Bridging the Gap: Menstrual Cycle Support needs in Sport from the Athlete and Support Staff Perspectives

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Female athlete | Menstrual cycle | Support staff | Support | Gendered sporting context | Female Athlete Supportive Environment | Professional | Nonprofessional

Headline

While previous research has identified key concepts regarding menstrual cycle and female athlete support, concrete steps are yet to be taken to move towards a more comprehensive understanding of what a supportive environment for female athletes entails. Based on mixed-method surveys for female athletes and support staff, this study identified the gendered sporting context as the main underlying cause of the current lack of support, and yielded seven support considerations for the *Female Athlete Supportive Environment* (FASE).

Aim

This study aimed to understand the different contributing factors required in the development of a supportive environment for female athletes, particularly relating to the menstrual cycle, and to translate the findings into actionable support considerations.

Methods

Design

To gain a comprehensive understanding of the menstrual cycle (MC) related support needs amongst athletes and support staff, a cross-sectional, mixed-methods study utilising two distinct surveys, one for the athletes and another for support staff, was designed. The mixed-methods approach is especially useful when trying to understand more complex issues or phenomena, such as female athlete support, and enables both the analysis of general trends in responses and a more in-depth understanding of the experiences shared by participants (1, 2). The surveys included questions on key themes such as communication around the MC, tracking and monitoring, and support provision. In addition, questions to assess both the actual and perceived MC knowledge were included. The survey questions were similar for both the athlete and support staff surveys, only slightly adjusted to better fit for the particular respondent group. All data collection was conducted in accordance with the principles of the Declaration of Helsinki.

Data collection

The data collection was conducted in two stages. For the first stage, Kitman Labs developed an anonymous online survey on SurveyMonkey and distributed it through its employee and customer networks, as well as on social media platforms like X, Instagram, and LinkedIn. The original surveys were available in English and open for responses between November 2023 and March 2024.

For the second stage, Kitman Labs partnered with a professional league to distribute the survey to its athletes and staff. The original surveys were reviewed and slightly modified, ranging from simple language updates to more extensive changes (such as separating questions or transforming open-ended questions into multiple-choice). These adaptations were made in consultation with Kitman Labs to ensure the adapted survey met the league's specific needs while maintaining comparability with the original surveys. To allow for greater inclusivity, the surveys were also translated into other languages, including Spanish and Portuguese.

All responses were collected on a voluntary basis, and participants were informed that their answers would remain confidential. To create the final datasets, the questions common to both the original survey and the adapted survey were used. This resulted in a total of 27 questions available for the athlete survey and 28 for the support staff survey.

Data Merging

The datasets from the two survey stages were merged to create separate final datasets for athletes and support staff. To address changes in question format between the two surveys, language was standardised, metrics were recategorised, and other standardisations were applied to create consistency and uniformity. For details on these standardisations, please refer to the appendix.

Participants

In total, 228 female athletes and 155 staff members (97 female, 55 male, and 3 who chose not to specify their gender) participated. The study population, which included individuals from both professional and nonprofessional (semiprofessional or amateur) sporting contexts, spanned 22 different sports for athletes and 18 different sports for staff members across the globe, with the primary representation coming from Europe and North America. Participants who did not answer the first substantive question following the demographic questions were excluded from the analysis. These questions were: "What is the typical duration of one complete menstrual cycle?" for athletes, and "How would you rate your knowledge about the different phases of the menstrual cycle and their potential impact on athletic performance?" for staff.

The majority of the athlete respondents were 24 years or younger (62.2%) and nonprofessional (55.3%). Most nonprofessional athletes were 24 and younger (84.9%), with 48.4% of them being under 21 years of age. The majority of professional athletes, on the other hand, were aged 25 and older (66.7%). Of all the athletes, 68.7% completed college or university or parts of it. Most of the athletes who had completed college or university were professional athletes (78.5%).

The support staff demographic revealed that the majority of respondents worked in professional sports (75.5%), with the remaining 24.5% working in nonprofessional sport settings. Regarding their roles, the distribution was led by medical staff (37.3%), followed by performance staff (28%), combined medical and performance roles (18%), and technical staff (16.7%).

The respondents were classified into these four functional areas based on their primary expertise. Medical roles included personnel such as physiotherapists and athletic trainers, while performance roles encompassed specialists like strength and conditioning coaches, sports scientists, or performance directors. The third group consisted of combined medical & performance roles, such as heads of medical and performance and sports dietitians. Finally, technical roles were comprised of coaches and analysts.

The gender breakdown across the support staff roles showed varying distribution. Women were better represented in medical and combined medical and performance roles. Conversely, performance and technical roles were nearly equally split between genders; however, men had a slight numerical advantage in performance roles, while women held a marginal lead in technical roles (Table 1).

Results for the support staff participants that preferred not to specify their gender or who worked in administrative roles (n=5) were not analysed as separate categories due to a small sample size. Their answers were, however, still included in the overall results.

Data analysis

Data analysis was conducted using both descriptive and thematic methods. A descriptive analysis of the quantitative data provided an overview of trends by calculating the frequencies and percentages of responses, and was used to corroborate the qualitative findings. The qualitative data, gathered from open-ended questions, was subjected to a thematic content analysis (3). This involved an inductive approach (3), where themes were identified directly from the data. For example, responses containing phrases such as “conversations”, “talking more”, “open chats” or “discussing” were coded under the theme “communication”. The analysis was conducted by one of the authors and was subsequently reviewed by the other to ensure reliability.

Results

Gendered sporting context as the barrier to MC related support

The athlete respondents reported the MC impacting their performance in different ways. As one athlete put it “I can definitely tell on days when I can push it or go easy based on where I’m at in my cycle”. The athletes reported the MC impacting energy levels: “the week or so before my period I sometimes find I can’t lift as much as I usually can, and my energy levels are also lower”. The MC was also reported to impact sleep: “sometimes my legs feel heavy, and I experience insomnia in the first couple of days of my period”. Pain was reported numerous times to impact training and performance: “I don’t do dives when just before my period [because] my boobs are sore” or “I couldn’t train because of pain”, as well as heavy bleeding or cramps: “[I] bled too much or cramps were too bad so I had to modify or stop training”.

Even the support staff reported being aware of the potential effects of the menstrual cycle on athletic performance. “We know there is an impact, but there is no formal method of dealing with it and there is no joint up thinking about support and putting things in place”. Despite 66.3% of the professional and 79.1% of the nonprofessional athletes reporting MC impacting their performance (Figure 1A) and 88% of professional and 94.7% of nonprofessional of the support staff being aware of the potential effects of the menstrual cycle on athletic performance (Figure 1B), the results showed that specific support around the MC is not commonly available.

Although a discrepancy existed between the levels of support reported by athletes and staff, the results showed a general lack of available support in both professional and nonprofessional settings.

Only 14.8% of the professional and 14.4% of nonprofessional athletes reported specific support or interventions related to MC being available to them (Figure 1C). In contrast, 44.4% of the staff in the professional and 32.1% of the staff in nonprofessional settings reported their athletes receiving specific support or interventions to address the effects of the MC on health and performance (Figure 1D). The results for this question, broken down by support staff role, show that only 33.3% of the medical staff and 38.1% of the technical staff reported their athletes receiving support or interventions to address the impact of MC on health and performance, while 50% of the performance staff, and 60% of those in combined medical and performance roles reported providing such support.

When gender is considered, 46.2% of the female versus 36.4% male support staff reported their athletes receiving specific support or interventions to address the effects of the MC on health and performance. In fact, women in three-quarters of the support staff roles reported higher rates of specific support or interventions provided to their athletes. Medical roles were the only exception.

Many of the comments by both the athletes and support staff revealed glimpses of the prevailing culture within female sports, often impacted by the gendered views and experiences. One support staff respondent, for example, said: “I think that sports and sporting institutions are built for the male athletes, not women and I think that there is a lot of work that can be done to benefit female athletes”. The taboo around the topic also became evident through the expressed view by another member of support staff: “menstrual cycles are still very "hush hush" in college athletics and there’s a component of shame surrounding them. The more open we are about talking about them, the easier it will be to consider them as a component of athletic performance”. Sporting context as gendered was expressed by yet another support staff, who revealed that “as a former athlete with mainly male coaches he physically could not comprehend the pain I was in so he thought I was overreacting most of the time and when he found out I was seriously in pain he suggested I get on the pill so I wouldn’t mess with the season”. Additionally, concerns of legal actions by one male support staff member brought to light the complexity around communication of the MC: “[there are] many obstacles being a male and having the knowledge of student-athlete menstrual cycles. Concern of lawsuit or allegations of being a "creep". [I] would be hesitant to engage in conversations and use language around the topic as some can get uncomfortable, again, with a male being involved”.

Athlete respondents revealed different aspects of the manifestations of the gendered sporting context with the following expressions: “[I wish] that it wasn’t a shame to not be able to go to practise because of your cycle or ongoing period”, and “[there’s a need for more] acceptance of missing practice/adapting practice when unable to compete as normal”. They even revealed the potentially serious consequences of lack of knowledge or a nonchalant approach to MC related issues as expressed followingly: “last year I had to stop playing for 1.5 months because of RED-S, and did not get my period for 2 years. [...] Our new hired medical director finally took it seriously and I was able to meet with a gynecologist who

tested me and put me on hormones that I was depleted in. I think this is a very important matter that is not focused on in this club".

The examples above provide a possible explanation for the lack of support specific to female athletes as it relates to their physiology and the needs associated with the menstrual cycle. In fact, 36.4% of the professional and 26.3% of the nonprofessional athletes conveyed not knowing whether support or interventions related to MC were available to them. From a support staff perspective, 35.3% of the medical and 34.4% of performance staff did not know if their athletes received specific support to address the impact of MC on health and performance. These results demonstrate the lack of systematic approach to female athlete specific support needs.

Table 1. Distribution of Support Staff Roles by Gender.

Role	Gender		
	Man	Woman	Total
Medical	25.5% (n=14)	74.5% (n=41)	100% (n=55)
Medical & Performance	18.5% (n=5)	81.5% (n=22)	100% (n=27)
Performance	52.5% (n=21)	47.5% (n=19)	100% (n=40)
Technical	48% (n=12)	52% (n=13)	100% (n=25)

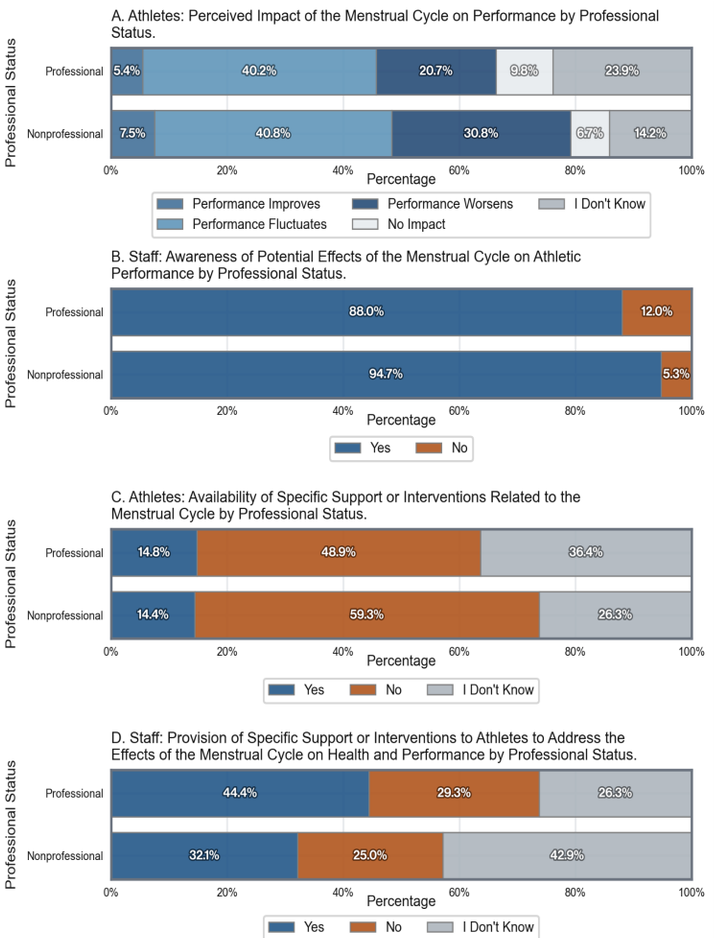

Fig. 1. Perceptions of menstrual cycle impact on performance and the availability of support from the perspective of athletes and support staff.

The identified themes around the support needs

The thematic analysis, corroborated by the quantitative results, yielded seven themes regarding the support around the MC, namely: education, communication, training and performance, medical, wellness, resources, and research.

Education

Both the athletes and support staff demanded MC education around several different themes.

A clear need for more education was identified around the MC's effects on training and performance based on where the athletes were in their MC: "I think just more education be-

cause I don't think any of us really know what the effects of our cycles are on our training or how to adapt our training based on our cycle phase", said one of the athletes. "Coach education on impact on player performance and better understanding that modifying player load during menstruation (as needed based on symptoms and phases) will help performance and not keep them back" was mentioned by a support staff respondent.

Education on menstrual cycle issues, such as amenorrhea, female athlete triad and RED-S, was a recurring theme among athletes, as demonstrated by the following quotes: "educate athletes about the importance of regularly getting your cycle", and "I do know plenty of female athletes 16+ and particularly 19-22 who end up with issues related to loss of the cycle etc as in endurance sport this is the biggest risk. So really the earlier the education and open understanding with the issue the better". Even the support staff expressed their need for education around the MC related issues: "education [is needed] - specifically on RED-S and the female athlete triad".

Education about contraception was also called for by both athletes and by support staff. An athlete wrote: "I am unsure of how to know the impact that my iud has on me. I don't get my period anymore and I don't know how that impacts my body". A support staff wrote: "[we need] education on contraception and how it works".

Both athletes and support staff also requested more education around nutrition, recovery aspects and emotional regulation. According to one of the athletes, "I think information about nutrition/sleep/emotional regulation would be really helpful". A support staff member added: "[there's a need for] education regarding the fueling, hydration and recovery pieces as it relates to women's health".

An improved general understanding around the menstrual cycle and its impact was also called for, as demonstrated by the following quote by an athlete: "[We need] more support and understanding from staff about it, we've got players who throw up from the menstrual pain and still keeps doing the fitness drills so more responsibility from the staff to take those players out of training etc. More understanding from staff also that you might be more tired and have less energy during certain phases".

A number of times, education specifically for coaches was mentioned, demonstrating a possible discrepancy of perspectives and education levels between the different staff roles. One of the support staff respondents illustrated this by saying: "[there's a need for] educating coaches about the menstrual cycle and its demands on the female athlete body (as I saw multiple times in my club when we make suggestions, the coach didn't listen or just said "power through I'm sure it's not that bad")".

In fact, 53.9% of the support staff working in professional settings reported that they had received education or training about managing the menstrual cycle's effects on athletic performance, oftentimes university level courses or other continued education certifications. Moreover, 21% of them reported receiving in-house training on the topic. However, only a small number of support staff respondents (17.1% of those working in professional and 18.4% of those working in nonprofessional settings) reported being very knowledgeable about MC and its potential impact on performance. Regarding athletes, only 15.4% of the professional athletes reported feeling that their coaches take their MC education into consideration. Further, only 10.8% of the athlete respondents reported specific educational interventions around the menstrual cycle being provided to them in their sporting environment.

Communication

More open communication and conversations around the MC and issues related to it was brought up by both the athlete and support staff respondents as an important factor in creating a more supportive environment for female athletes. One athlete expressed this by saying "I think that the menstrual cycle is unbelievably important to the female athlete experience. It's crazy to me that our staff isn't aware or asking about our cycles". Another athlete expressed the need for "open conversation on for example it being ok to take off the load or skip practice if being super ill from period, our staff talking about it and not making it only a matter of the players". Further, one of the support staff respondents stressed the importance of normalised conversations around the topic by saying that "being open about talking about the menstrual cycle in the same way we all talk about a sore achilles will be wonderful. To get to that point all genders should be included in the training and the education", linking MC education to more open communication. Another support staff respondent expressed the importance of athlete-staff conversations by saying that "[it's important to have] more conversations with the athletes on how we can better support them".

While the majority (71.1%) of the support staff working in the professional settings thought that open communication around MC related issues for optimising performance and well-being is very important (Figure 2B), only 47.8% of the professional athletes reported conversations around menstruation taking place in their sporting context (Figure 2A). Further, while 84.2% of those in the combined medical & performance (87.5% of the women, 66.7% of the men) and 85.7% of those in the technical roles (90.9% of the women vs 80% of the men) thought that open communication was very important, only 56% of those in the medical (59.5% of the women vs 41.7% of the men) and 64.3% of those in the performance roles (54.5% of the women vs 75% of the men) thought so. 58.3% of the men in medical roles thought open communication was somewhat important (Figure 2C).

With respect to athlete communication preferences, a clear pattern emerged: athletes generally prefer discussing their menstrual cycles with female support staff. One athlete's comment, "I feel comfortable talking to everyone about my period minus male coaching staff," reflects this sentiment, which is supported by data showing that 60.4% of professional and 73.8% of nonprofessional athletes were more comfortable discussing these issues with female staff members. In fact, only 34.1% of the professional and 22.9% of the nonprofessional athletes felt equally comfortable discussing MC related matters with either men or women.

Professional athletes reported more education (25%), staff initiated (22.2%) and regular normalised conversations (19.4%) as key to feeling more comfortable talking about MC issues in their team. While 23.6% of nonprofessional athletes did not know what would make them more comfortable talking about MC related issues, similarly to the professional athletes, regular normalised conversations (17.3%), understanding of the MC's impact on performance (12.3%) and staff initiated conversations (11.1%) as well as acceptance and no judgment (11.1%), were reported as key to feeling more comfortable discussing MC issues in their sporting context (Figure 3).

The fact that the question above was originally open-ended is notable, as the categories that emerged spontaneously from the athletes' answers directly corroborate the themes identified through the overall thematic analysis.

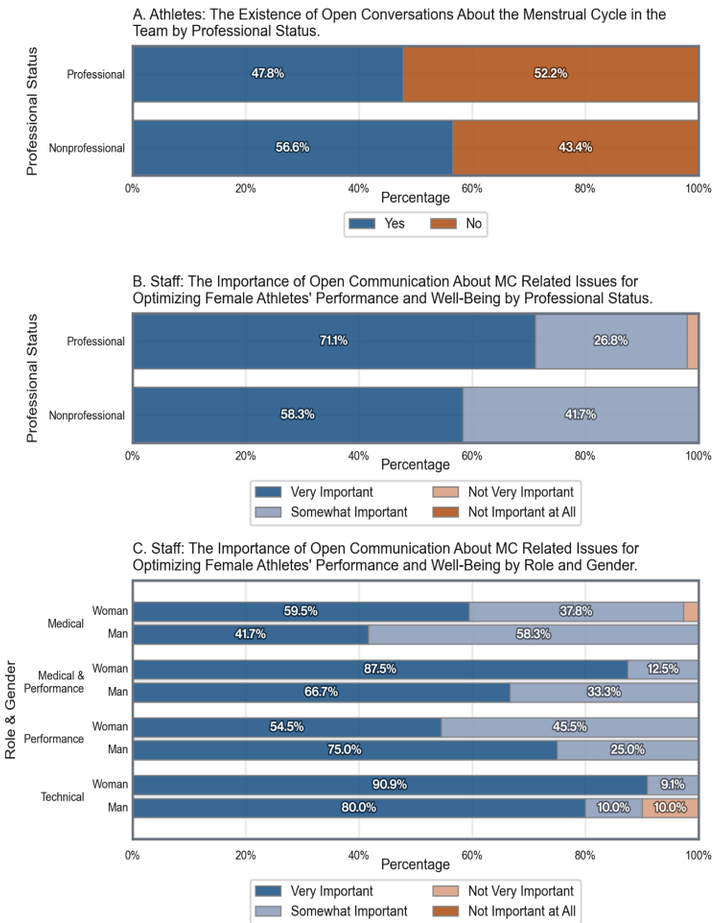

Fig. 2. **Presence of open communication and its importance for female athlete support, from the perspective of athletes and support staff.**

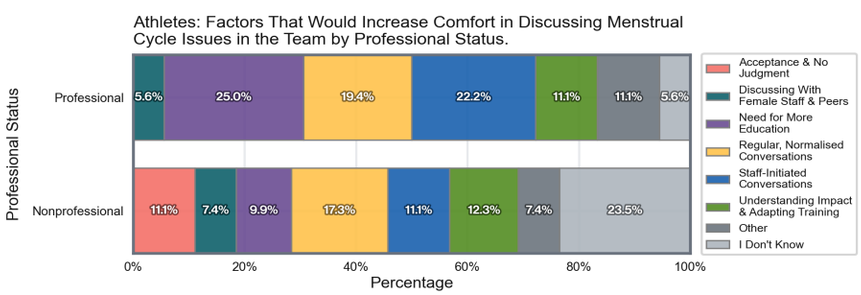

Fig. 3. **Factors influencing athlete comfort in discussing menstrual cycle-related issues.**

Training and Performance

Training and Performance measures were yet another theme that emerged through thematic analysis, more specifically considerations around training adaptations based on the phase or symptoms of the MC, as well as tracking and monitoring. As one athlete put it, training should be adapted "to avoid overexertion in the phases where active bleeding occurs, and to take advantage of the phases where performance feels easier". Another athlete suggested training to be adjusted "based on the phase of our menstrual cycle to get the most out of our training". One of the support staff respondents suggested "potential adjustments to training intensity/volume depending on phase of their cycle", while another said "weekly performance testing could help support training and performance when looked at in association with menstrual cycle".

Considerations around MC tracking were raised by athletes requesting "consistent means of tracking athlete menstrual cycles across the entire team to keep coaches and trainers informed about any symptoms athletes are experiencing" and

"tracking which phase you're on and how you're feeling, monitoring the workload based on it". Even injury prevention considerations were raised by athlete respondents: "I think it could prevent injuries if it got monitored better". Support staff also suggested tracking "so that higher risk training activities can be modified during that time and so that support staff can better support the athlete through that time via nutrition, medical, etc". Further, one support staff respondent demanded "wellness monitoring to guide athlete participation, [...however], I don't believe there is enough research to support altering training exposure based on phases but I agree symptoms should influence participation"..."there are more pressing things to address like adequate strength and conditioning knowledge, nutrition, and mental health". The support staff also saw tracking as a means of reducing risk of MC related issues: "I believe tracking menstrual cycles is important and would likely help medical, performance, and coaching staffs reduce risk of secondary amenorrhea/red-s/female athlete triad and so on".

A serious consideration regarding the MC tracking was also raised by support staff: "While I see a great value in menstrual cycle tracking, as a female in this political climate I have chosen to not electronically track my menstrual cycle and I know that many of my student athletes are uncomfortable with other people having this information [...] for fear of prosecution based on information that may become available". Nevertheless, 66.7% of the professional and 61.9% of the nonprofessional athletes of this study currently track their MC and 85% of them use a tracking app to do so.

Among the support staff who answered 'no' when asked if the current methods available were suitable to assess MC's effect on athlete health and performance, 29.3% worked in professional and 39.3% worked in nonprofessional settings. They argued that "other methods [such as tracking apps] are unreliable" as they are based on subjective data. They also noted that preferred methods, such as blood tests and ovulation kits, were too costly and therefore inaccessible for most. Also, the need to individualise and track different aspects of the cycle were provided as an explanation: "right now it only tracks based on when the athlete says it's occurring but it may be more useful to track different aspects of the cycle in order to better prepare the athlete for competition". Even the political climate as a barrier to MC tracking, as well as lack of resourcing within female sports, were identified as barriers in monitoring MC's effect on health and performance. This was especially the case in the nonprofessional environments as "these part time environments where staff have other full time jobs, it would be a logistical challenge compared to full time environments". In fact, only 10.7% of the nonprofessional support staff reported monitoring the MC of their athletes in comparison to the 48.5% of the support staff in professional settings.

Lastly, regarding the tracking of contraceptive use, only 21.1% of the support staff working in professional settings and 17.9% of those working in nonprofessional settings reported tracking contraceptive use and type within their organisation. Further, 61.9% of the technical, 42.9% of the performance, and 32.7% of the medical staff reported not knowing if they were tracked in their organisation.

When tested for MC knowledge and more specifically when asked about the impact of the contraceptive pill on natural hormones, 43.1% of the professional versus 38.3% of the nonprofessional athletes answered correctly that their levels get suppressed (4) in comparison to 66.7% of the support staff in professional and 40.7% in the nonprofessional settings. Medical roles were slightly more accurate (63.5%) than performance (55.9%) and technical (52.4%) roles in correctly answering this question. However, a large gender disparity emerged within the technical roles: women had the highest correct answer rate (81.8%) across all staff roles, while men had the lowest (20%).

Further, when asked about the typical duration of MC, around 90% of all the medical and performance staff were able to provide the correct answer, while only 68.2% of the technical staff were able to do so. Again, a discrepancy between genders was observed as women in technical roles were able to answer this question correctly about 30% more often than their counterparts.

Medical

Medical considerations were identified as a theme as concerns around MC related issues and injuries were raised by both the athletes and support staff.

One of the athletes raised concerns about the absence of menstruation by explaining that [my] "hypothalamic amenorrhea [...] is never talked about in my sporting club. [I] would love some extra support from coaches and teammates to help me recover my period/increase body fat etc because my body is under so much stress from high volume training plan". Another athlete reported her injuries having always occurred around the same MC phase: "I have experienced 3 acl-injuries during my career and all of them happened while I was menstruating"..

Consequently, the support staff called for "proper screening/follow up procedure with women's health specialists (I feel that all we do is put women on [birth control] when menstruation is irregular or painful)". They also requested testing of "blood concentration, hemoglobin and iron % in blood", as well as a "screening for endometriosis". In addition, "it is vital to have team doctors who understand the nuances of this rather than prescribing hormonal birth control pills to mask symptoms", as demanded by another support staff respondent. In fact, "contraception is more than just the pill [as expressed by one of the support staff participants]. With more players and staff having children during their career, changes to their menstrual cycle, pelvic floor and breast feeding all affect female health and performance". Consequently, support staff requested "proper referral channels" to more easily direct athletes to specialised care, diagnosis or treatment when needed.

When the support staff was asked if they were able to define amenorrhea, as absence of menstruation (5), 86.7% of those working in professional vs 70.4% of those working in nonprofessional settings reported being able to do so (Figure 4A). Further, those working in medical and combined medical & performance roles reported being able to define amenorrhea over 95% of the time, in comparison to 52.4% of the technical staff. However, women in all roles (except medical) reported being able to define amenorrhea more often than their male counterparts. In fact, women in technical roles reported being able to define amenorrhea as often as the men in the performance and in the combined medical & performance roles. Technical roles had the biggest discrepancy between genders: 42.7% more women than men reported being able to define amenorrhea (Figure 4B).

Regarding the Female Athlete Triad (FAT), which is a medical condition comprising of low energy availability, MC dysfunction, and low bone mineral density (6), 84.8% of the support staff working in professional settings versus only 48.1% of those working in nonprofessional settings reported being able to define it. Concerningly, only 24.8% of the professional and 13.4% of the nonprofessional athletes reported being able to do so (Figure 4C). Further, while all of the men and 92.3% of the women in the medical role reported being able to define the FAT, 33.3% of the men vs 88.9% of the women in the com-

bined medical & performance role, and only 30% of the men vs 63.6% of the women in the technical role reported being able to do so (Figure 4D).

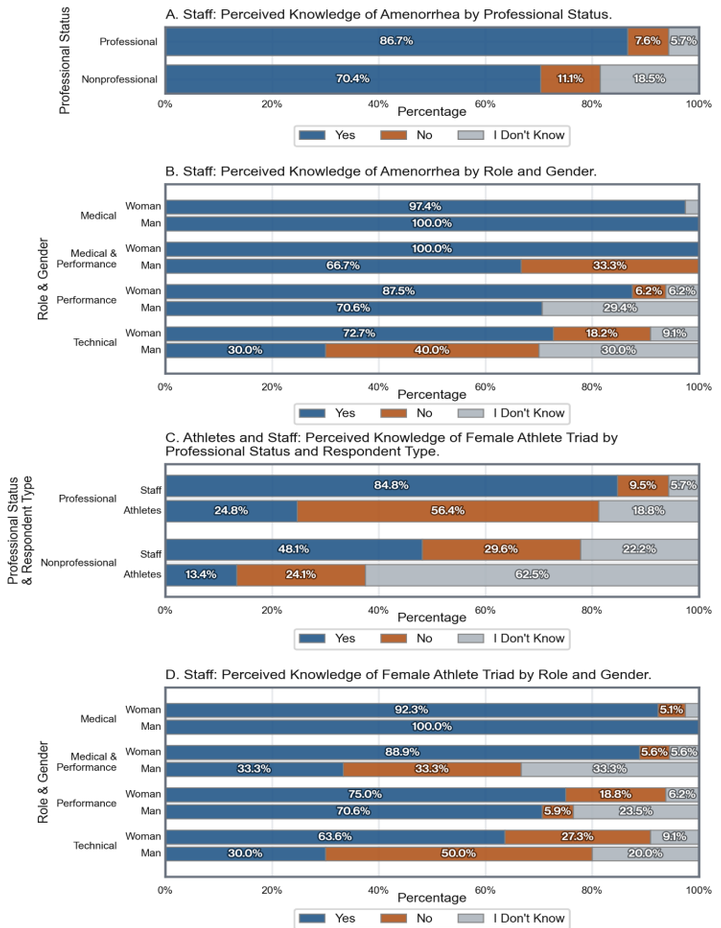

Fig. 4. Perceived knowledge of key menstrual cycle issues, including amenorrhea and the Female Athlete Triad, among athletes and support staff.

Wellness

The fifth theme identified through thematic analysis was wellness considerations, such as nutrition and supplements, sleep and recovery, mental health, as well as wellness monitoring.

Nutritional support needs and considerations around sleep were expressed by both the athletes and the support staff. One athlete wished that her team was "providing supplements that would help in different cycles, [and. . .] information about nutrition and what to eat during certain stages of your cycle", while another demanded "nutrition and sleep quality talks [...] as I think more recovery is needed at certain times". One support staff called for "recommendations for [...] specific supplement/nutritional recommendations for different cycle times" and another said that "[we must] allow time for sleep". Wellness monitoring and symptoms were suggested by support staff to "guide athlete participation as there [isn't] enough research to support altering training exposure based on phases". According to them, "better correlation of wellness measures with menstrual cycle could be done". Also, "some athletes are mentally affected by their cycle, so while physically can track strength or power output, there [aren't] direct resources to assess the mental effect". This indicates a need for wellness monitoring that also takes mental aspects into consideration.

When the support staff was asked if the methods currently available were suitable to assess MC's effect on health and performance, 32.3% of the professional support staff and only 3.6% of the nonprofessional support staff believed so. According to these respondents, this perspective had a varied number of reasons. They felt that self-reporting captured the adequate information, as the focus was on maintaining a regular menstrual cycle and not adjusting training according to its phases. This perspective was also expressed by a support staff respondent: "If players are open to answer, the self reported wellness surveys will capture their health/symptoms during their menstrual cycle". Additionally, technology was recognised as a tool that was able to consider a number of metrics from multiple data sources allowing for the coaches and medical staff to make any necessary adjustments for each individual - "[the] ring connects with [a] health app to use objective physiological metrics to give feedback on players' health".

Resources

As the sixth theme regarding the MC related support, both the athlete and support staff respondents expressed their needs

around resources, such as gear, products and staffing to better manage the MC and menstruation.

The demand for appropriate gear was highlighted, as reflected in one athlete's request for alternatives to "white shorts or spandex.". Tampons available in the locker room were also requested, as well as heating pads and medicine. The support staff also highlighted this as an opportunity for commercial partners to get involved, as "[we should make] sure teams get partnerships with period brands so we can stay supplied with products".. Additionally, the athletes wanted better resources available, such as having access to medical practitioners or physiotherapists, and being able to talk with an obstetrician-gynecologist. The support staff also highlighted the need to "try to raise the number of women working with female professional sport clubs".

Research

The thematic analysis revealed even the need for more research to better understand how the MC impacts health, training and performance and the causes of MC disturbances to better support female athletes. The athletes "[wished] there was more research done about it", while the support staff claimed that "[there are] lots of theories but little strong evidence" and that it "requires further investigation" as "right now there is too little research to establish best practice [around the MC related support] unfortunately". However, one support staff member said that "there is good preliminary evidence of each phase of the cycle as related to performance, recovery, and nutrition", although, as expressed by another, "further research with appropriate interpretation and implementation [is needed]". More specifically, "[implementation of] any modifications in relation to injuries" was mentioned by support staff.

Further, it was mentioned that "the work that is being conducted in this space so far is a great start, and yet 50% (about) of the population is female so that supports the idea that 50% of the research should be done here too".

Lastly, there was a call to "develop women's health specific groups to continue to help support and assist with increasing women's health awareness and research nationally and globally" and that "we desperately need studies, guidelines on this topic". An embedded researcher in the sporting context to support athletes was suggested.

Suggestions for best practice MC support

When the support staff respondents were asked if there was an established best practice around how to support athletes in relation to their MC, 77.8% of those working in the professional and 92.9% of those working in the nonprofessional settings did not think this was the case. They provided explanations and current best practice suggestions, revolving mostly around the following ideas.

The baseline, as was suggested by one of the support staff respondents, should be "generally establishing healthy communication pathways, and empowering the athletes to scale up or down the intensity/volume of their training" and "daily monitoring and targeted support around nutrition, MSK (musculoskeletal system), [and] GI (gastrointestinal) support".

Multidisciplinary collaboration and improved communication were highlighted by others who thought that "communication with athletes, medical, dietitian, OBGYN, and technical, day to day or month to month about adjustments that need to be made to support the individual" were necessary. Further, injury prevention was underlined and demands to "minimize high risk exposures during the late luteal phase and [attempt] to maximize training gains during the follicular phase (although evidence more lacking for this component)" were made.

Individualised approach based on hormonal contraception (HC) considerations was also highlighted: "An individualised approach is needed. Based [on] HC use or non use and patterns of symptoms. [It should be] more about helping the athlete to understand their cycle better, how to manage symptoms, nutrition etc. To help optimise athlete well-being and performance. Are there any patterns we can identify and manage things differently to improve this for the athlete". This approach was also confirmed by another respondent who called attention to "understanding the individual impact on a short term, mid and long term to individualize approach and to create a holistic approach per player for performance on and off pitch, nutrition and gym".

Lastly, the current lack of guidelines and protocols was recognised as a symptom of the gendered sporting context. This context is characterised by factors such as: sports and sporting institutions are primarily built for male athletes, MC remains a taboo topic that is still not discussed enough, athletes feeling shame around their MC, and the lack of knowledge, education and research around the topic. This was even illustrated by one of the support staff respondents who "[believed this being] a bigger issue. Until power house entities like adidas, nike....get on board with the female athlete body, our professional females will remain in a cycle of shame when they do experience a shift in their body or performance due to hormonal changes". Additionally, "opportunities for discussion on this topic within the league/training or policies" was seen as "beneficial to making sure this is made a priority across the board".

The seven support considerations for the Female Athlete Supportive Environment (FASE)

To summarise, the thematic analysis identified seven themes related to menstrual cycle support, which consequently form the seven support considerations of the FASE (Figure 5). Each support consideration is specified by its key findings in bullet points.

- Education considerations, particularly for male coaches and for early interventions with female athletes:
  a) The physiology of menstrual cycle and its impact (including symptoms) on the athlete.
  b) Menstrual cycle issues and dysfunctions, such as amenorrhea, RED-S and Female Athlete Triad.
  c) The role of nutrition, sleep, recovery, and emotional regulation in relation to the menstrual cycle.
  d) Contraception: its mechanisms and impact on the body.
  e) The menstrual cycle's effect on training and performance, and how to modify load/training accordingly.
- Communication considerations:
  a) Athletes currently prefer discussing their MCs with female support staff.
  b) The need to establish healthy communication pathways within the multidisciplinary team and between the support staff and the athletes.
  c) Regular normalised, staff initiated conversations and understanding the MC's impact on performance are key factors for athletes to feel more comfortable talking about MC issues in their team.
- Training and Performance considerations:
  a) An individual approach is crucial.

b) Safe and secure tracking and monitoring of the MC, with focus on maintaining regularity and understanding the individual athlete symptom profile.

c) The ability to interpret and understand test results and performance indicators according to MC.

d) The ability to identify at-risk athletes (injury, amenorrhea, RED-S, Female Athlete Triad).

e) The ability to adjust and adapt training volume and intensity based on an athlete's symptoms.

- Medical considerations:
  a) The implementation of proper screening protocols for MC function and dysfunction.
  b) The use of blood tests, such as hemoglobin, iron levels, and blood concentration.
  c) Monitoring hormonal contraceptive use versus non-use.
  d) Closer monitoring of the relationship between injury and MC.
  e) Considerations for pelvic floor health, pregnancy and post-partum.
- Wellness considerations:
  a) Adequate time for recovery and sleep.
  b) Nutritional support tailored to the different phases of the menstrual cycle.
  c) Emotional and psychological support.
  d) Support around the musculoskeletal and gastrointestinal systems in relation to menstrual cycle.
  e) Wellness monitoring.
  f) Technology to integrate multiple data sources for holistic health monitoring.
- Resource considerations:
  a) Providing alternatives to white shorts or spandex.
  b) Making menstrual products (such as tampons and pads) available in the locker room.
  c) Providing resources to alleviate MC symptoms, such as heating pads and pain relief medicine.
  d) Ensure access to medical practitioners, such as obstetrician-gynecologists and physiotherapists.
  e) Increase the number of female support staff.
- Research considerations:
  a) The need for further research with appropriate interpretation and implementation to better understand MC and its impact on health, wellness and performance in order to provide more tailored support.
  b) Embedded researchers within sporting contexts to support athletes.
  c) The development of groups to improve women's health through research.
  d) The need for guidelines on support provision.

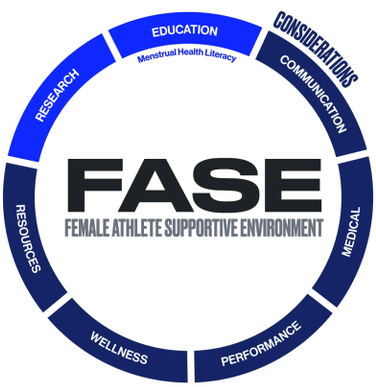

Fig. 5. The illustration of the Female Athlete Supportive Environment with the seven considerations of support.

Discussion

The aim of this study was to understand the different contributing factors required for a female athlete supportive environment. Based on the analysis of the survey findings, the aim was to find a concrete way of utilising them to benefit female athletes and their support staff in their daily sporting context.

According to this study, a substantial 86% of the athletes reported a lack of specific support or interventions related to their MC. This finding makes it evident that support around MC is currently not an established part of either the professional or the nonprofessional female sporting environment.

The evident gender data gap (7,8), a finding also recognised by the study participants, inevitably leads to male bias in the way female athletes are managed and trained. This bias might negatively impact their health, wellbeing and performance, as recommendations around nutrition, injury prevention and training are still largely based on male data (5). Thus, sports are gendered in nature, and it can be argued that this gendered sporting context, a view also corroborated by the participants of this study, is the underlying barrier to female athlete support. This is particularly true for issues related to the MC, though its impact is not limited to that area.

Inevitably, this has led to a copy-paste culture from the men's sporting context to the women's (9), leading to women not only being coached (mostly) by men (10), but also being coached like (miniature) men (11). In fact, there is scarcity of female athlete specific health and performance expertise (12) in the organisations whose sole purpose is to support the female athletes.

Further, the evident communication limitations enveloping especially the male coach-female athlete dynamics is hampering the progress in protecting female athletes from unhealthy attitudes and practices. This is due to the lingering stigma

around the MC, as confirmed by the participants of this study and others (13-18). Ultimately, this lack of progress helps to maintain the status quo. Similarly, coaches do not feel comfortable advising or supporting athletes based on their hormonal cycles, due to their perceived lack of menstrual health knowledge (13, 19, 20). This was also confirmed by the results of the current study, showing the evident lack of MC related knowledge, particularly among the male technical support staff and the athletes themselves. In fact, the existing research is unanimous in recognising the urgent need for educational interventions for both the athletes and the support staff to ensure better communication and support in female sporting environments.

While several studies have aimed to understand the level of menstrual health knowledge in female athletes (20-22), this understanding has been almost absent when it comes to support staff (23, 24). The current study, therefore, also included a few MC knowledge questions to both the athletes and support staff. The results revealed that men in technical staff had the widest knowledge deficit. In fact, male technical support staff reportedly struggled to define key menstrual cycle issues such as amenorrhea and the Female Athlete Triad (FAT).While the majority of the athletes were able to answer correctly to the question regarding the duration of the MC, their perceived knowledge of the FAT was poor across both the professional and nonprofessional settings. This lack of understanding might have serious consequences as the FAT can lead to stress fractures (due to osteoporosis), increased cardiovascular and mental health issues, and infertility (25). Such conditions, particularly the loss of bone mineral density and infertility, may not be reversible, causing long-term harm that affects not only the athlete's sporting career but other parts of life as well. It is therefore of utmost importance that female athlete-specific education requirements are integrated into support staff, coach and/or competition licensing, to ensure the proper support considerations are implemented, thereby protecting athletes from potentially harmful practices.

Even though there is not yet sufficient research to support adjusting training based on the MC phase (26-29), many athletes recognise their bodies' natural fluctuations. As demonstrated in this study and others (28, 30), they are aware of the times when they can 'push it' or when they need to 'go easy' based on where they are in their cycle. Hence, the athletes perceive the MC impacting performance, even though the perceptions vary within and between the individuals. Indeed, due to the high variability of the MC length and frequency, symptoms, consistency of symptoms, and perceived impact on performance, (31-34) an individualistic approach is required, as also recommended by the support staff in this study. To accomplish this, tracking and monitoring, not only the MC but also the symptoms, injuries and performance data, as well as contraceptive use, becomes a central part of providing better and more individualised support to athletes. This is only possible, however, when the security and privacy of the menstrual and reproductive health data can be guaranteed. Nevertheless, support considerations should not end with the MC, as many other aspects need to be considered. These include pelvic floor and breast health, pregnancy, post-partum return-to-perform, as also highlighted by support staff. Other aspects, such as mental health issues, whether related to the MC or not, are also important.

It is obvious that more research is needed, as highlighted in the FASE support considerations. However, a shift in approach is needed to gain a better understanding of how to support the individual athlete. The voices and experiences of athletes and support staff are central to better understanding their support needs. Moving from doing research *on* athletes and the support staff to doing research *with* them is therefore essential. Coproduction has been suggested as a method to achieve this (35). Ultimately, it is time to move the needle towards a sporting culture that considers the MC as a natural physiological process, accepting and fully integrating it as a normal part of training and supporting female athletes. To achieve this, the gendered sporting context as the fundamental barrier to female athlete support in general, and MC related support in particular, needs to be dismantled. This requires a collaborative process involving athletes, support staff, administrative and management staff, researchers, product developers (sponsors), and technology providers. Hence, an iterative and socioculturally relevant coproduction process should be used to create a unified physical and digital Female Athlete Supportive Environment (FASE).

Conclusions

This study has addressed a critical gap in understanding the multifactorial support needs around the MC in female athletes and the gendered sporting context as the underlying cause of the current lack of support. Seven support considerations for a female athlete supportive environment were identified and specified with the help of thematic content analysis. These support considerations lay the foundation for the development of the Female Athlete Supportive Environment (FASE) ensuring that research continues to evolve in collaboration with key stakeholders.

To conclude, regardless of the complex and multidisciplinary nature of this research area, it is better to start taking practical steps toward better female athlete support than to wait, and to "research while doing it", as knowledge expands in the intersection of research and experience.

Practical applications

- While 66.3% of the professional and 79.1% of the nonprofessional athletes report MC impacting their performance, only around 14% of them received specific support or interventions to mitigate the impact.
- Knowledge and, therefore, education is a precursor for improved support. However, as menstrual health knowledge is still low, especially among male technical staff and athletes themselves, educational interventions are desperately needed.
- A more in-depth understanding of what a Female Athlete Supportive Environment entails (in relation to the MC but not limited to it) is needed.
- The seven support considerations, namely education, communication, training and performance, medical, wellness, resources, and research, uncovered in the analysis, provide the basis for such an environment. As a next step, this environment needs to be developed through coproduction with the relevant key stakeholders, including female athletes and support staff.

Limitations

The study's primary limitations include:

- Reliance on self-reported data, which may be subject to recall bias.
- Potential for selection bias due to the voluntary nature of the survey.
- The original survey was conducted solely in English despite a global distribution, which likely excluded non-English speaking participants and created a potential for misinterpretation of specific terms in other languages.

- Methodological assumptions made during the merging of data from two separate stages. For instance, key assumptions that could influence our findings include:
  - Recategorising "I don't know" responses as "No".
  - Categorising open questions as "Yes" or "No" and assuming that a "Yes" to a definition-based question implied a correct answer.

Acknowledgments

The authors would like to thank all the athletes and support staff members who participated in this study and provided valuable information, which contributes to an improved understanding on how to better support female athletes. We also extend our gratitude to the Kitman Labs performance strategists, applied sports scientists, and data scientists who contributed with their knowledge and expertise when designing the survey and helping to distribute it far and wide across the globe.

Conflicts of Interest

This research was commissioned by the global sports technology company Kitman Labs, and the authors are contractors or employees of the commissioned company. There is no gain for the authors or Kitman Labs, financial or otherwise, as a result of the study's findings, nor would there have been had the findings been different.

Data Availability Statement

The data used in this study were obtained from a third-party source under restrictions. Access to these data is subject to approval from the data provider and cannot be shared by the authors. Requests for access should be directed to the commissioned company of this study at Legal@kitmanlabs.com.

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Appendix

Methods

The following bullet points detail the steps taken to merge the original and adapted datasets:

- *Harmonised the language*: the language in the two datasets was made consistent to facilitate the merge. For instance, terms such as "player" and "woman" from one survey were aligned with the original survey's use of "athletes" and "female".
- *Translation of Qualitative Data*: open-ended responses received in languages other than English (e.g., Spanish and Portuguese) were translated into English using Google Translate prior to thematic analysis.
- *Nulled values*: specific observations were excluded from the final analysis due to two primary data quality issues. The first was a poorly translated question that did not align with the original metric's categories. The second was a logic problem that led to the exclusion of data from respondents who should not have answered a particular question.
- *Added metrics to dataset provenient of the adapted survey*: because the league's population was homogeneous, certain questions from the original survey were not included in their version. To enable a successful merge, questions such as "professional status" were added back into the partner's dataset with a single, consistent value for all respondents.
- *Excluded metrics*: some metrics were excluded from the final analysis because they either did not have an equivalent question in both surveys (e.g., the adapted survey did not ask athletes about amenorrhea) or were incompatible due to differing response scales (e.g., a ranking question with unmatched options) or a different core meaning.
- *Categorised numerical metrics*: to maintain consistency, some numerical metrics from the adapted survey (such as

age) were converted into categories to match the structure of the original survey.

- *Categorised open-ended questions*: open-ended questions from the original survey were categorised to match the multiple-choice options in the adapted survey. This was done to enable a unified quantitative analysis across both datasets.
  - In some cases, originally open-ended questions were re-defined by the partner. For example, the original open-ended question "What components make up the Female Athlete Triad?" was adapted into a multiple-choice question: "Can you define the Female Athlete Triad?". For questions of this type, we manually categorised the open-ended responses from the original survey as "Yes" for a correct answer, "No" for an incorrect one, and "I don't know" if the respondent explicitly stated they did not know the answer.
- *Recategorised inconsistent categorical data*: to enable a successful merge, all extra or differing categories from the adapted survey were addressed through specific coding rules:
  - "I don't know" or "I'm not sure" categories for yes/no questions were re-coded as "No," as these questions focused on opinions, awareness and experiences rather than factual information.
  - New options added in the adapted survey were merged into the best-matching categories from the original survey. This included combining a new "I am not comfortable..". option into the "I am equally comfortable..". category. This was done to ensure consistency and comparability across the merged datasets.
- *Merged split questions*: to align with the original survey, two related questions in the adapted survey were merged into a single metric. A 'Yes' response for this combined question was only recorded if the respondent answered 'Yes' or both of the partner's questions, All inconsistent responses, including 'I don't know' and divergent answers, were re-coded as a 'No' for the final analysis.
- *Converted multi-select questions to single-choice*: to maintain consistency between the surveys, questions that were multi-select in the adapted survey were transformed into single-choice using a logical hierarchy. For example:
  - For a question about tracking methods, if a respondent selected both "a tracking app" and "diary or calendar record", the more specific option of "a tracking app" was chosen as the final answer.
  - For questions on professional roles, the wider, more encompassing role was selected from the multi-select options.
  - For questions around education and training content, options were prioritised based on a hierarchy of formality.