




National team biathletes' experiences of the menstrual cycle: "it's something that needs to be heard"

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ABSTRACT

Objectives To describe national team biathletes' experiences of their menstrual cycle (MC) while training and competing, and to identify factors to be considered in the development of policy and practice to support these athletes.

Methods Participants included 18 national team biathletes (ages 17–32 years) who experience the MC. Following a qualitative description design, athletes participated in one-on-one semistructured interviews that were audio-recorded, transcribed verbatim and analysed using a content analysis process.

Results Four descriptive themes represent the findings: (a) 'A very under-rated part of performance and training': Critical impacts of the MC on sport; (b) 'It varies month to month': Fluctuation in occurrence and impact of MC symptoms; (c) 'Block out and get through it': Managing the MC for performance; and (d) 'For the next generation': Improving policy and practice around the MC. Findings from this research outline actionable steps to support athletes who experience a MC, including developing mandatory MC education, increasing knowledge about the management of MC symptoms (eg, MC tracking, leakproof suits), and creating a fair point system of the overall biathlon season ranking allowing elimination of two race results that may have been affected by a health issue, such as adverse MC symptoms.

Conclusions This research outlines the critical need for 'macro' level policies and practices that reduce the perceived impact of MC symptoms on athletes' training and performance. Furthermore, individual variations described in this study highlight the importance of individualised approaches to supporting athletes as they navigate the MC alongside the demands of sport.

INTRODUCTION

Triathlete Emma Pallant-Browne raced to victory in the 2023 PTO European Open Triathlon in Ibiza, Spain. Her victory received international attention because she was visibly menstruating on race day. Sharing an image of her blood-stained swimsuit on Instagram, she wrote, "This is a true female sport and the more barriers we can break through the better." Although women remain vastly under-represented in the sport

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Research that has examined the impact of the menstrual cycle (MC) on objectively measured performance outcomes has shown mixed results, yet many athletes perceive that their MC influences athletic performance.
- ⇒ Limited research has identified specific strategies to support athletes in managing their MC symptoms alongside their athletic endeavours.

WHAT THIS STUDY ADDS

- ⇒ Athletes described a broad range of physical (eg, cramps, bleeding) and psychological (eg, decreased motivation and confidence) MC symptoms that impact their performance.
- ⇒ Athletes highlighted the complexities of understanding the impact of MC symptoms and the importance of individualised recommendations to optimise training and performance.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ This study proposes actionable steps for athletes, coaches, practitioners and sport organisations to support athletes who experience a MC, including mandatory MC education, increased communication about the MC, development of leakproof race suits, and creation of a fair points system.

and exercise medicine literature,¹ there is a growing body of research examining the impact of the menstrual cycle (MC) on performance.^{2–3} Despite the debate over the physiological impact of MC phases on objectively measured performance outcomes (eg, strength, exercise performance and hypertrophy),⁴ it has been estimated that 50%–70% of exercising women perceive that their MC influences fitness and athletic performance during specific MC phases.^{5–7} Negative perceptions of MC symptoms include performance detractors,⁸ feeling slower/heavier during menses⁹ and reduced attentional focus.¹⁰ Athletes have also reported negative experiences related to menstrual stigma and



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taboo.¹¹ However, there remains a need to examine the personal and lived experiences of athletes' experiences of the MC, which have been largely neglected in the literature.¹¹ Notably, a recent modified Delphi survey with 40 Team USA female athletes identified MC symptoms as one of the top five priorities for any sport research agenda.¹²

There is also a need for more research focused on the experiences of winter Olympic sport athletes. A bibliometric analysis of 25 003 studies of Olympic sports found that only 1669 were focused on winter sports, and only 47 studies (less than 0.001%) were focused specifically on biathlon.¹³ Sport-specific studies can help facilitate awareness, knowledge and understanding of the MC based on the athletes' lived experiences and needs within a particular sport context.¹⁰ The objectives of this research were to describe national team biathletes' experiences of their MC while training and competing, and identify factors to be considered in the development of policy and practice to support these athletes.

Methods

A qualitative description (QD) design was employed as it is an applied approach that is used to generate practical knowledge.¹⁴ Results of QD studies present a comprehensive summary of findings using 'everyday language' related to a phenomenon under investigation. This is intended to make results accessible to practitioners, policy-makers and researchers alike. As such, QD is a useful approach to produce knowledge that can inform policies and practices.¹⁵ QD designs usually adopt paradigmatic assumptions,¹⁶ focusing on finding practical solutions to applied research questions. Pragmatism can be helpful to bridge the gap between research and practice by allowing the researcher to focus on practical problems within the specific sport context.¹⁷ Thus, pragmatists are interested in searching for practical solutions through collaborative efforts and work.

This project was conducted by a team of four researchers. The first author was a former biathlete and is currently a national team coach and a research coordinator. The other three authors are senior researchers: the second author is a researcher with expertise related to elite athletes' reproductive health and women's exercise physiology, the third author is a sport researcher and an expert in qualitative research methodologies, and the last author's research is focused on enhancing gender equity in sport with in-depth experience engaging in qualitative research with elite athletes.

Participants

Between October 2023 and July 2024, 18 biathletes competing for North American national teams were recruited using a criterion-based sampling approach.¹⁸ To be eligible, participants had to meet the following criteria: (a) have International Biathlon Union (IBU) racing experience; (b) be 16 years or older and (c) be assigned female at birth with the potential to have a MC.

Table 1 Demographic characteristics of participating female biathletes

Age (years)	21±2.6 years (17–32 years)
Hormonal contraceptive use	44% (n=8)
Active menstrual cycle tracking	67% (n=12)
International competition level	
Youth (17–18)	17% (n=3)
Junior (19–21)	44% (n=8)
Senior (≥22)	39% (n=7)

A known sponsor approach was used, whereby the lead researcher disseminated study information to individuals within her professional network. Participants (see table 1) were between the ages of 17–32 (21±2.6 years) and trained or competed at youth (ages 17–18 years, n=3), junior (ages 19–21 years, n=8) or senior levels (ages ≥22 years, n=7) in biathlon.

Data generation

Participants engaged in individual semistructured interviews that lasted, on average, 52 min (±8 min). All the interviews were facilitated by the first author and were conducted online via Zoom (n=15) or in-person (n=3). A semistructured interview guide was developed by all four members of the research team and informed by sport and MC-related literature (see online supplemental material). The guide included seven main questions (eg, "Tell me about your experiences with the MC and biathlon?"), followed by probes for elaboration. Prior to the interviews, individuals provided written informed consent and answered brief demographic questions (eg, age) and MC history (eg, use of hormonal contraceptives).

Data analysis

Consistent with QD, a three-phase (preparing, organising and reporting) content analysis procedure¹⁹ was adopted. Data analysis was an inductive process led by the first author. To prepare the data, the interviews were audio-recorded, transcribed verbatim by Sonix.ai, checked for accuracy by the first author, and she removed any identifying information (eg, names) from the transcripts. During the preparation phase, all authors familiarised themselves with the data by reading and re-reading transcripts. The organisation phase involved a process of open coding, whereby the first author identified groups of words that were assigned codes. Codes were subsequently organised into categories that were accompanied by detailed descriptions, which were then shared with the entire research team. The four researchers worked collaboratively to classify categories into four higher order themes (see table 2). The reporting phase of the analysis involved identifying quotes from participants

to create a narrative description to illuminate each of the four themes.

Within QD research, a relativist approach is often used to judge the quality of work (eg, Davenport *et al*).²⁰ The criterion for judging such quality varies from study to study depending on the nature and purpose of the research.²¹ Within the context of the current study, readers are encouraged to consider the worthiness of the research topic, coherence, and utility. This research topic is worthy in that athletes' lived experiences of the MC have been overlooked in the vast sport literature, despite MC being acknowledged as a priority area of research by female athletes.¹² The coherence of this study is demonstrated by the alignment of the research purpose, purposeful sampling, data generation, and data analysis processes. Finally, the utility of the study refers to the effectiveness of the design and methods for achieving the study objectives.²¹ Within the context of the current study, an information-rich sample of elite level biathletes engaged in one-on-one interviews, which provided critical insights into experiences of their MC while training and competing.

Equity, diversity and inclusion statement

Recruitment was restricted to participants from North America who met the inclusion criterion. All but one participant self-identified as white. This study was generated by a research team of four, including three women and one man. The first author is a junior researcher, whereas the three other team members are senior investigators. All authors self-identified as white with diverse backgrounds in research (sport psychology and physiology), methods (quantitative and qualitative research) and practical expertise (high-performance sport and women's health). There was no public involvement in the conduct of the study.

RESULTS

Four themes were identified (see [table 2](#)): (a) 'A very under-rated part of performance and training': Critical impacts of the MC on sport; (b) 'It varies month to month': Fluctuation in occurrence and impact of MC symptoms; (c) 'Block out and get through it': Managing the MC for performance; and (d) 'For the next generation': Improving policy and practice around the MC. Individual variations were observed across the themes, highlighting the complexities of understanding the impact of MC symptoms on training and performance and the importance of individualised recommendations.

'A very under-rated part of performance and training': critical impacts of the MC on sport

All participants shared in-depth examples of how their MC symptoms impact their training and performance. While most participants described the negative impacts, some participants suggested that being on their period had a positive effect on their performance.

Of those negatively affected, athletes described a range of physical (eg, abdominal cramps, fatigue and headache) and psychological (eg, reduced motivation and confidence) MC symptoms that interfered with their training and performance. Pain from abdominal cramps was the most reported physical symptom that athletes described as adversely impacting performance. A6 explained, "I've had days where I couldn't train because the training was very low quality. It [abdominal cramping] is painful." In contrast, A4 did not think her MC directly impacted her performance. She said, "I don't think about it that much because I don't really get any symptoms." In contrast, athletes who experienced a performance benefit of being on their MC indicated that they felt "stronger on my period ... a little bit unstoppable with that. It's really cool" (A2). Similarly, A16 stated, "Your period can be something that helps you because ... I could be performing better around it. I do notice it in training when my energy is better through intensity sessions. ... There is a positive aspect to it." A4 also shared that at certain phases of her MC, "I'll be feeling really, really peppy. ... It felt good, and I felt I was getting it, which was awesome. And I think that really helped push myself more and get more out of the actual workout."

All athletes described two or more physical and/or psychological symptoms that had varying impact on their performance. A10 said that while her MC symptoms are generally "pretty manageable," the symptoms such as minor cramping and decreased confidence "takes up space in my head. I think about that instead of being able to be present in the training session or at the race." Some athletes described how the physical and psychological symptoms of the MC are inextricably linked. For example, A6 explained that her perceptions about herself changed during her MC. She alluded to both a drop in confidence as well as her physical abilities: "I feel weaker, so I see myself as weaker."

Further illuminating the impact of psychological symptoms on performance, several athletes discussed how their confidence and motivation were impacted during their MC, even when the physical symptoms were absent or manageable. For example, A7 shared during her MC, "My confidence drops, so I find that's hard ... I don't feel as confident when I'm shooting or skiing." Similarly, A5 said, "I've seen a bunch of girls lose confidence because they know their race is going to be happening on a period day. They just give up." In this quote, A5 alluded to athletes losing confidence in their ability to perform and race well because of their periods. Similarly, A10 described how the MC negatively impacts motivation and confidence, which is detrimental to performance:

It's a very underrated part of performance and training. Because a lot of people are like, 'If you're fit and you physically feel good; you're great; off you go!' You can race, you can train and do that at the highest level. But if you're not motivated to do it or

Table 2 Overview of the four themes with associated categories and example quotes

Themes	Categories and representative quotes
Critical impacts of the MC on training and performance	<p>Physical MC Symptom: Cramps</p> <ul style="list-style-type: none"> ► I've had days on the first day where I couldn't train just because the training was very low quality. It's painful. ... I dare say it makes it worse because I'm working my body and I'm also having cramps, so I don't feel good (A6). <p>Psychological MC Symptom: Confidence</p> <ul style="list-style-type: none"> ► I think this is probably the biggest side effect of my period and what affects me the most. ... I always break out on my period, so I don't feel as confident. ... I get really sad right around the start of my period too (A7). <p>No Symptoms</p> <ul style="list-style-type: none"> ► I don't think it really impacts my performance. Or I don't really think about it that much because I don't really get any symptoms (A4). <p>Perceived Effect on Performance</p> <ul style="list-style-type: none"> ► "You're not as strong. You're not as quick." You hear all these things about when you're menstruating, so I think it affects you mentally racing (A9).
Managing the MC for performance	<p>Discomfort</p> <ul style="list-style-type: none"> ► I don't really pay attention to it as much because your body's going to be uncomfortable anyways. That's just another thing that you have to block out and get through it (A9). <p>Pain</p> <ul style="list-style-type: none"> ► A lot of women can be in a lot of pain, and somebody can push through that and just keep training and keep going hard. But sometimes I think you must listen to your body and bring it back (A7). <p>Management of Bleeding</p> <ul style="list-style-type: none"> ► I'll be worrying about, "Should I switch my pad or my tampon, so I don't bleed through my clothing." I'd say that is a distraction for me, but also the pain (A6). <p>Skipping</p> <ul style="list-style-type: none"> ► I was like, "No chance I'm letting myself have that much pain for the biggest races of the season." And so, I went three months without it, and I don't like skipping it because it's what your body is built to do (A8).
Fluctuation in occurrence and impact of MC symptoms	<p>Caught by Surprise</p> <ul style="list-style-type: none"> ► For some reason, it always surprises me. But if I was more aware, I'd tell myself: "This is because of my period. I can get through it. ... I've done it so many times before." That would help (A7). <p>Timing and Impact</p> <ul style="list-style-type: none"> ► I feel I'm lacking in this place because I forget about it until I start to bleed, and then that lasts only a week, and then I forget about it again (A6). <p>Tracking</p> <ul style="list-style-type: none"> ► I was quite good about it [tracking], doing more than just the bleeding phase, ... mood cramps, energy, that sort of thing. I will do it because I also think I can see, "Oh there's a dip in energy before (my period)," because I couldn't tell you (A18).
Improving policy and practice around the MC	<p>Policy and Practice</p> <ul style="list-style-type: none"> ► I've always looked at periods just as something that we have to go through, and that's the way it is and that there's no chance of changing anything. So, I have never considered any policies directed at women (A6). <p>Mandatory Education</p> <ul style="list-style-type: none"> ► Trying to understand what's going on, how athletes feel, and how people are being affected by that. And then promoting that knowledge, sharing it, and making it part of coaching courses and introducing it to a lot more. Like broadening, I guess, the understanding of the general community (A4). <p>Free Products</p> <ul style="list-style-type: none"> ► If they could find a way to let people know that there's free tampons [at] all the volunteer check-in booths. You can just ask a volunteer, and they will have stuff like that (A8). <p>Fair Points Systems</p> <ul style="list-style-type: none"> ► With racing it's really hard because there's a set calendar ... For (the) total score, not having every single race count. ... A bit more grace there (A4). <p>Open Communication</p> <ul style="list-style-type: none"> ► It's important for a coach to ... be okay talking about it because it's new to especially younger athletes. ... I think it should be talked about (A1).
MC, menstrual cycle.	

you don't have the confidence to do it ... You can't go train, race, and be your best.

A4 tried to articulate how a drop in motivation, as a result of the MC, impacts performance: "I don't really want to try as hard and I'm more in a 'do the bare minimum' sort of mood. I'm not really having as much fun, at training specifically." Notably, athletes understand that their MC impacts their training and performance, and it is something that must be acknowledged and managed. A14 shared that, when she was younger, she was not able to "understand that performance was connected to my period. ... I was like, 'Why am I feeling like this?' But now it's easier to pinpoint ... and it's just how things are." Similarly, A3 shared, "I'm going to feel like sh*t for these next four days. Then, I'm going to feel better, and learn what works." Overall, participants shared detailed examples of how MC symptoms impact their training and performance. Such knowledge supports necessary understandings of how training can, and should, be adapted to accommodate specific needs of athletes to not only enhance performance outcomes but to promote the holistic well-being of athletes.

'It varies month to month': fluctuation in occurrence and impact of MC symptoms

As noted in the previous theme, all participants acknowledged that their MC impacts their training and performance. However, as described within this theme, participants also explained how their MC symptoms often fluctuate from month to month, and there are also variations in menstruation occurrence. A4 explained, "I would have liked more science of the MC [in our education]; this is what's happening, these are your hormones, this could be how you're feeling." However, such MC education is not occurring within the context of sport. With little sport-specific education about the MC, and the natural variations that occur in one's MC, it makes it very challenging for athletes to manage the symptoms that impact their training and performance. As pointed out by A12, "[MC symptoms] varies month to month, if I'm being so honest. And that, I think, is very true for a lot of girls and women in sport." Similarly, A1 shared, "It's happening and you're in it, and I'm like, 'Why is my shooting so bad? Why can't I ski today?' And then a few days later, I'm like, 'Maybe this is why!'" A7 echoed a similar feeling saying, "For some reason, it always surprises me. But if I was more aware [of my MC patterns] I'd tell myself 'This is because of my period. I can get through it ... I've done it so many times before.' That would help." As clearly stated by participants, they want to alleviate any "surprises" so they can work to effectively manage MC symptoms.

Twelve of the participants reported using a tracking app for their MC. A10 did not use a tracking app but said she wanted to start tracking her MC to better understand and be prepared to manage MC symptoms. She further explained, "I'm just super interested if I start seeing

trends ... maybe there is a trend that I've been ignoring." For many of the athletes in this study, tracking the MC is an essential component for understanding not only when they will menstruate, but also for understanding other impacts on their mental or emotional health that occur throughout their cycle. Importantly, athletes also said that tracking their cycles is essential for helping them to identify what is "normal" (A9) with respect to their MC. Indeed, participants in this study are aware of the risk of "relative energy deficiency in sport (RED-s) syndrome" (A1), and tracking their MC could help identify "red flags" (A12) for health issues that require immediate medical attention. The shared experiences of the participants suggest that encouraging athletes to track their MC can help to improve awareness and understanding of the month-to-month variations of their MC symptoms.

'Block out and get through it': managing the MC for performance

Participants reported several approaches for managing MC symptoms for performance. A3 identified pain management strategies associated with her physical symptoms, ranging from "pushing through" to specific recovery strategies. For example, to "help with cramping [I'm] staying super hydrated, drinking a lot, and sleeping well before if I know I'm getting my period while I'm racing. I'll be extra cautious." However, A3 also discussed how the psychological symptoms can be challenging to manage, as the "brain fog can be worse than the pure physical pain because you can't concentrate. And with sports, if you're in pain, sometimes you can channel that pain into focus; into racing." A6 shared, "I'm pushing through the pain. But there's pain from racing and pain for menstruation. So, I find it a little harder to push myself mentally."

Some said they used strategies including hydration (A7) and painkillers (A14) to manage the physical symptoms related to their MC. However, A12 described a lack of management solutions as it relates to the MC. She said,

I don't think there is a ton of solutions for women in sports other than, you know, take a painkiller or get on birth control. ... I do take painkillers when I have to, but there isn't really a ton of options. ... It hasn't been a huge focus in our medical system, and especially not for athletes at all. So, I think the education will hopefully open some doors to progress in the future.

While some athletes described management techniques to navigate their MC, most athletes described a general "push through it" (A5) and "plow through it" (A4) attitude. As such, athletes requested more knowledge about "the management, the details, and the options" (A8) regarding their MC. A10 elaborated, "Whether that's how to manage symptoms while you're training, and then have that apply to racing. Just knowing the different options that are out there." Participants were clear that there is

a need to educate athletes on strategies they can use to manage their MC and perform at their best.

In addition to managing pain, athletes also spoke about the discomforts and management of bleeding. A8 shared, “Bleeding itself. The amount of race suits I have ruined ... it gets in the way a lot.” Similarly, A6 explained, “Never mind the fact that I’ll be worrying about ‘Oh, I should go switch my pad or my tampon, so I don’t bleed through my clothing.’ I’d say that already is a distraction for me, but also the pain.” Eight participants used hormonal contraceptives, and of these, two participants described using oral contraceptives to regulate the MC in relation to performance (eg, to skip their periods around important races). A8 shared:

I just refused to have my period during a race weekend because it gets in the way. I have to! It’s so uncomfortable to race with a liner, a pad, and even a tampon. I start getting cramps after six hours with a tampon. That’s not an option. ... No chance I’m letting myself have that much pain for the biggest races of the season. I went three months without it, and I don’t like skipping it because it’s what your body is built to do.

‘For the next generation’: improving policy and practice around the MC

Participants shared their views on ways MC-related sport policies and practices could be developed to support athletes. Suggestions included the need for education, free products, learning materials/resources, fair points systems and open communication. On the topic of education, A4 suggested, “Promoting that [MC] knowledge, sharing it, making it part of coaching courses, and introducing it to a lot more.” Similarly, A12 said, “A rule or policy would be at some level, that everybody needs to be educated on the inner workings of the female body. ... There’s a huge gap sometimes.” As for athlete education, A10 suggested it should include “knowledge and the tools to help, whether that [is to] alleviate symptoms, whether it helps deal with the mental side of it.”

Another practice suggestion was to ensure “clean washrooms” (A18) as well as “free pads and tampons” (A6). A8 explained that “Tampax [as a] sponsor would be cool” because, as A1 stated, “The amount of money athletes spends, anybody spends. But athletes we’re poor. We’re broke. We don’t have money to spend on this stuff ... like tampons, pads. Anything would be quite helpful.” To implement such a change, A8 suggested that sport organisations should ensure at all race events “there’s free tampons [at] all the volunteer check-in booths. You can ask a volunteer, and they will have that.”

Making sure there is a fair points system in place was also discussed by the athletes. It is difficult to define “fair,” but many of the athletes perceived there were times throughout their MC “you weren’t set up to have your best performance” (A8). As some athletes noted a negative impact of their MC on sport performance, a fair

ranking system could be put in place to accommodate. Such a system could entail only counting 23 out of the 25 race results towards the final total score (ie, IBU Qualifying Points, Nation Cup Score, World Cup Total Score) of the season, thereby allowing elimination of two race results that may have been affected by a health issue, such as adverse MC symptoms. A4 said, “With racing it’s hard because there’s a set calendar. ... For [the] total score, not having every single race count. ... Like a bit more grace there?” Similarly, A18 suggested, “[A] fair point system so not every single race of the season will count.” A6 shared that in her experience with the MC:

Some races I have almost no chance of performing well if it’s on the first or second day of my menstruation just because of my cramps. So, what if we had you can exclude 1 or 2 races ... to count towards our overall points?

A18 provided a nuanced view on how changing the points system by excluding two races per season from the overall score would be beneficial to athletes’ health and performance:

The point system is huge. ... I think most women would probably still race, but it just gives that little bit of not feeling like you have to hurt yourself more. ... But it could be the policy is not just for sickness, but even in the example, so that women know that they have an option if they’re having a horrendous day that they have “two drop results” in the year that don’t count.

Finally, and maybe the simplest improvement in current sport practice, was to create more open conversations about the MC as athletes perceived it was still a “taboo” topic. A16 suggested sport organisations could “cover a story about how females feel about performing on their period.” A4 shared that “while it’s not super talked about,” it would be critical, moving forward, to “just learning from the athletes, their experiences, outside of just science.” Participants also emphasised the importance of discussing, “How [the MC] mentally affects athletes. Because obviously it affects people physically, but I think the mental side of things isn’t really shared, so I think that would be super important” (A10).

DISCUSSION

This study provides in-depth insights into national team biathletes’ experiences of their MC while training and competing and outlines factors to be considered in the development of policy and practice to support athletes who experience a MC. Findings highlight the critical need for policies and practices that reduce the impact of MC symptoms on training and performance on a ‘macro’ level (see [figure 1](#)). Furthermore, the complexity of athletes’ unique experiences of the MC highlights the importance of individualised approaches for managing athletes’ MC symptoms.



Figure 1 Actionable steps to inform policy and practice around the menstrual cycle in female biathletes. MC, menstrual cycle.

A broad range of physical and psychological MC symptoms were described by the participants. Participants described pain associated with menstruation and their related worries of bleeding through race suits. Actionable change to mitigate such worry would be to design 'leakproof' suits or uniforms. Leakproof leggings and underwear have been developed by companies such as Knix.²² Notably, participants shared detailed examples of how psychological symptoms (eg, decreased confidence) may negatively impact performance. Such psychological MC symptoms have generally been overlooked in sport research, and our research addresses this gap. Our results are consistent with those reported by Taim *et al* who showed that affective MC symptoms appeared to be more prevalent than physical symptoms among female athletes.⁷ However, it is important to note that within the current study, some participants reported few MC symptoms and some reported performance benefits as a result of MC symptoms. As such, our findings suggest it is critical for athletes, coaches and practitioners to understand individualised variations in athletes' experiences of the MC and the perceived impact on performance.

Participants in the current study also talked about understanding month-to-month variations in the impact of their MC, whereby many identified being surprised by its impact on their training and performance. Swedish national team skiers also perceived low levels of knowledge and awareness regarding the MC in sport, expressing the desire for opportunities to discuss the MC earlier in their career (eg, educational interventions).²³ As suggested by McGawley *et al*, there is a need to enhance menstrual health literacy in sport.²⁴ In addition to education, athletes in the current study described MC tracking as a means to become more aware of their individual MC symptoms. Such findings suggest that increasing athletes' knowledge and understanding of their MC through education and MC tracking apps would be a valuable strategy for supporting optimal performance.^{23 25}

Athletes shared some strategies to manage the MC-related physical symptoms for performance; however, most athletes had the attitude of 'pushing through the pain' of their MC symptoms. Some athletes described how they use contraceptives to manage their

MC symptoms, which again speaks to the importance of MC education, particularly as it relates to management strategies. In a study of 113 biathletes and cross-country skiers, 68% of the athletes used hormonal contraceptives (HC), with 60% reporting non-contraceptive reasons (eg, MC symptoms) for their use. Notably, the majority of HC users (81%) experienced either a positive influence, or no influence, of using HC on their training and/or performance.²⁶ A relatively low number of participants used HC in the current study (44%), and several participants expressed a need for more knowledge, research and education on the MC and contraceptives in the context of high-performance sport.

The individual variations reported in the current study suggest that sport organisations may face challenges in terms of establishing macro-level or organisational-level policies and practices to support athletes experiencing MC symptoms. Some general strategies may include providing early-career education to help athletes understand their MC and its fluctuations. Topics could include understanding MC phases, impact on sport and performance, hormonal contraceptives and MC symptoms and dysfunctions. Such education could empower athletes to find individualised management approaches to the MC symptoms that work for them. Some sport organisations, such as the International Ski and Snowboard Federation and Women's Tennis Association, have already begun to provide such educational initiatives. In addition, FIFA has specific MC-related policies in place, such as players can request absence from training or matches due to menstrual health reasons and still receive full pay.²⁷ We encourage the IBU to develop educational initiatives and policies to support athletes in managing their MC symptoms.

The creation of fair points systems that account for the potential impact of MC symptoms on performance was also a suggestion by participants. A fair points system could include mechanisms for not counting the points accrued from every single race in a season when calculating end-of-season rankings, which would enable athletes to choose to exclude certain race results. For example, in a 25-race season, athletes could select 23 races to be included in end-of-season performance rankings, thus reducing the

performance consequences of races that were impacted by MC symptoms. This would be a bold strategy the IBU could consider, but one that would be consistent with the organisation's goal to support gender equality across the sport.

Strengths and limitations

Strengths of this study included sampling high-level athletes, focusing on a winter Olympic sport, and taking a sport-specific approach; these decisions contributed to addressing gaps in the existing literature.^{7 13} A limitation of this study was that, while we examined the perceived impact of MC symptoms on training and performance, we did not obtain objective measures related to training and performance outcomes. Other limitations include the ethnic/racial homogeneity of the sample, that we relied on a single data collection source (ie, one individual interview), and we did not obtain detailed information about athletes' MC symptoms as they occurred throughout a season. In the future, it may be useful to collect data throughout a season (eg, using a diary or repeated interview approach), track specific MC patterns (eg, using commercially available apps) and assess training and/or performance outcomes to reveal more information about individual variations (and commonalities) in athletes' MC profiles and their effect on training and performance.

CONCLUSIONS

The participants highlighted several challenges in navigating the MC alongside competing at the international level in biathlon. Grounded in the voices of national team biathletes, findings from this study identify actionable steps for athletes, coaches, practitioners, as well as national and international sport organisations to support athletes' who experience the MC. Creating sport practices and policies that support athletes who experience a MC is critical for ensuring gender equity across all levels in sport.

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