Menstrual cycle impact and barriers for football and futsal performance of Portuguese players – a survey-based cross-sectional study

Cristiana Santos[1]; Mário Lopes[2]; João Brito[3]; Katrine Okholm Kryger[4,5]; Carolina Wilke[5]; Bruno Travassos[1,3,6]

[1] University of Beira Interior – Department of Sport Sciences, Covilhã, Portugal

[2] Institute of Biomedicine, School of Health Sciences, University of Aveiro, Aveiro, Portugal

[3] Portugal Football School, FPF, Lisboa, Portugal

[4] UEFA Medical, UEFA, Nyon, Switzerland

[5] Faculty of Sport, Applied Health and Performance Science, St Mary's University, London, UK

[6] Research Centre in Sports, Health Sciences and Human Development, CIDESD, UBI, Covilhã, Portugal

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Abstract

The objective of this study was to investigate the perceived impact of the different phases of the menstrual cycle to football and futsal participation, and identify barriers that may limit performance and participation of Portuguese female players across competition levels. An online survey was conducted with the following inclusion criteria: registered participation in football or futsal in Portuguese official championships; age equal or superior to 18; and perceived regular menstrual cycles. A total of 197 answers were obtained and analysed. Most participants were 18-25 years old (61%) and 59% played futsal. Top-tier league players represented 15% of respondents, mid-tier 26% and low-tier 59%. For most respondents, the first three days of menstruation were perceived as having the most negative impact (66%), with abdominal pain, bloating, and breast tenderness being the most common symptoms. Players also associated the menstrual phase with decreased performance (endurance and power) and self-confidence, whereas they generally felt more confident and motivated during ovulation. No significant differences were found between sports (football and futsal) or competition levels in the perceived impact on performance and participation ($p>0,05$). Overall, 53% of the players reported perceived lack of knowledge and trust in their coach and other staff members to talk openly about menstrual health. The most cited external barrier to sports participation was the fear of leaking. To address the challenges identified five intervention levels were proposed: communication, comprehension, education, equipment and facilities. These findings emphasize the need for better communication, education, and structural support to reduce menstruation-related barriers.

Keywords: *women, soccer, competitive behaviour, exercise, physical fitness.*

Introduction

Football and futsal are two team sports with a significant increase in female athlete participation worldwide. Portugal is not an exception. Recently, the Portugal Football Observatory reported that the participation of female athletes in football and futsal have increased by 132% between 2012/2013 and 2022/2023 season (Portugal Football Observatory, 2024). Despite this substancial rise in participation, little is known about the menstrual health of these athletes and its impact on participation and performance. In fact, to guarantee a sustainable future for women's football and futsal, increasing the understanding of specificities of the womens' game and the female players is needed to continuosly support the quality of practice (de Jonge et al., 2019).

Women's menstrual health is an important factor in optimizing support for female players. Multiple studies report that the majority of women experience some type of pre-menstrual symptoms, with the most frequent being mood changes/anxiety (59-91%), increased tiredness/fatigue (80-86%), abdominal pain (71-84%), and breast pain/sensitivity (83%) (Brown et al., 2021; Bruinvels et al., 2021; Findlay et al., 2020;Morales et al., 2023). Additionally, sleep quality is often reported as being negatively affected during pre-mesntrual phase (Carmichael, et al., 2021;Ekenros et al., 2022). Whilst no clear physical performance variations have been observed during the pre-menstrual phase (McNulty et al., 2020), several studies have highlighted changes in self-perception regarding their sporting abilities. A high percentage of female athletes report experiencing changes in training, performance and overall wellbeing throughout the mentrual cycle (von Rosen et al., 2022). Notably, physical performance has been positively correlated with self-reported motivation and an athlete's perception of their own performance level, regardless of the menstrual phase

(Dam et al., 2022). Moreover, menstrual cycle-related symptoms and well-being perception variations can have implications not only on individual capacity perception but also on team trust climate (Read et al., 2022).

Although these topics have received the attention of the scientific community, few studies have investigated the influence of the menstrual cycle on participation and performance in female football and futsal players according to specificities of each country and culture (Costa et al., 2022; Pinel et al., 2022). Given the cultural and contextual differences, the increasing participation in these two sports modalities (i.e., football and futsal), and despite the growing number of young female athletes in Portugal, any research have investigated the portuguese players' perceptions and symptomatology related to the menstrual cycle. It is also essential to examine whether the differing demands of the sports influence these perceptions and whether the level of competition affects those perceptions. For that, the primary objective of the current study was to identify the players' experienced symptoms and participation barriers related to the menstrual cycle across playing levels. The secundary objectives were to investigate differences between sports and playing levels, as well as the influence of the most prevalent symptoms on performance perception and sports participation. We hypothesised that symptoms would be more pronounced during the mentrual phase and would impact players' experienced performance and participation. The findings from this research could provide valuable information to help break down barriers and foster an environment of trust and understanding in women's sports.

Methodology

Study Design

A survey-based cross-sectional research was conducted according to STROBE guidelines (Von Elm et al., 2007). This research was granted ethical approval by the Research Committee of Ethics of University of Beira Interior (CE-UBI-Pj-2020-040). The study aligned with The Checklist for Reporting Results of Internet E-Surveys (Eysenbach, 2004; Appendix 1).

The following inclusion criteria were set: regular participation in organised football or futsal in a Portuguese league; 18 years or older; not using oral contraceptives; and regular menstrual cycles (menstrual cycle that occurs regularly and last between 21 to 35 days) (Carmichael et al., 2021). The survey used was previously validated and used to analyse the impact and barriers related to the menstrual cycle in amateur female football players in England (Pinel et al., 2022). The original survey was provided by the authors in English, then translated by a football expert (BT) into Portuguese, and back-translated into English by a second author (ML) to verify congruence. The Portuguese version of the survey was piloted on two participants to assess the congruence and identify any potential linguistic errors in the questions. Since the pilot testing was informal, it may be considered a potential limitation. No changes were made following the pilot fase. Six closed-response questions concerning the influence of the technical team on the perception of sports performance impact and one open-response question regarding barriers to sports participation were added to the original questionnaire for relevance to the research, following key topics from literature review. The questionnaire consists of 25 items related to: participant characteristics, sports background, clinical history, impact of menstrual cycle on sports performance and barriers to participation. The final 25-item survey available in Appendix 2. The questionnaire was

administered online via Google Forms (Google Corp, California, USA). The participation invitations were sent to the official emails of clubs participating in Portuguese football and futsal competitions regulated by the Portuguese Football Federation, spanning low tier (regional leagues), mid-tier (second leagues), and top tier (major league in the country) leagues and no randomization was performed. The participation was voluntary and no incentives were offered. Considering that the survey link was sent to clubs, potential sampling bias is acknowledge, as only the more engaged players answer it. Participants were offered to sign informed consent after reading an information sheet at the start of the survey explaining the study. The survey could only be accessed if informed consent was granted. The survey was divided into seven sections, with all questions being mandatory and the participants having the possibility to go back and change the answers until the survey was submitted. No identifiable information from the participants were retained. The limit of one response person was managed by ensuring participants completed the survey using their personal google account. The timeframe used for collecting responses was six months (January to June 2023).

Data analysis

The descriptive and inferential statistical analysis of the database was conducted using SPSS Statistics 27 (IBM, New York, USA). Descriptive statistic was used to describe participant's characteristics, self-reported menstrual symptons and experienced impact of the menstrual cycle on performance and participation. Due to sample size and observed expected counts greater than 5, Pearson's chi-square test was used, to assess statistical relationship between the perceived impact of the menstrual cycle ("*Do you feel like your menstrual cycle limits*

you on playing your sport?") and sports type, level of practice and menstrual cycle characteristics. A p-value of ≤0.05 was considered for statistically significant relationship between variables. A content analysis of open-response items was conducted using Braun and Clarke's six-step model (Braun & Clarke, 2006). The inductive analisys was performed by CS and checked again by BT, with each response grouped based on its relevance to the research. These groups were then compared and further categorized.

Results

Participants

A total of 197 athletes completed the survey. From these, no participants were excluded for not meeting inclusion criteria or not completing the survey. Table 1 presents the demographic and playing characteristics of the particpants. The sample consisted of a mixture of female football (41%, n=81) and futsal (59%, n=116) players playing in Portugal. The participants were distributed across different competition levels in Portugal, with 15% (n = 29) playing in a top-tier league, 26% (n = 52) in a mid-tier league, and 59% (n = 116) in a low-tier league. The top-tier league had the lowest representation. Participants varied in age (61%, n=121 within 18-25 years, 21%, n=42 within 26-30 years and 17%, n=34 within >30 years), years of football/futsal practice (10±6 years), and weekly football/futsal training and matches hours (51%, n=100 played <6 hours, 31%, n=62 played 6-8 hours, 18%, n=35 played >8 hours).

Table 1. Participant characteristics

Characteristic		**Football n (%)**	**Futsal n (%)**	**Total n (%)**
		81 (41%)	116 (59%)	**197 (100%)**
Age (years)	18-25	65 (54%)	56 (46%)	**121 (61%)**
	26-30	12 (29%)	30 (71%)	**42 (21%)**
	31-35	3 (16%)	16 (84%)	**19 (10%)**
	36-40	1 (9%)	10 (91%)	**11 (6%)**
	40-45	0 (0%)	4 (100%)	**4 (2%)**
Country Region	North	23 (41%)	33 (59%)	**56 (28%)**
	Center	46 (42%)	64 (58%)	**110 (56%)**
	South	6 (30%)	14 (70%)	**20 (10%)**
	Islands	6 (55%)	5 (45%)	**11 (6%)**
Competition Level	Top tier	22 (76%)	7 (24%)	**29 (15%)**
	Mid tier	27 (52%)	25 (48%)	**52 (26%)**
	Low tier	32 (28%)	84 (72%)	**116 (59%)**
Championship	Portuguese League	34 (57%)	26 (43%)	**60 (30%)**
	National Championship II Division	16 (41%)	23 (59%)	**39 (20%)**
	National Championship III Division	20 (95%)	1 (5%)	**21 (11%)**
	National Championship Under 19	6 (86%)	1 (14%)	**7 (3%)**
	Regional League	5 (7%)	65 (93%)	**70 (36%)**
Practice hours per week	<6	30 (30%)	70 (70%)	**100 (51%)**
	6-8	23 (37%)	39 (63%)	**62 (31%)**
	>8	28 (80%)	7 (20%)	**35 (18%)**

Main Results

Self-reported menstrual symptoms and signs

When asked to report their typical menstrual flow during their menstrual phase, half of participants reported having a moderate flow (48%, n=94) and one third reported having a heavy flow (34%, n=67). Figure 1 shows the frequency of menstrual symptoms reported by the participants. The most prevalent menstruation related symptoms were abdominal pain (23%, n=45), bloating (23%, n=44), and breast sensitivity (18% , n=36) with fewer than one in four participants reporting these symptoms as 'always' occurring. Additionally, symptoms reported as "*frequent*" included irritability (29%, n=58), bloat (25%, n=49) and low energy (24%, n=47; Figure 1).

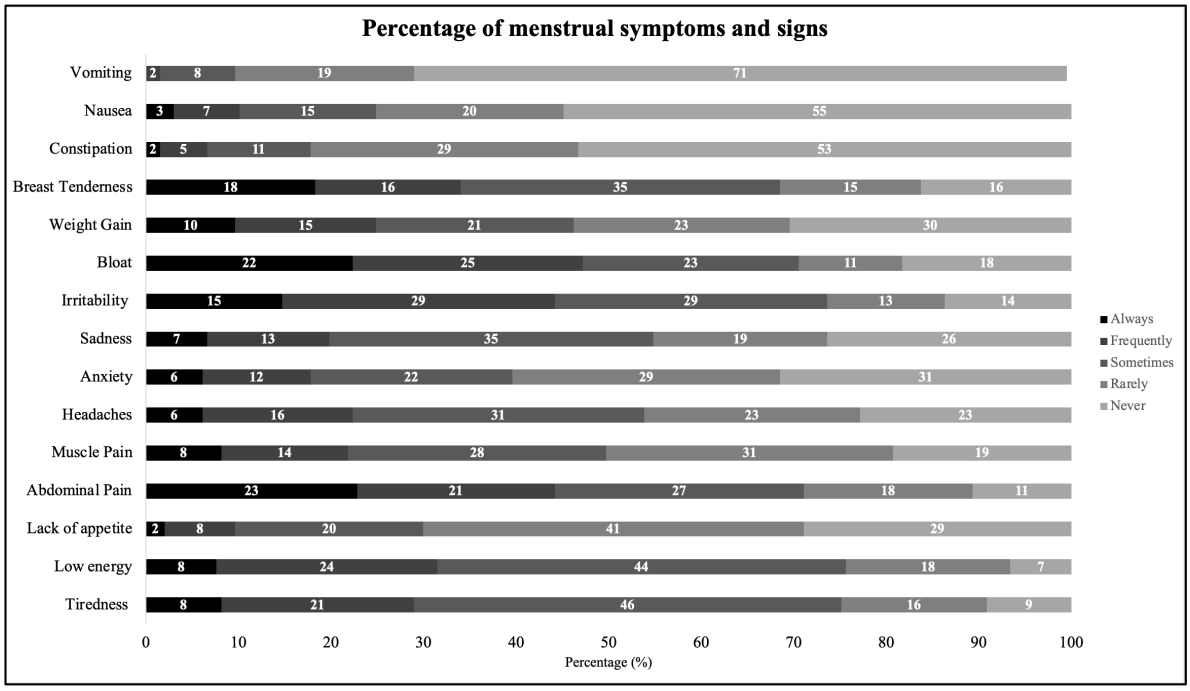

Figure 1. Frequency of menstrual symptoms and signs reported by participants

Experienced impact of menstrual cycle on performance and participation

Three in four players (75%, n=147) reported feeling limited to participate in football/futsal due to menstruation. In most cases, the limitation lasted for 1-3 days (66%, n=128), whilst longer limitations were less frequently reported (8%, n=15; Figure 2). Furthermore, 9% (n=17) of players avoided football/futsal activities during menstruation (Figure 2). Regarding the impact on performance, less than half of participants felt performance changes during the menstruation phase with 41% (n=80) reporting an experience of decreased overall performance, decreased aerobic capacity (37%, n=74), and decreased power (35%, n=69) during menstruation compared to the rest of the menstrual cycle.

Although less pronounced, during the menstrual phase, some participants reported lower motivation to play, being much worse compared to the rest of the menstrual cycle (12%,

n=24). In the pre-menstrual phase, the aforementioned variables were also reported as 'worse' compared to the rest of the cycle. In the ovulatory phase, one in five players reported improved confidence and power (21%, n=41) compared to the rest of the menstrual cycle. Additionally, the motivation to play was reported as much better ("*much better than in the rest of the menstrual cycle"*) by 10% (n=20) of the participants. Of all the variables analysed descriptively, the one that varied the least according to the menstrual cycle phase was the fear of injury, with similar percentages in all the menstrual cycle phases.

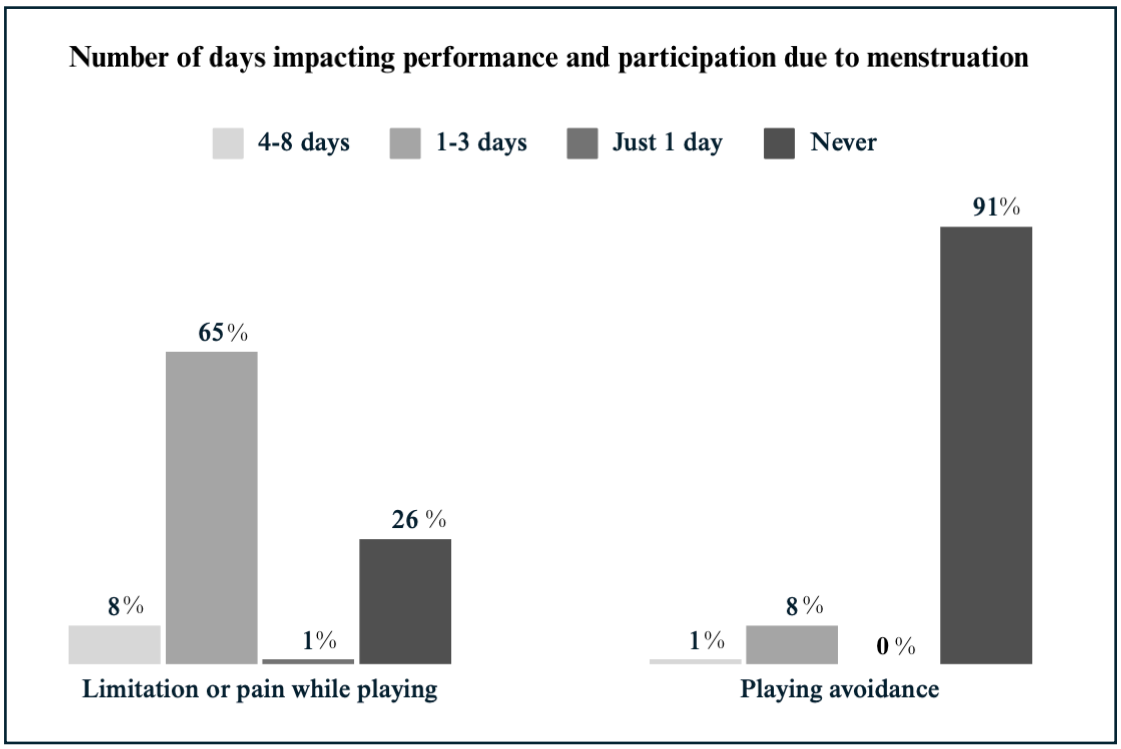

Figure 2A and 2B. Limitation to sports participation related to the menstruation. A. Experienced limitation or pain while playing due to menstruation. B. Playing avoidance due to menstruation.

Perceived limitation to play according to sport (football and futsal) and playing levels

The analysis of the perceived impact of menstruation on participation and performance ("*Do you feel like your menstrual cycle limits you on playing your sport?"*) did not significantly

differ between football and futsal players ($X^2(4)=6.7$, $p=0.150$) nor did it differ between playing level ($X^2(8)=5.9$, $p=0.664$).

Technical team and menstrual cycle

Among all participants, 78% (n=154) were coached by a male coach. Overall, 53% (n=104) felt that their coach and technical staff lacked sufficient and appropriate knowledge about the influence of menstruation on their sports performance and participation. Notably, 76% (n=22) of top-tier players perceived their coaches and technical staff as having less knowledge of the menstrual cycle and its implications for sports performance compared to mid-tier (48%, n=25) and low-tier players (49%, n=22) ($X^2(2) = 7.279$, $p \leq 0.05$), suggesting that top-tier players were more likely to perceive a lack of menstrual cycle knowledge among their coaches and staff. One third (32%, n=62) of the players reported not feeling confident discussing the menstrual cycle with their coach and technical staff. When asked with whom they usually discuss menstrual cycle and perceived limitation in performance and participation within their team, most players (77%, n=152) reported only talking to their teammates, whilst only 7% (n=13) talked to the coach and the remaining 16% (n=32) with their medical team.

Barriers related to sport performance and participation during menstruation

One in five responders, across sports and competition levels, feared menstruation leakage ("*Always*"; 22%, n=44). This was followed by concerns related to the fit or colour of sports equipment ("*Always*"; 17%, n=34) and issues with sanitary products ("*Always*"; 15%, n=30). The least influential factors affecting sports performance were the social taboo surrounding

menstruation ("Never"; 39%, n=76), followed by access to appropriate facilities ("Never"; 21%, n=42; Figure 3).

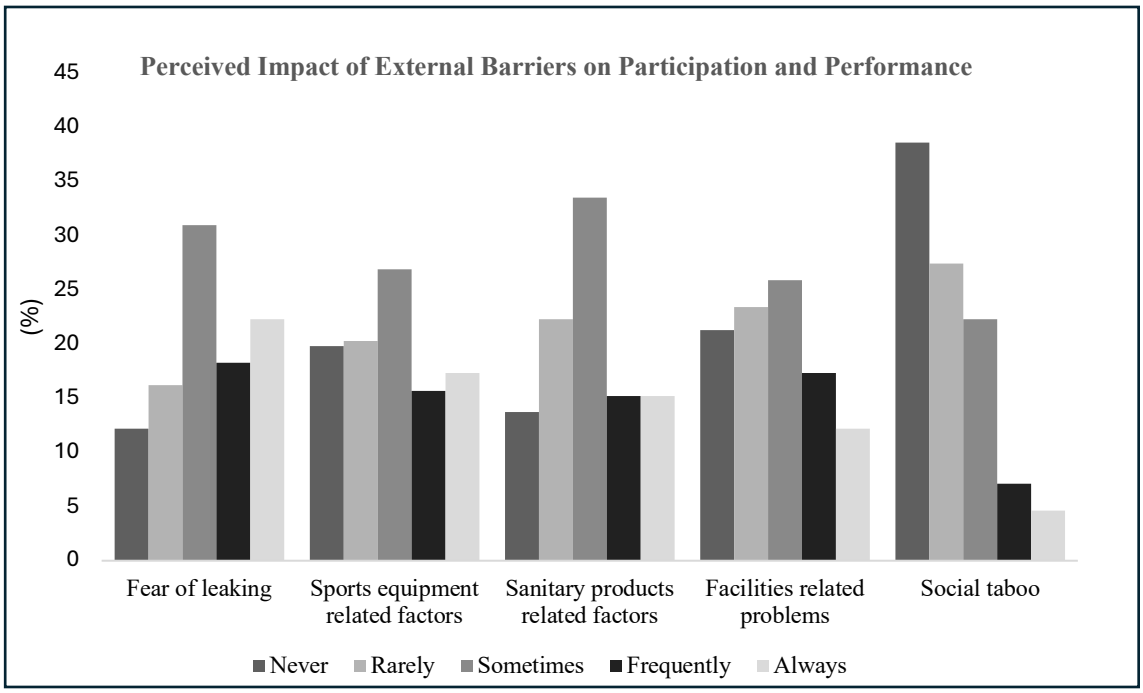

Figure 3. "How do you feel like the following factors affect your sport participation or performance?"

Proposed strategies to mitigate the barriers related to the menstrual cycle.

When asked in an open question, how participants thought the above-mentioned barriers could be improved, 93 responses were obtained. Some examples are shown in Table 2. Five categories were identified: communication, understanding, education, equipment, and facilities (Figure 4).

- Communication

Players emphasized the need to *'improve dialogue'* between teammates and the technical staff regarding the menstrual cycle and its impact on sports performance. They also highlighted the importance of *'increased awareness'* from clubs and their technical teams

about the menstrual cycle and its potential effects on players performance and participation. While only a few participants identified the social taboo surrounding menstruation as a performance barrier in the external barriers section, many players stressed the need to *'break this taboo'* and *'normalize the dialogue'* in their open responses. They believe that this normalization would *'improve trust'* between the club, technical staff, and players.

- Understanding

Players emphasized the importance of coaches *'understanding the individuality of symptoms'* experienced during the menstrual cycle and recognizing that availability and motivation to play may vary due to these symptoms. They also stressed that menstrual cycle information should not be used as a *'criterion for excluding players'* from selection. Additionally, players reported that both coaches and clubs should '*adopt inclusive policies'* that allow for a reduced training load when necessary and, in cases of severe symptoms, permit absences from training without repercussions.

- Education

The most frequently mentioned topic was the importance of education. For players, education was seen as a way to develop understanding and knowledge about the impact of the menstrual cycle on sports performance and effective *'ways to manage symptoms.*' For coaches, education was suggested to improve their understanding of the individuality of symptoms experienced by players, allowing them to adjust training plans and manage workloads accordingly, ultimately enhancing both performance and well-being. Suggested methods included lectures, educational sessions, integrating this topic into coaching courses, club-level training, and creating charts to track players' menstrual cycles and associated symptoms.

- Equipment

Players emphasised the importance of security and comfort. The results highlighted discomfort with kits that were too tight or too light in colour. It was suggested that primary and secondary uniforms should not be white and that overly tight uniforms should be avoided.

- Facilities

Hygiene conditions were identified as the main area for improvement by participants. They emphasized the need for clean and sanitized facilities, including toilets equipped with trash bins and toilet paper. Additionally, some suggested providing feminine hygiene products, such as tampons and sanitary pads, in the changing rooms.

Table 2. Strategies proposed to mitigate the barriers related to menstrual cycle - examples of participant quotes

Communication
"We should start talking openly about the menstrual cycle with the entire team. There should be someone on the staff who discusses the importance of menstrual health, without any taboos." *"There is a need for more awareness from all parties, and the dialogue about menstrual cycle should be promoted."* *"We need to improve communication between coaches and athletes, allowing the athletes to openly inform coaches about their symptoms while menstruating."* *"Clubs can help normalize discussions about menstruation by making it a regular part of locker room conversations. This can help reduce the stigma surrounding menstruation and make players feel more comfortable discussing their needs."*
Understanding
"It's important to normalize menstrual tracking for athletes to ensure that adjustments to training volume and intensity can be made when needed." *"It's important for the coaches to understand the extent of the limitations each player experiences due to their individual menstrual symptoms to allow adjustments to the training plan."*

"There is an important need to improve understanding, comprehension and support by encouraging open discussions and providing answers to players regarding menstrual health."

"Adopt inclusive policies: clubs should have inclusive policies that allow players to take days off during their menstrual period if necessary. This can help ensure that players have time to recover and prevent injuries."

"Understandig, no doubt. Especially when male coaches are leading female teams. The effects of menstruation vary from woman to woman, but men often have no idea how limiting menstruation can be for some women on certain days."

Education

"Promotion of lectures and courses for technical teams and staffs on menstrual health."

"Facilitating access to scientific information for staff and players to improve knowledge."

"It is important for clubs to ensure that coaches and athletes have accurate knowledge about menstrual health, fostering a climate of trust and making players feel comfortable to discuss their needs."

"Provide information: t is important for clubs to offer information about menstrual health to their players. This can include details about the menstrual cycle, common symptoms, and how to manage them."

"Creating a table with each athlete's menstrual cycle information would allow the coaching staff to better understand and support players during those periods. This would help in adjusting both physical demands and psychological support according to individual needs."

Equipment

"The selection and use of darker kits should be preferred, for primary and secondary uniforms."

"Avoid the use of white kits"

"Improvements in equipment regarding the fitting and the colour- shorts shouldn't be too thigh or in white colours."

Facilities

"Ensure that the facilities are properly cleaned and that trash bins are available"

"Better hygiene conditions in all sports facilities."

"Toilets should have appropriate trash bins."

"Female hygiene products should be available in the dressing rooms"

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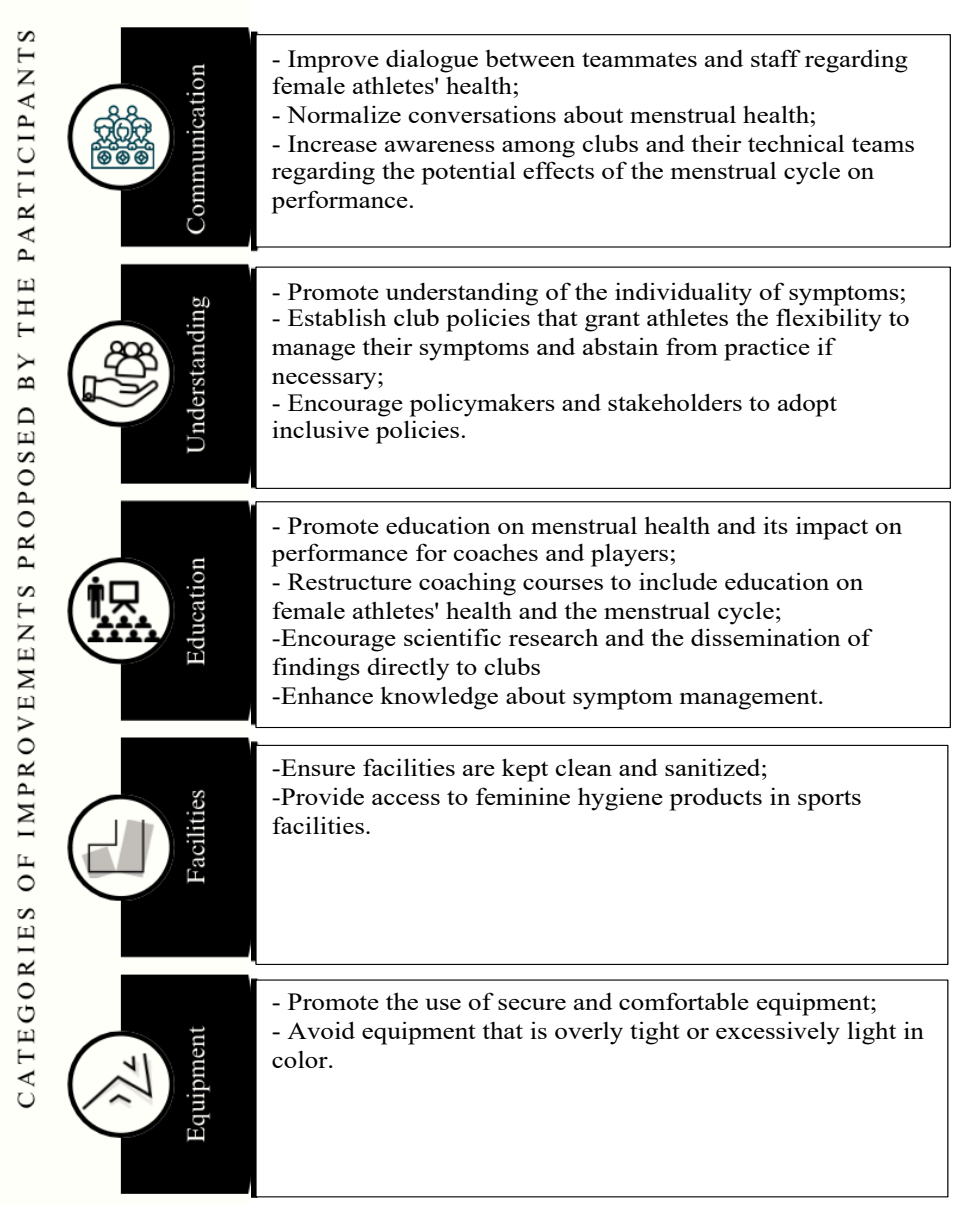

Figure 4. Improvements proposed by the participants to mitigate the barriers related to the menstrual cycle.

Discussion

This study aimed to explore the experienced symptoms and barriers to participation and sports performance related to the menstrual cycle among female football and futsal players

in Portugal. The main findings indicate that (1) players perceive a negative impact on performance during menstruation, with the greatest limitations occurring in the first three days; (2) the most frequently reported symptoms are abdominal pain, bloating, and breast tenderness; (3) the menstrual phase is strongly associated with perceptions of decreased performance, self-confidence, endurance, power, and readiness to play, while the ovulation phase is linked to higher confidence and motivation; (4) no significant differences were found between sports or competition levels in the perceived impact on performance and participation; (5) players reported a perceived lack of knowledge and trust in their coaches and other staff members for discussing menstrual cycles openly; (6) to address menstrual cycle-related barriers, players propose improvements in communication, understanding, education, equipment, and facilities.

Consistent with previous studies, our findings suggest that most football and futsal players experience some performance variations throughout their menstrual cycle (Bruinvels et al., 2022; Carmichael et al., 2021; Ekenros et al., 2022; Pinel et al., 2022). According to previous research of Pinel et al. (2022), some players perceived decrease in performance the first three days of menstruation. Although a range of symptoms were experienced by some players in the first three days, absence rates remained low. This finding also aligns with previous studies (Findlay et al., 2020;Ergin & Kartal, 2020). However, further investigation is needed to better understand the biological factors and personal reasons behind players' decisions to abstain from training or matches, as well as to develop appropriate support strategies.

The more frequently reported symptoms related to the menstrual phase included abdominal pain, bloating, and breast tenderness. These symptoms partially align with another studies on football players (SantaBarbara et al., 2024; Pinel et al., 2022). Similarly, top tier level football players have reported fatigue and abdominal pain as the most common symptoms, which also

312 partially support the results of this study (Read et al., 2022). This study focused on the
313 frequency of menstrual symptoms rather than their intensity. Future research on symptom
314 intensity among Portuguese football and futsal players would be valuable in determining
315 how, and to what extent, symptom severity impacts performance and participation. This
316 knowledge could help develop targeted strategies to mitigate symptoms, enhance player well-
317 being, and optimize performance. Additionally, further research could explore ways to
318 mitigate these symptoms in athletes, both pharmacologically and non-pharmacologically.
319 Deodato et al. (2023) found that physical therapy, specifically manual therapy and pelvic
320 floor exercises, could be an effective tool for mitigating primary dysmenorrhea. Similar
321 strategies could be investigated in team sport athletes to assess their potential benefits in
322 improving performance perception and reducing menstrual-related discomfort.
323 Furthermore, consistent with previous research investigating mestrual symptoms across
324 various sports, symptoms do not appear to differ significantly between sports and competitive
325 levels (Ekenros et al., 2024; Brown et al., 2021; Bruinvels et al., 2021; Solli et al., 2020). It
326 is, therefore, essential for coaches and technical staff across all levels and sports to
327 understand the prevalence and impact of both positive and negative symptoms, enabling them
328 to provide the necessary support for players and promote continued participation in football.
329 A systematic review by McNulty et al. (2020) found a trivial and non-significant change in
330 performance during the early follicular phase, though the literature remains inconclusive.
331 However, despite being based solely on perception, some players reported a decrease in
332 overall performance during menstruation and an increase during the ovulatory phase. These
333 findings have also been reported in various studies (Ihalainen et al., 2024; Pinel et al., 2022),
334 further supporting the notion that performance variations throughout the menstrual cycle may
335 be influenced by both physiological and psychological factors. Additionally, the positive

correlation between readiness for sports participation and motivation to play may play a crucial role in shaping athletes' performance and experiences throughout the menstrual cycle (Dam et al., 2022). While the present study primarily identified a higher frequency of physical symptoms, further research should emphasize psychological symptoms and athletes' mental health to provide a more comprehensive understanding of their impact on performance and well-being. Hence, coaching staff's relationship with players to comfortably communicate on symptoms, is essential to help adjusting training, improve well-being strategies and support any potential psychological barriers. This has also been reported in other study, highlighting the need to stablish structured communication pathways, considering individual needs and preferences (Taim et al., 2023).

Menstrual cycle tracking has been utilized in several studies related to menstrual health. For example, Verrier et al. (2024) found that, in elite rugby players, this method led to personal benefits by increasing the understanding of their menstrual cycle and symptoms, allowing them to respond more effectively to those symptoms. It also improved relationships, enhanced communication and interactions with coaches and support staff, and facilitated team support. Tracking the menstrual cycle increased opportunities for open conversations between athletes, coaches, support staff, and teammates about the menstrual cycle. Due to its simplicity, such as through phone apps, menstrual tracking is an accessible and practical method across different playing levels. It allows athletes to record cycle length, duration, and intensity of the period, as well as the occurrence and frequency of common cycle symptoms. This helps in gaining a better understanding of the individual needs and necessities of each athlete (Roffler et al., 2024). Given its effortlessness and ease of use, even at amateur-level

sports competitions, menstrual tracking could be considered an effective tool for supporting the health surveillance of female athletes.

Cultural considerations should also be taken into account, as our study focuses on female Portuguese athletes, and cultural beliefs and education regarding menstruation may influence the results. According to Coutinho et al. (2021) 86.3% of athletes from multiple sports perceived performance variations throughout the menstrual cycle. Additionally, a high percentage of athletes (82%) reported using hormonal contraceptive methods, which aligns with the contraceptive practices commonly adopted by the Portuguese population. The menstrual patterns observed in that study are similar to the characteristics found in our research, with a significant proportion of athletes reporting menstrual pain and low energy availability during menstruation. At the time of publishing, no information was found regarding Portuguese coaches' education on menstrual health. However, based on insights gathered from athletes in the present study, we can anticipate difficulties in communication and a mutual discomfort in discussing menstrual cycle experiences between athletes and coaching staff.

Amongst external barriers to performance related to the menstrual cycle, fear of menstrual blood leaking the equipment was considered the most limiting factor. Overall, players did not perceive their coaching staff as having sufficient knowledge or confidence to openly discuss menstrual cycle topics and improvements in five levels were proposed: communication, understanding, education, equipment, and facilities. These are similar to external barriers related to menstrual cycle in various studies: female players continue to report constraints in communicating with their coaches, feeling fear, discomfort, and shame when discussing the topic (Read et al., 2022). Also, players from this study reported

perceived gaps in coaches' and technical teams' knowledge about menstrual cycle, its symptoms, and its potential impact on performance. The issue of insufficient knowledge is widely reported, along with barriers to open communication. This may explain why players prefer discussing these issues among themselves, and the low percentages of participants who talk about these issues with their coaches (Armour et al., 2020). Interestingly, this study suggests a negative association between competitive level and technical team knowledge where at higher competitive level, players perceive their technical teams to be less understanding of the impact of menstrual cycle on players' performance. Future research could investigate whether players at higher levels of professionalism have a better understanding and awareness of menstrual-related issues, which may lead to the perception that the technical team's knowledge is comparatively lower. Another potential line of research could explore whether, in more competitive and professional contexts, external pressures to achieve competitive results cause technical teams to undervalue these issues. A previous study investigating educational needs of coaches regarding menstrual cycle revealed a necessity to provide training and increase their knowledge to identify and refer players with menstrual dysfunctions or other related health issues, promote collaboration among athletes, coaches, and staff, and facilitate effective communication among all parties (Clarke et al., 2021). Therefore, efforts should focus on improving existing knowledge and facilitating its dissemination among players, coaches, and other stakeholders, by creating education programs centred on players and their individual needs to establish a structured support network that addresses women's health and performance (McHaffie et al., 2022).

The possibility of establishing partnerships with healthcare professionals specialized in female health should be considered to educate athletes and coaching staff about menstrual

health through lectures and educational sessions. Additionally, implementing club-level policies to support and protect athletes would be highly beneficial. Furthermore, enhancing the education of futsal and football coaches by restructuring coaching courses to include topics on the menstrual health of female athletes is crucial. Currently, these topics are not part of the existing coaching curricula in Portugal. Incorporating menstrual health education would empower coaches to become active advocates for their athletes' well-being, fostering better support, trust, and overall health management.

Strengths and Limitations

Focusing on a single country provided valuable and actionable insights for Portuguese football and futsal. However, it is important to note that findings may differ between nations and cultures outside of Portugal. A potential underrepresentation of severe symptoms should also be considered, as stigma surrounding menstruation may influence reporting. Furthermore, while using subjective experiences in research provides valuable perspectives, it should not be mistaken for objective perceptions and the self-reported nature of the survey could be a source of bias. For certain measures, conducting more quantitative assessments in follow-up studies would be beneficial to gain a more comprehensive understanding of the topic. It is well acknowledged that true identification of the hormonal phase requires physiological measures such as blood or urine samples, however, this is gold-standard. We believe there is a value in measuring players' experience in relation to their perceptions of their menstrual cycle based on 'bleeding' and approximation of date calculations. This value relates to the ecological validity of what players normally have available as indicators. Furthermore, the study did not inquire about the use of co-morbidities or medication used by players which could influence how the impact player experiences.

Conclusion

The study revealed that Portuguese female football and futsal players perceive the menstrual cycle to influence their sports participation and performance. Specifically, participants experience a variety of symptoms; though only a minority perceive them to limit their participation during menstruation. There was no significant association between in perceived participation impact and football performance and competitive levels. The main barriers identified by participants include lack of understanding, deficits in knowledge, the need for education, and poor and ineffective communication on the menstrual cycle topic. This study could serve as a foundation for further research to gain a deeper understanding of players' symptoms, limitations, and perceptions regarding the menstrual cycle. It could provide a framework to minimize menstruation-related barriers and improve overall well-being. The development of policies and intervention strategies for female football and futsal players, at both the club and federation levels, is a step that must be taken for ensuring athletes' safety, health, protection, and respect.

References

Armour, M., Parry, K. A., Steel, K., & Smith, C. A. (2020). Australian female athlete perceptions of the challenges associated with training and competing when menstrual symptoms are present. *International Journal of Sports Science and Coaching*, *15*(3), 316–323. https://doi.org/10.1177/1747954120916073

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology; In qualittaive research in psychology. *Uwe Bristol*, *3*(2), 77–101. https://psychology.ukzn.ac.za/?mdocs-file=1176

Brown, N., Knight, C. J., & Forrest, L. J. (2021). Elite female athletes' experiences and perceptions of the menstrual cycle on training and sport performance. *Scandinavian Journal of Medicine and Science in Sports*, *31*(1), 52–69. https://doi.org/10.1111/sms.13818

Bruinvels, G., Goldsmith, E., Blagrove, R., Simpkin, A., Lewis, N., Morton, K., Suppiah, A., Rogers, J. P., Ackerman, K. E., Newell, J., & Pedlar, C. (2021). Prevalence and frequency of menstrual cycle symptoms are associated with availability to train and compete: A study of 6812 exercising women recruited using the Strava exercise app. *British Journal of Sports Medicine*, *55*(8), 438–443. https://doi.org/10.1136/bjsports-2020-102792

Bruinvels, G., Hackney, A. C., & Pedlar, C. R. (2022). Menstrual Cycle: The Importance of Both the Phases and the Transitions Between Phases on Training and Performance. *Sports Medicine*, *52*(7), 1457–1460. https://doi.org/10.1007/s40279-022-01691-2

Carmichael, M. A., Thomson, R. L., Moran, L. J., Dunstan, J. R., Nelson, M. J., Mathai, M. L., & Wycherley, T. P. (2021). A pilot study on the impact of menstrual cycle phase on elite australian football athletes. *International Journal of Environmental Research and Public Health*, *18*(18). https://doi.org/10.3390/ijerph18189591

Carmichael, M. A., Thomson, R. L., Moran, L. J., & Wycherley, T. P. (2021). The impact of menstrual cycle phase on athletes' performance: a narrative review. In *International Journal of Environmental Research and Public Health* 18(4), 1–24. https://doi.org/10.3390/ijerph18041667

Clarke, A., Govus, A., & Donaldson, A. (2021). What male coaches want to know about the menstrual cycle in women's team sports: Performance, health, and communication. *International Journal of Sports Science and Coaching*, *16*(3), 544–553. https://doi.org/10.1177/1747954121989237

Coutinho, F. M., Rebelo-Marques, A., Andrade, R., Espregueira-Mendes, J., Bombas, T., & Moura, P. (2021). Menstrual pattern and contraceptive choices of Portuguese athletes. The European Journal of Contraception & Reproductive Health Care, 26(3), 240–245. https://doi.org/10.1080/13625187.2021.1879780

Costa, J. A., Rago, V., Brito, P., Figueiredo, P., Sousa, A., Abade, E., & Brito, J. (2022). Training in women soccer players: A systematic review on training load monitoring. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.943857

Dam, T. V., Dalgaard, L. B., Sevdalis, V., Bibby, B. M., Janse De Jonge, X., Gravholt, C. H., & Hansen, M. (2022). Muscle Performance during the Menstrual Cycle Correlates with Psychological Well-Being, but Not Fluctuations in Sex Hormones. *Medicine and Science in Sports and Exercise*, *54*(10), 1678–1689. https://doi.org/10.1249/MSS.0000000000002961

Deodato M, Grosso G, Drago A, Martini M, Dudine E, Murena L, Buoite Stella A. (2023). Efficacy of manual therapy and pelvic floor exercises for pain reduction in primary dysmenorrhea: A prospective observational study. J*ournal of Bodywork and Movement Therapies, 36*, 185-191.https://doi: 10.1016/j.jbmt.2023.07.002.

de Jonge, X. J., Thompson, B., & Ahreum, H. A. N. (2019). Methodological Recommendations for Menstrual Cycle Research in Sports and Exercise. *Medicine and Science in Sports and Exercise*, *51*(12), 2610–2617. https://doi.org/10.1249/MSS.0000000000002073

Ekenros, L., von Rosen, P., Solli, G. S., Sandbakk, Ø., Holmberg, H. C., Hirschberg, A. L., & Fridén, C. (2022). Perceived impact of the menstrual cycle and hormonal contraceptives on physical exercise and performance in 1,086 athletes from 57 sports. *Frontiers in Physiology*, *13*. https://doi.org/10.3389/fphys.2022.954760

Ekenros, L., von Rosen, P., Solli, G. S., Sandbakk, Ø., Holmberg, H. C., Hirschberg, A. L., & Fridén, C. (2024). The perceived influence of menstrual cycle and hormonal contraceptives on training and performance: Comparison between football, handball, and orienteering. *International Journal of Sports Science and Coaching*, *19*(4), 1560–1569. https://doi.org/10.1177/17479541231216403

Ergin, E., & Kartal, A. (2020). Menstrual Cycle and Sporting Performance Perceptions of Elite Volleyball Players. *BMC Women's Health*, *9*(10), 57–64. https://doi.org/10.1136/bjsports-2019-101486

Eysenbach, G. (2004). Improving the quality of web surveys: The Checklist for Reporting Results of Internet E-Surveys (CHERRIES). In *Journal of Medical Internet Research*, 6(3). https://doi.org/10.2196/jmir.6.3.e34

Findlay, R. J., MacRae, E. H. R., Whyte, I. Y., Easton, C., & Forrest, L. J. (2020). How the menstrual cycle and menstruation affect sporting performance: Experiences and perceptions of elite female rugby players. *British Journal of Sports Medicine*, *54*(18), 1108–1113. https://doi.org/10.1136/bjsports-2019-101486

Ihalainen, J. K., Takalo, S., Mjøsund, K., Solli, G. S., Valtonen, M., Kokkonen, M., Hackney, A. C., & Mikkonen, R. S. (2024). Self-Reported Performance and Hormonal-Cycle-Related Symptoms in Competitive Female Athletes. *Women in Sport and Physical Activity Journal*, *32*(1). https://doi.org/10.1123/wspaj.2023-0102

McHaffie, S. J., Langan-Evans, C., Morehen, J. C., Strauss, J. A., Areta, J. L., Rosimus, C., Evans, M., Elliott-Sale, K. J., Cronin, C. J., & Morton, J. P. (2022). Normalising the conversation: a qualitative analysis of player and stakeholder perceptions of menstrual health support within elite female soccer. *Science and Medicine in Football*, *6*(5), 633–642. https://doi.org/10.1080/24733938.2022.2145349

McNulty, K. L., Elliott-Sale, K. J., Dolan, E., Swinton, P. A., Ansdell, P., Goodall, S., Thomas, K., & Hicks, K. M. (2020). The Effects of Menstrual Cycle Phase on Exercise Performance in Eumenorrheic Women: A Systematic Review and Meta-Analysis. In *Sports Medicine*, 50(10), 1813–1827, https://doi.org/10.1007/s40279-020-01319-3

Pinel, C. J. J., Mehta, R., & Okholm Kryger, K. (2022). The impact and experienced barriers menstruation present to football participation in amateur female footballers. *Journal of Sports Sciences*, *40*(17), 1950–1963. https://doi.org/10.1080/02640414.2022.2122328

Portugal Football Observatory. (2024). *O Futebol Feminino em Portugal*. https://portugalfootballobservatory.fpf.pt/Content.aspx?id=486

Read, P., Mehta, R., Rosenbloom, C., Jobson, E., & Okholm Kryger, K. (2022). Elite female football players' perception of the impact of their menstrual cycle stages on their football performance. A semi-structured interview-based study. *Science and Medicine in Football*, *6*(5), 616–625. https://doi.org/10.1080/24733938.2021.2020330

Roffler, A., Fleddermann, M. T., de Haan, H., Krüger, K., & Zentgraf, K. (2024). Menstrual cycle tracking in professional volleyball athletes. *Frontiers in Sports and Active Living*, *6*. https://doi.org/10.3389/fspor.2024.1408711

SantaBarbara, K., Helms, E., Armour, M., & Harris, N. (2024). Menstrual cycle characteristics, hormonal contraceptive use and perceptions of related effects in resistance-trained athletes. *International Journal of Sports Science and Coaching*, *19*(4), 1570–1577. https://doi.org/10.1177/17479541241228986

Solli, G. S., Sandbakk, S. B., Noordhof, D. A., Ihalainen, J. K., & Sandbakk. (2020). Changes in self-reported physical fitness, performance, and side effects across the phases of the menstrual cycle among competitive endurance athletes. *International Journal of Sports Physiology and Performance*, *15*(9), 1324–1333. https://doi.org/10.1123/IJSPP.2019-0616

Taim, B. C., Ó Catháin, C., Renard, M., Elliot-Sale, K. J., Madigan, S., & Ní Chéilleachair, N. (2023). The Prevalence of Menstrual Cycle Disorders and Menstrual Cycle-Related Symptoms in Female Athletes: A Systematic Literature Review. *Sports Medicine*, *53*(10), 1963–1984. https://doi.org/10.1007/s40279-023-01871-8

Verrier, A., Knight, C. J., & Brown, N. (2024). Perceptions of menstrual cycle tracking among elite rugby players. *Journal of Sports Sciences*, *42*(16), 1538–1547. https://doi.org/10.1080/02640414.2024.2400810

Von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for Reporting Observational Studies. *PLoS Medicine, 4*(10), 1623. https://doi.org/10.1371/journal.pmed

von Rosen, P., Ekenros, L., Solli, G. S., Sandbakk, Ø., Holmberg, H. C., Hirschberg, A. L., & Fridén, C. (2022). Offered Support and Knowledge about the Menstrual Cycle in the Athletic Community: A Cross-Sectional Study of 1086 Female Athletes. *International Journal of Environmental Research and Public Health*, *19*(19). https://doi.org/10.3390/ijerph191911932