daily Life

For many athletes, the diverse symptoms expressed were shown to impact on various aspects of training, competition, and daily life. Training and competition performances were perceived to be negatively impacted by over two-thirds and over half of the athletes, respectively. These are slightly higher than previously reported in athletes[9]. The discrepancy may again be the result of differing methodologies between the studies (interviews versus questionnaire-based approach) and prior research focussing specifically on heavy menstrual bleeding.

Unsurprisingly, the symptoms that emerged most frequently were also noted as having the greatest impact. Two athletes reported that pain or dysmenorrhoea prevented them from completing a session. One said: *"Cramp, nausea, really bad, so it was quite hard to train sometimes. It would be like symptoms of an illness, so I would just pass it off as in illness [be]'cause I literally couldn't train" (P11),* whilst another reported: *"Sometimes I'll just be kind of doubled over with pain and then just for if [when] its real bad I can't, I won't, [train] I'll take the day off training" (P14).* This appeared to have more of an affect in higher intensity sessions:

> *"When I have a bad period (once every couple of months or so) it can stop me from completing a high intensity session (Intervals etc.), and other sessions will not be as productive (sometimes, [although] rarely, not completed at all) due to cramping and pain" (P11)*

Limiting daily activities due to menstrual cycle symptoms is often common within the general population[6,15]. However, relatively low absenteeism was reported during training and may be due to athletes' internal and external pressures to perform. These pressures may result in competitive athletes being more likely to endure training/competition despite experiencing symptoms, in comparison to the general population or recreational athletes[8]. Or, perhaps athletes are better able to cope with the physical demands/pain that they experience during their menstrual cycle as training and competing in high level sport is intertwined with pain: sport at this level hurts and athletes may simply adapt.

Psychological symptoms also impact on performance: "*It's just something else that you have to worry about"* (P11), whilst others perceived a general distraction whilst menstruating: *"I don't know if it's a mental thing, but, you become more aware and you just know it's happening, so it just kind of puts you off a bit"* (P7). This results in reduced attentional focus on the sporting task, with one woman saying: "*I think psychologically it takes my mind off of what I'm supposed to be thinking about, it's kind of distracting*" (P6). With distraction being shown to impact on attentional focus in sport (e.g.[28]) and with studies noting that females reported decreased concentration in work and school as a consequence of the menstrual cycle and symptoms[18], it seems likely that athletes' perceived distraction could impact on their work as athletes.

Despite a number of athletes reporting menstrual cycle related symptoms, some others, *"…forget about [the symptoms]"* (P8) once they begin training. For example, one athlete stated: *"My period sometimes make me feel tired before a session, but [I] generally don't have any noticeable effects during or after the session"* (P4).

Perhaps unexpectedly, slightly more athletes reported greater negative feelings towards menstruating whilst training, than during competition or games. One athlete said:

> "*So, no I've never noticed it in a game. I would say I still played that game the way that I would've played before. But certainly [I notice my menses] when I go to the gym. I go there four mornings a week and, definitely, when I'm on my period if I'm in the gym I feel a bit more lethargic. And, if we do quite a lot of running and if we're outside running I just feel a bit more tired and I'm like [I feel as though I am] trying to run but my body won't move as fast as I want it to"* (P13)

It is unclear why this may be, however heightened arousal and/or greater attentional focus during competition and games may override the distraction from symptoms which occur in training. Alternatively, it has been suggested that females are more likely to express symptoms within

comfortable environments (e.g. the home environment)[29]. Thus, in comparison to competition, athletes may feel more comfortable within their training environment and be more likely to disclose symptoms that they perceive to negatively impact performance.

However, this was not the case with all our athletes as several responded negatively to the pressures of competition when menstruating. It seems that the impact of the menstrual cycle related symptoms or consequences (e.g. potential flooding) was increased during high-pressure competition situations: *"But when I'm in a situation where I feel like I have to be performing, well then I, obviously I'd much rather not be on my period, but do you know then I think it affects me"* (P15).

One athlete who had monitored the impact of the menstrual cycle throughout her cycle reported noted that despite a lack of enjoyment, she felt stronger in the week prior to menses onset*: "usually the week before I'm on [my period] I'll not enjoy the gym but I feel strong in the gym*" (P14). Overall, athletes expressed less perceived impact from their menstrual cycle to their daily life (33%) than either training or competition.

### Resolution: Mentality

In light of the dynamic and evolving nature of qualitative interviews, when discussing symptoms, issues, impacts or concerns relating to the menstrual cycle, additional topics were uncovered about how athletes responded to their symptoms and the support they received. Athletes dealt with the difficulties they faced in one of two ways: by accepting them or adapting to them. This varied between individuals with around half of athletes appearing to accept their issues: "*If it's real bad … I'll take the day off training, unless I'm on a camp, when I can't, I don't feel comfortable to do that, I'll just kind of suck it up."* (P14) and, *"I got [my menses] one day in camp and felt awful but we were training all day - I just kinda [sort of] had to get on with"* (P13). These athletes displayed an acceptance of their menstrual cycle symptoms or concerns, reporting that they don't feel that menstrual cycle issues are acceptable reasons to take rest or abstain from training and they felt that they must continue, regardless of pain or other symptoms. This accepting mentality has been previously reported in the literature[6]. In contrast, others had an adapting mentality, for example: *"I have to just be quite on top of [my symptoms], I think, if I'm training or competing"* (P5).

### Resolution: Management

Athletes tended to manage symptoms either with self-treatment or expert treatment. Almost all athletes reported self-treatment of symptoms, most often pain, which was managed with exercise

and/or 'over-the-counter' analgesics and anti-inflammatory medications. Exercise positively impacted on three athletes, with one noting: "*If I'm on my period, if my tummy is crampy and sore, sometimes if I go into exercise that can make it a bit better."* (P15). In particular, she identified light exercise as being beneficial: "*If I'm not somewhere where I have to perform, well then actually going and doing some exercise [on] day one when I'm crampy helps."* Although exercise is thought to improve the frequency and severity of dysmenorrhoeic symptoms[1,3], light exercise may be challenging to undertake in team environments.

Some athletes described the use of painkillers as effective in removing symptoms: "A*s soon as I feel a bit of pain or I know my period is coming I just kind of take it to just counter the pain*" (P8). Others felt that painkillers reduced the pain to a manageable level that allowed them to perform: "*I think it's because the painkillers lessen the pain to a level where I am able to work through it"* (P15). A few players felt that painkillers did not help at all: "*[I took] painkillers that are specifically for your period but they didn't make any difference*" (P6).

In addition to using analgesics and anti-inflammatory medications, HC were also utilised in order to manage symptoms: *"That was the reason I went on the pill just to carry it through so I didn't get a period at all, initially because of the cramps"* (P13). Four athletes reported having run two packets or more of oral contraceptives together, to avoid menses when they felt it was required with one commenting: *"I try to make sure that I've like timed the pill so that I've, either if you have to take another packet, to make sure it's [menses is] not there" (P1)*. Despite some athletes stating that they had worsened menstrual symptoms following the combined courses of oral HCs, they acknowledged that they would still choose to use this method to completely eradicate any complications that having menses may bring to their performance:

> "*But I found with that the next period I got after [combining HC courses] would be way worse than usual … I probably would take it again if I was worried but, yeah I didn't really like taking it but then I suppose if I thought my period was going to come on the day of a game I might take it to stop that*" (P3)

Martin *et al.* reported that 43.5% of elite athletes in their study acknowledged using HC to manipulate the timing of menses around training or competition, suggesting that this method of management may not be uncommon[8].

Outside the use of HC, three athletes with severe or more complicated issues sought expert treatment. One indicated what she was prescribed to manage pain: "*Mefanamic acid […] I've kind of used it on and off and I use it currently and it helps" (P14),* while another was prescribed, *"Ttranexamic acid to help manage heaviness of menses"* (P5). Less than half of athletes have received expert treatment for symptoms, including those on HC for management purposes. This may be due to social attitudes

towards menstruation, with females being reluctant to seek medical advice, believing menstrual concerns are not justifiable medical issues[6], consequently choosing to conceal any symptoms[30].

### Support: Medical

When seeking or requiring menstrual cycle related treatment or advice (including check-ups such as smear tests), most athletes (80%) were currently, or had been, in contact with a medical professional in the past, including their General Practitioner (GP), Sports Medical Doctor or Gynaecologist (Table 2). With regards to seeking advice or treatment from medical personnel, both GPs and Sports Medical Doctors were commonly approached. One player stated: *"If the [Sports] Doctor is available I would probably go straight to the Doctor just because they kind of deal with that stuff all the time and probably feel a bit more comfortable"* (P12), whilst others indicated they would: *"Probably [see my] GP first, and then maybe Sports Doctor after"* (P8), or"*[I'd] probably* stick to my GP" *(P15)*, highlighting that this is often the result of previous positive experiences with their GP. Others explained that they would prefer to seek help for menstrual cycle related issues outside their sports environment, as they have less contact with their GP than medical sports staff: *"I think it's [be]'cause you don't have to see your GP regularly, I think there's probably still a stigma about it all, and you only have to see your GP when you want to really, but you're always around everyone else"* (P11). This preference towards non-sports staff may be due to social attitudes towards the menstrual cycle, in which females remain uncomfortable highlighting menstrual concerns within their sporting environment[6].

### Support: Non-expert

Unlike the general population[6], athletes sought advice from medical sources more frequently than non-experts such as friends/relatives, which may be due to the fact they are accustomed to speaking to medical personnel on a regular basis. However, one athlete reported that she would approach her coaches with menstrual concerns, *"…if it was affecting how I was training"* (P6). Most athletes expressed a reluctance to confide in their coaches with these matters. This was described to be due to several reasons including awkwardness, embarrassment, gender and feeling like there would be nothing that the coach could do to help them (Table 3).

### Support: Comfortability

Despite most athletes being comfortable approaching at least one person (GP/gynaecologist, sports staff or family), three of the 15 athletes reported having no *confidant*, as they would not feel

comfortable speaking to anyone about menstrual cycle concerns. One athlete indicated that this was due to her own personality, rather than issues with staff, choosing to keep these issues private: *"I'm just quite a quiet person, and quite a private person" (P7).* Another athlete expressed that she was aware that she could go to a Doctor for advice/treatment on menstrual concerns, however was still reluctant to do so (Table 3). This reluctance has been noted by others in literature[6,9], however, remains worrying as menstrual cycle issues may go undetected/unsupported.

Many athletes referred to staff gender when considering who they would feel comfortable approaching in related to menstrual cycle issues. It was acknowledged that previous female staff members had approached athletes and initiated discussions on menstrual cycle management prior to a major event, and having a female Doctor reduced the unease surrounding the subject: *"…with a female Doctor, I found that a bit easier to talk to her, so I had a problem and I was confident that I could 'phone her up and speak to her about it*" (P6). Others noted the unease at having menstrual cycle conversations with male support staff: "*All the coaches I've had in rugby are male, and I don't know, I'd just feel uncomfortable"* (P14), while another felt: *"It would make them [staff] feel uncomfortable"* (P15). Others conveyed an uncertainty in discussing menstrual issues with male staff members, stating that they would "potentially" speak to them, or they "think" they would approach them if required. It is not unusual for the general population to hold similar views with female patients often asking to be seen by female Doctors for gynaecological issues[31].

However, a small group of athletes were impartial to gender and comfortability: *"Within the [international] team we've got our own Doctor as well. Previously it was a woman, it is now a man, but I'm not really fussed personally, I don't really care who I talk to, if he's a Doctor he's a Doctor" (P13)*. These responses highlight the individuality in preferences with regards to communication and sharing menstrual cycle-related experiences.

## Limitations and Recommendations

We acknowledge the following limitations. First, we have only included data from one international rugby team; results may not be transferrable to other rugby teams of different ages or performance levels, nor to different sports. Second, athletes in this study were interviewed at different phases of their menstrual cycle and this may have influenced their perceptions. For example, the intensity of pain is limited by autobiographical memory and when the experience ends, the reliability of pain intensity recall reduces[32]. Real-time data capture may be preferable to identify women's experiences and responses at the time they are experiencing them.

Strengths of our study include that most females were comfortable discussing their menstrual cycle experiences, perceptions, responses and support mechanisms. With positive participation from

athletes, no withdrawals, and relative comfort in sharing personal details with a female researcher, it seems practicable for sports support practitioners to actively seek menstrual cycle-related information from female athletes. While athletes may not always be confident in raising concerns, this study suggests that they may feel more at ease if such conversations are initiated by staff. This may be especially important within male dominated sports such as rugby.

Practical recommendations for sports/governing bodies are outlined in Figure 1. Applying these recommendations would help to identify any issues/concerns within athlete groups, especially since many athletes currently self-manage, or report menstrual concerns to their GPs as opposed to sports staff.

## CONCLUSION

This study is the first to explore elite female athlete responses to menstrual cycle symptoms/concerns and associated support mechanisms. The results highlight the individuality of responses and the importance of monitoring menstrual cycle and associated symptoms/impact. Our findings emphasises the importance of support teams initiating conversations with all female athletes to normalise conversations surrounding the menstrual cycle, especially within male-dominated environments, in an attempt to minimise any negative impact and maximise positive outcomes.

Subsequent to the research being conducted, recommendations were made to the governing body. Prompt changes to practice were made in line with those displayed in Figure 1. In addition, the national women's rugby governing body sought practical solutions by providing sanitary products at training and competition venues and avoidance of light coloured shorts where possible.

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**KEY POINTS**

**What are the main findings?**

- Menstrual related symptoms are highly prevalent and highly individualised in female athletes
- Almost all athletes perceived that menstrual symptoms impacted negatively upon sporting performance
- Support and treatment for menstrual symptoms varied for individuals, with athletes generally choosing to adapt to or accept symptoms
- Athletes' comfort to discuss menstrual cycle concerns concerns/issues varied with many perceiving a gender barrier in discussing menstrual cycle concerns/issues with male staff members

**How might it impact on clinical practice in the future?**

- Clinicians need awareness, knowledge and understanding of menstrual cycle dysfunctions and menstrual symptoms along with appropriate available treatments
- Clinicians (and the wider support team) should understand the potential impact of negative menstrual symptoms
- Clinicians should develop and facilitate education for athletes and support staff and seek further educational opportunities in relation to the topic of the menstrual cycle and athletic performance
- Clinicians (and the wider support team) should initiate menstrual cycle conversations and screening in order to prevent potential health consequences and maximise health and performance.

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Figure 1. Practical recommendations for female athlete support teams with the aim of optimising health, wellbeing and athletic performance.