



short communication

## Do women athletes' experiences of menstrual function and dysfunction vary across competition levels? A mixed methods exploration<sup>☆</sup>

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### ARTICLE INFO

#### Keywords:

Female athlete triad  
Health and well-being  
Competitive sport

### ABSTRACT

Menstrual dysfunction is a common phenomenon in sport and many women describe that their menstrual cycle can negatively impact their sport participation, performance, and experiences. However, there is little research examining if competition level plays a role in women athletes' rates and experiences of menstrual function and dysfunction. Therefore, the purpose of this study was to explore and describe rates and experiences of menstrual function and dysfunction among athletes of differing competition levels. An online mixed methods approach was applied. Women athletes ( $N = 63$ ), between 14 and 39 years of age ( $M = 24.20$ ,  $SD = 6.53$ ), competing in a range of sports from the local to international level completed an anonymous interview style survey to generate data. Data analysis for this project was an iterative and integrated process where quantitative and qualitative data were considered together and are represented through reported statistics and generated themes. Although group differences were hypothesized, no differences based on competition level in rates or experiences of menstrual dysfunction were observed. In addition to detailed descriptive statistics, five themes were generated: *Normalizing Dysfunction*; *Menstrual Symptoms*; *Clothing as a Distraction*; *Participation Impact*; and *Regaining Control*. In line with previous research, the women in this study experienced a range of menstrual dysfunctions that impacted their sport experiences. However, this study highlights that regardless of competition level or sport type women face challenges in sport regarding menstrual function and due to the normalization of dysfunction in sport women athletes' health and well-being are not always supported.

### 1. Introduction

Menstrual function and dysfunction conversations have long been stigmatized both in the general population and in sport settings (O'Flynn, 2006, December). Typically, menstrual function or *normal* menstruation is described as a regular 28-day menstrual cycle or having 10 or more menstrual cycles in a given year (Gordon & LeBouff, 2015; Mihm et al., 2011). Whereas menstrual dysfunction is most often identified or categorized by irregular or an absence of menstruation and is often linked directly to low energy availability/relative energy deficiency in women athletes (Gordon & LeBouff, 2015; De Souza et al., 2014). Unfortunately, these broad descriptions of menstrual function and dysfunction do not emphasize the range of possible experiences that can fall on a continuum and can be perceived as functional or dysfunctional by individual women. Within this research, the language

of function, dysfunction, and function-dysfunction has been adopted to highlight the unique experiences and the continuum of women athletes' menstrual function and dysfunction experiences. Although recently more research has been conducted regarding menstruation in sport, this area of research still represents a very small proportion of sport health research (Brown et al., 2020; Bruinvels et al., 2016; Bruinvels et al., 2017; Findlay et al., 2020). Discussions of menstruation in the sport context often focuses on the impact of physical menstrual symptoms and dysfunction on activities such as training and sport performance (Bruinvels et al., 2016; Knowles et al., 2019). For example, 41%–66% of women athletes reported that their menstrual cycle negatively affects their training and sport performance (Bruinvels et al., 2017; Findlay et al., 2020). Additionally, it has been proposed that the menstrual cycle can impact sport performance in multiple ways, as reproductive hormones influence cardiovascular, respiratory, thermoregulatory, and

<sup>☆</sup> This study was approved by the Behavioural Research Ethics board and adhered to ethical practices for research with human participants at all stages of the research process.

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<https://doi.org/10.1016/j.psychsport.2022.102270>

Received 15 July 2021; Received in revised form 30 July 2022; Accepted 4 August 2022

Available online 8 August 2022

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metabolic parameters (Brown et al., 2020). However, menstrual dysfunction can also emotionally impact women athletes' sport experiences (Mountjoy et al., 2014), and this has remained largely unexplored.

The research conducted thus far begins to provide a description of women athletes' experiences in sport regarding menstrual dysfunction (Findlay et al., 2020). However, much remains underdiscussed, such as: menstrual function in addition to dysfunction; menstruation as a bio-psycho-social process; and notably, how different sport factors such as competition level might impact or change women's experiences. The practical implications of these areas of research regarding differences in rates and experiences of menstrual function and dysfunction are important for potential athlete supports or coach training. In their recent publication Findlay et al. (2020) noted that a major limitation in the current research is the inability to assess if competition level impacts menstrual experiences. This is of particular importance as consensus statements regarding the Female Athlete Triad and Relative Energy Availability suggest that athletes in lean or individual sports who compete at more competitive levels are at a greater risk of menstrual dysfunction (De Souza et al., 2014; Mountjoy et al., 2014). Therefore, the purpose of the current study was to explore and describe if women athletes' experiences of menstrual function and dysfunction vary across competition levels. Based on the consensus statements (De Souza et al., 2014; Mountjoy et al., 2014), we hypothesized that there would be a difference in both rates and experiences of menstrual function and dysfunction between competition levels.

## 2. Methods

### 2.1. Study design and analysis

To best address our proposed hypothesis, an online embedded mixed methods design was applied, with quantitative data nested within the qualitative data (quali [QUANT]; Creswell & Poth 2011, 2018). This approach was aligned with both the quantitative (i.e., rates) and qualitative (i.e., experiences) aspects of the purpose statement that fostered the integration of the quantitative and qualitative data. Further this approach reflects the pragmatic frameworks applied throughout the research process. In addition to aligning with pragmatism, this research reflects interpretive description approaches (Thorne, 2008). Interpretive description focuses on providing in-depth description of "complex experiential clinical phenomena" that focuses on applied health knowledge (Thorne, 2008, p. 26–27). Researchers applying this approach embrace that generated knowledge is based on a process of interpretation on the part of the research and that the analysis and construction of meaning depends on subjective and intersubjective experience (Thorne, 2008).

Following ethical approval from the Behavioural Ethics Review Board at the University of Saskatchewan. Women athletes were recruited via purposeful and snowball sampling to maximize the reach and representation of participants. These recruitment and sampling approaches were best suited to the current study to target individuals who fit the eligibility requirements and to allow athletes to share the study information with teammates and friends (Patton, 2015). Athletes were eligible to participate in the study if they were 14–39 years of age (to intentionally focus on pre-menopausal women<sup>1</sup>), had at least two years of sport experience, had competed within the past 2 years at the local to international level, and were not currently pregnant or lactating.

Recognizing that conversations regarding menstruation can be taboo, uncomfortable, elicit self-conscious emotions, and require individual reflection (O'Flynn, 2006, December), we adopted a novel data generation method that allowed space and time for participants to reflect and respond without the barriers of identification or judgement

that could be experienced during in-person data generation. The women athletes completed an anonymous conversation style survey. Each section of the survey included a range of closed- and open-ended questions reflecting a conversation. The conversation style survey was generated based on past research findings and our experiences with previous qualitative and mixed-methods research programs. Outside of the demographic and menstrual history sections (e.g., age of menarche, aspects related to the Female Athlete Triad/RED-S, secondary amenorrhea, and menstrual frequency at a series of age ranges<sup>2</sup>), questions focused on menstrual experiences were primarily open-ended concentrating on the athletes' experiences within their specific sport contexts. Roughly two thirds of the survey focused on open-ended (qualitative) style questions with relevant follow-up probing style questions. For example, a series of questions could start with a yes/no item or likert scale item and then the survey logic would redirect the athlete to relevant follow-up questions regarding their response (full survey available upon request<sup>3</sup>).

Data analysis for this project was an iterative and integrated process where quantitative and qualitative data were considered together in two phases (Creswell & Plano Clark, 2011, 2018; Creswell & Poth, 2018). The first phase focused on identifying differences in rates and experiences between competition levels and included: descriptive statistics, t-tests, and group-based comparison thematic analysis. The quantitative analyses were conducted in SPSS Version 26 and the qualitative thematic analyses (and sub-group thematic analyses) were done manually. Specifically, the reflexive thematic analysis approach was aligned with phases described by Braun and Clarke (2021; data familiarization; coding; theme generation; theme review; theme revision; and writing), and our process included activities such as note taking, memoing, coding, and then theme generation, review, and refinement, and data representation. Within the thematic analysis the data was first separated by competition level and analyzed, then separated by sport type and analyzed, and finally separated by sport category and analyzed.

The first two authors engaged in a flexible, collaborative, and iterative processes that worked to address the needs of the study (rather than following a strict process) to analyze the generated data. Much of this analysis process was deductive and focused on description as it was building on the quantitative results and aligned with interpretive description approaches (Thorne, 2008). Specifically, the first two authors engaged in: i) familiarization and immersion practices (including taking initial notes); ii) memoing (building on initial notes and starting the process of connecting the data back to the research purpose and quantitative data); iii) coding (multiple iterative phases of coding took place with conversations between the first two to facilitate interpretation and align the analysis with the research purpose and quantitative data); iv) initial theme generation; v) review and refinement of generated themes; and vi) review and refinement of data representation approaches. Initially the codes were organized into four themes; however, upon further reflection and discussion the themes were re-organized resulting in five themes that represent the qualitative data and the women athletes' experiences of menstrual function and dysfunction in sport. Throughout the analysis process the first two authors communicated and reflected on their shared process to manage discrepancies or differences in their experiences and interpretations of the generated data.

When comparing between groups our analysis focused on identifying novel experiences between groups and similarities between groups. The first two authors engaged in lengthy conversation for each division of the data set to decide if there were or were not experiential differences existed between groups. The second phase of analysis was to describe

<sup>2</sup> Athletes also had the opportunity to describe any other information they perceived as relevant or important in the menstrual history section.

<sup>3</sup> There was variation in what questions each athlete was asked based on their preceding responses.

<sup>1</sup> The experiences of perimenopausal, menopausal, and post-menopausal athletes may differ from the current cohort and should be explored separately.

and explain the group differences identified. However, the authors agreed that there were not meaningful differences between the groups. Therefore, all the data was regrouped into one data set for the final analysis and are presented below.

### 3. Results and discussion

#### 3.1. Participant

Sixty-three North American (Canada [95%], Mexico [3.2%], and United States [1.5%]) women athletes ( $M_{age} = 24.2$ ,  $SD = 6.53$ ), from a range of aesthetic/non-aesthetic and team/individual sports who were competing at various competition levels participated in this study. Primary sports reported included: basketball; cheerleading; cross country running; curling; cycling; dance; fencing; figure skating; football; gymnastics; hockey; horseback riding; long distance running; martial arts; Olympic weightlifting; ringette; rowing; rugby; soccer; softball; swimming; target shooting; track and field; triathlon; ultimate frisbee; volleyball; and wrestling. Participants were categorized into two levels of competition, competitive (local, regional, and provincial) and high-performance (national, elite for age, and international), based on their highest level of competition.<sup>4</sup>

#### 3.2. Descriptive statistics and hypothesis testing

There were no significant differences in rates (quantitative) or described experiences (qualitative) of menstrual function and dysfunction (Tables 1 and 2) between levels of competition, rejecting our original hypothesis. To further explore potential differences, comparisons between sport type (team/individual) and sport category (aesthetic/non-aesthetic) were conducted with the quantitative and qualitative data. These exploratory analyses also highlight that there was no effect of sport type (team/individual) or category (aesthetic/non-aesthetic), with the exception that athletes from individual sports reported higher rates of lifetime secondary amenorrhea compared to team sport athletes ( $F = 0.13$ ,  $p = .02$ ). However, it is important to note that within the past 12 months there was no difference in secondary amenorrhea across any of the groupings. Further, there was an observed discrepancy between medically diagnosed menstrual dysfunction and self-reported menstrual dysfunction, highlighting that women athletes' may not be disclosing to physicians or aware that their menstrual irregularity is problematic. Together, these findings emphasize that women athletes across competition levels, sport types, and sport categories experience similar rates of secondary amenorrhea but often lack a formal diagnosis. Moreover, the findings also highlight that the age of menarche, rates of primary amenorrhea, longest menstrual absence, and diagnosed rates of the Female Athlete Triad and components do not differ between groups.

To build upon the quantitative data, we then analyzed the qualitative data by competition level, sport type, and finally by sport category. These analyses highlighted that there were no experiential differences in menstrual function and dysfunction between groups. However, individual variation was identified within all groups in their unique individual experiences (e.g., symptoms were described as "worst" during the follicular, ovulation, and luteal phases or during active menstruation within the data set). Therefore, providing context that athletes may need support at various phases of the menstrual cycle and should be involved in how they are personally supported. Since our hypothesis was not supported, and further exploratory examination of the results (i.e., sport type and context) highlighted that rates and experiences do not differ between competition level, sport type, or sport category, the remaining results and discussion will refer to the full sample rather than sub-

groups. Therefore, all themes presented below are a reflection of the full sample.

#### 3.3. Generated themes

The purpose of the qualitative data was to further describe and explain the quantitative data regarding rates of menstrual function and dysfunction. Five themes were generated to reflect the data. The themes highlight and describe athletes' experiences and are titled: normalizing discomfort and dysfunction; physical and psychological menstrual symptoms; issues related to clothing as a distraction; menstrual cycle symptoms impacting training; and regaining control. These themes are described below, supported with participant quotes.

##### 3.3.1. Normalizing Dysfunction

Athletes normalized discomfort and dysfunction associated with their menstrual cycle, viewing it as an inconvenience and a nuisance rather than a component of health. Normalizing menstrual dysfunction is problematic as it has been identified as one of the top reasons why women athletes do not seek help regarding amenorrhea (Verhoef et al., 2021). Over 50% of participants in the current study disclosed that they had experienced an absence of menstruation for 3 months or longer (secondary amenorrhea) and often discussed menstrual irregularity, for example a gymnast highlighted that "My menstrual cycle is very irregular it could be up to 4 months with no period. I have done nothing to treat it" (P58, 18). Therefore, missed or absent menses were not viewed as problematic; it was considered typical, "My period has always been quite irregular and since it doesn't impact me much overall it doesn't make a difference with it's presence or absence" (P66, 20, martial arts) or, "they [periods] might just be unusual rather than a symptom of a larger problem" (P3, 37, ultimate frisbee).

Furthermore, athletes normalized painful, missed, or absent cycles as a consequence of being an athlete. Specifically, a long-distance runner said, "I have never had a regular period. Always was told it was normal for an athlete" (P102, 34), and a cyclist described, "I was amenorrheic from ~2008–Dec 2017. Doctors told me it was 'normal' because I was an athlete and put me on birth control" (P45, 26). Even when irregularities were noticed, their concerns were normalized by other athletes, parents, coaches, peers, and even medical professionals. For example, another runner said "I have not been diagnosed for menstrual irregularities however I often don't have my period for some months and then other months I will. My mom said that it was the same for her (and she was a very competitive athlete) so I assumed it was relatively normal" (P21, 22).

Furthermore, participants' language describing their menstrual cycle was primarily negative, and using language such as "annoying" or "a pain" was common. Additionally, some athletes described menstruation as an inconvenience, stating "I find it an inconvenience now that I am done having children, and wish I could circumnavigate it somehow" (P92, 37, long distance running), or "I wish I didn't have it. It's one more thing to make life harder than it needs to be" (P54, 32, volleyball). In contrast, not bleeding was viewed as convenient, and some participants desired dysfunction, one softball player described that she "felt fine when I wasn't having any periods ... It was actually a lot more convenient" (P71, 18) and another runner said "".

These results could also highlight that there are socio-cultural factors at play in sport that reinforce the normalization of menstrual dysfunction and the objectification of women athletes' bodies. For example, it is possible that over time women athletes become desensitized to or disconnected from their bodily functions because of socialization and learning in sport contexts. For example, when teammates, coaches, and even medical professionals downplay or minimize menstrual dysfunction it is reasonable that women athletes would not view absences and dysfunction as a problem that should be addressed. Further, because sport contexts tend to be male dominated and highly focused on objective measures, movements, and outcomes it can be a challenge for

<sup>4</sup> The competition level categories reflect the five aspects of competition level definitions as proposed by Swann et al., (2015).

**Table 1**  
Demographic and Sport Participation Data.

	Full Sample (N = 63) Mean (SD)	Competition Level		Sport Type		Sport Category	
		Competitive (n = 25) Mean (SD)	High-performance (n = 38) Mean (SD)	Individual (n = 33) Mean (SD)	Team (n = 30) Mean (SD)	Non-aesthetic (n = 51) Mean (SD)	Aesthetic (n = 12) Mean (SD)
		Age	24.20 (6.53)	23.97 (6.19)	24.35 (6.82)	25.14 (6.47)	23.16 (6.54)
Height (m)	1.69 (.09)	1.67 (.09)	1.71 (.09)	1.67 (.08)	1.72 (.10)	1.69 (.09)	1.69(.07)
Weight (kg)	67.40 (12.07)	64.94 (7.86)	68.96 (13.97)	66.17 (13.90)	68.81 (9.61)	67.63 (12.06)	66.44 (12.56)
BMI (kg/m <sup>2</sup> )	23.43 (3.99)	23.35 (3.29)	23.48 (4.41)	23.59 (4.39)	23.25 (3.55)	23.47 (4.04)	23.24 (3.90)
Age Starting Sport	14.05 (7.03)	14.07 (8.68)	14.04 (5.83)	16.00 (7.40)	11.91 (6.01)	14.17 (6.85)	13.54 (8.05)
Years EXP	10.14 (5.41)	9.90 (5.53)	10.30 (5.39)	9.14 (5.54)	11.25 (5.13)	10.28 (5.53)	9.58 (5.07)
Days per Week	4.34 (1.55)	4.32 (1.37)	4.36 (1.68)	4.96 (1.38)	3.66 (1.47)	4.29 (1.64)	4.58 (1.16)
Hrs per Week	7.38 (6.35)	5.90 (6.02)	8.36 (6.45)	10.56 (5.99)**	3.88 (4.74)	6.42 (5.61)	11.46 (7.89)
Longest Absence (mos)	9.72 (19.37)	7.28 (16.19)	11.27 (21.23)	13.58 (24.42)	5.72 (11.28)	11.28 (21.44)	3.58 (2.02)
Age of Menarche	12.87 (1.55)	12.54 (1.55)	13.08 (1.52) <sup>A</sup>	13.18 (1.55) <sup>A</sup>	12.52 (1.49)	12.79 (1.57) <sup>A</sup>	13.17 (1.43)

Note. \*\* =  $p < .01$ , BMI = body mass index, EXP = experience, Hrs = hours, mos = months, <sup>A</sup> = 1 athlete had not yet reached the age of menarche.

**Table 2**  
Menstrual Dysfunction Rates.

	Full Sample (N = 63)	Competition Level		Sport Type		Sport Category	
		Competitive (n = 25)	High-performance (n = 38)	Individual (n = 33)	Team (n = 30)	Non-aesthetic (n = 51)	Aesthetic (n = 12)
		Amenorrhea	32 (51%)	12 (48%)	20 (53%)	21 (64%)*	11 (37%)
Amenorrhea (last 12 mos)	15 (24%)	5 (20%)	10 (26%)	10 (30%)	5 (17%)	11 (21%)	4 (33%)
Diagnosed MD	17 (27%)	5 (20%)	12 (32%)	10 (30%)	7 (23%)	16 (31%)	1 (8%)
Low BMD	2 (3%)	1 (2%)	1 (2%)	1 (3%)	1 (3%)	2 (4%)	—
Low EA	10 (16%)	4 (16%)	6 (16%)	7 (21%)	3 (10%)	8 (16%)	2 (17%)
Diagnosed MD + Low BMD	2 (3%)	2 (8%)	—	1 (3%)	1 (3%)	2 (4%)	—
Low BMD + Low EA	1 (2%)	—	—	1 (3%)	—	1 (2%)	—
Diagnosed Triad	1 (2%)	—	1 (2%)	1 (3%)	—	1 (2%)	—

Note. Frequencies reported. \* $p < .05$ . MD = menstrual dysfunction, BMD = bone mineral density, EA = energy availability, Triad = the female athlete triad.

women to have embodied experiences that extend beyond performance metrics to include menstrual health. Furthermore, within research, researchers have described that the complexities of the menstrual cycle are often considered major barriers to the inclusion of women in clinical studies, which plays a role in the lack of information that athletes, coaches, and medical professionals have access to (Bruinvels et al., 2016; Costello et al., 2014). However, further investigation is needed to explore and describe the impact of socio-cultural factors in the process of normalization of menstrual irregularity and dysfunction.

### 3.3.2. Menstrual symptoms

Almost all participants (89%) noted that the physical and psychological symptoms they experienced impacted their sport experiences. Athletes described physical symptoms such as: abdominal cramps (79%), bloating (14%), migraines (2.3%), back pain (0.6%), and nausea (0.5%). These symptoms are generally associated with dysmenorrhea, which is common within the female athlete population (Martin et al., 2018). The most prevalent symptom of dysmenorrhea discussed was abdominal cramps (105 times across 50 participants), which is similar to Findlay and colleague's (2020) study, where 80% of the participants in their study reported abdominal cramping. Additionally, participants in the current study said that abdominal cramps had the most negative effect on their sports performance, a ringette player said that "if the cramps are bad and don't go away, I do not do as well" (P38, 20) highlighting that athletes' perceive menstrual cramps as directly related to decreased performance. The women in this study also highlight that their cramps caused unnecessary breaks in training that was disruptive and potentially impacts their ability to do their best in sport. For example, a cross country runner said, "there have been many cases on a run in the trails where I have to make bathroom stops because my stomach feel like it's stabbing me and going to explode" (P14, 19).

In addition to physical symptoms, these women athletes reported a

range of psychological symptoms that negatively influenced their well-being, training, and competition. The most common psychological symptom was a lack of motivation, one of many runners described how she has "lower energy on days prior to the period. This feels like an emotional low to me which equates to a lack of motivation" (P106, 38). This is congruent with Brown and colleagues (2020), who reported that psychological symptoms are typically recounted in the 7 days before menses. These findings are also consistent with research that identifies a lack of motivation as a major psychological symptom of menstruation in sport and physical activity (Bruinvels et al., 2021; Kolic et al., 2021). However, within our sample, psychological symptoms were also expressed during their menstrual period, such as irritability and anxiety that were challenging for training and competition. Within another study, mood changes and anxiety were noted as the most prevalent menstrual cycle symptoms (Bruinvels et al. (2021).

Within the current study, anxiety was generally associated with a lack of control related to menstruation. Overall, not knowing when menses was going to arrive, or the possibility of leaks and floods created the most anxiety for the women in this sample. For instance, a volleyball player expressed, "it [is] frustrating not being able to predict when you're period is going to start and causes anxiety for when or if it's going to arrive" (P69, 18) and a football/rugby player stated "it caused a lot of anxiety not [knowing when I will] have it and playing rough sports" (P103, 22, football/rugby). Anxiety and worry were also associated with menstruation in other research studies (Findlay et al., 2020; Mountjoy et al., 2014). Specifically, concerns regarding unexpected menses, unexpected increased cycle length, or increased heaviness of bleeding, distracted athletes from competition (Findlay et al., 2020).

### 3.3.3. Clothing as a distraction

A common external distraction that athletes faced concerning menstruation was related to their sport uniforms and clothing, for

example an Olympic weightlifter said that “having a menstrual period is distracting, it pulls focus away from the sport. If I’m constantly worried that I’ll bleed through my pants, I am not focused on the sport” (P9, 32). Some athletes spoke about how menstrual irregularity and dysfunction was perceived as positive because not menstruating meant less distraction regarding clothing. For example, one rugby player described that “it [secondary amenorrhea] was awesome; I was able to participate without worrying about what I was wearing” (P50, 32). Previous research highlights how the negative consequences of clothing requirements, such as white shorts, leotards, and swim bottoms, can alter performance during menses due to distraction or a loss of confidence (Brown et al., 2020; Findlay et al., 2020). Research conducted by Johnston-Robledo and Chrisler (2013) reported that 75% of female athlete’s had experienced or were afraid of experiencing leaks during competition. Other sport and physical activity researchers have also noted that leaks and flooding can be a source of distress during menstruation (Kolic et al., 2021). Athletes in this study also expressed fear of leaks, “it took way too much concentration to worry if I was leaking in my pants instead of focusing” (P21, 22, cross-country), or “I worry about leaks and the string of the tampon showing if I’m doing water sports” (P80, 32, running). Unfortunately, this fear of leaking and continual distraction led to one long distance runner in our study, (P102, 34) quitting competitive swimming in their teens and taking up “dry sports” once they got their menstrual period. Although this is only the experience of one participant, the embarrassment and distraction of menstruation related to uniforms could be a reason why some athletes transition to other sports or drop out of sport completely, especially in the adolescent years. To prevent this embarrassment and distraction some athletes talked about how they wore different clothes, when possible, when menstruating, “I have to wear different clothes when I’m on my period” (P10, 14, volleyball). These clothing changes were often related to concealment efforts reflecting the adherence to the taboo of menstruation still prevalent in women’s sport.

### 3.3.4. Participation Impact

Twenty percent of participants in this study reported that they had sat out of training or competition “when I had a long break between periods and then suddenly got it, I would be in too much pain to participate in my practices” (P69, 18, volleyball), or modified their participation “I did as much as I could (the main part of the lifting program), but cut the accessory work or cardio if I absolutely needed to” (P9, 32, Olympic weight lifting) due to symptoms associated with their menstrual cycle. This differs from a recent study that reported that only 4.2% of female athletes sat out due to menstruation and suggested that sitting out did not commonly occur at higher competition levels (Martin et al., 2018). Findlay et al. (2020) also found that competitive athletes were more likely to endure training and competition despite symptoms when compared to recreational athletes. In contrast, our results did not indicate a significant difference between competition levels when assessing data on sitting out, yet we would suggest competition level should still be considered as a possible reason why athletes sit out or modify their sport participation. However, our results are consistent with recent research that explored the impact of menstruation on general physical activity behaviours related to the menstrual cycle (Kolic et al., 2021). The study by Kolic et al. (2021) highlights that about a third of the participants avoided or modified physical activity as a result of menstruation or menstrual symptoms. We agree with their suggestion that individual differences regarding avoidance and non-avoidance orientations and menstrual taboo should be taken into consideration in addition to competition level when working to understand sport participation behaviour changes related to menstruation.

Although not significant, there was a difference between competitive and high-performance athletes in rates of sitting out, with 30% of competitive athletes stating they had sat out due to their menstrual period and only 16% of the high-performance group. This difference may be due to indirect and direct communication in sport. For example,

several athletes described that their menstrual cycle was not a valid reason to sit out, as one triathlete said, “our coach didn’t accept ‘I’m on my period’ as an excuse. So being unable or uncomfortable during a workout was perceived as an unacceptable excuse” (P94, 20), while an Olympic weightlifter described that “if I lost my arm, probably not gonna train that day. Period cramps are not as much of an excuse” (P9, 32). Other researchers have also reported that athletes did not feel that menstrual cycle issues were an acceptable reason to take rest or abstain from training, and that they had to continue regardless of the pain or other symptoms (Findlay et al., 2020). Within this study, both male and female coaches were perceived as unaccepting of menstruation as a valid reason to sit out or modify. Furthermore, some athletes noted that menstruation was an assumed reason for poor performance that they felt was very frustrating and at times demeaning, particularly when directly commented on, “I’ve had male coaches ask after a bad race whether I was on my period, which honestly is a little insulting. I’ve never had a poor performance which I would attribute to being on my period” (P65, 27, rugby). Whereas a rower was frustrated by the awkward and often unspoken assumptions that others made about her performance being impacted by her period, she said “coaches and teammates asking why my performance is not what it normally is” (P13, 15). The assumption from others that menstruation was the cause of poor performance motivated some athletes to further engage in hiding and concealing their menstrual function and dysfunction from others.

### 3.3.5. Regaining control

Similar to previous samples (e.g., Findlay et al., 2020), to minimize adverse effects of menstruation, some athletes resorted to medical interventions and birth control to manage symptoms and control menses. For example, one athlete described that she “went on birth control to regulate symptoms” and to “suppressed [menstruation] (on IUD)” (P50, 32, Rugby). Within this study, multiple participants reported medicating to deal with menstrual pain, for example one track and field athlete said, “if I’m in pain I take an Advil or rob ax and go on with practice” (P82, 23). The “go on with it mentality” (Brown et al., 2020) was also noted, where participants’ common coping strategies were predominantly anti-inflammatories or analgesics to manage symptoms that impacted their sport training and performance. However, one triathlete in the current study took this to an extreme, finding it necessary to “overdose” in order to train and compete,

“It sucks. It hurts, I have to take so much pain medication (overdosing on over-the-counter Midol/Advil for 2–3 days every time) ... usually have a headache because I am hyped up on a shit tonne of painkillers (... even though I’m on the pill to reduce cramps). Doctors don’t take me seriously when I complain about it, so I guess I’m just going to destroy my liver by the time I’m 25, because I don’t know what else to do ... If I have a competition, I will compete. But I am miserable and unhappy, and on so many pain medications that sometimes I feel like I’m drifting away and watching myself run from 3 feet above my head” (P94, 20).

Athletes in this study also worked to regain control of their experiences through managing symptoms with birth control (BC). Using BC to manage symptoms is common within the literature; for example, previous research has reported that 44% of participants used BC to manipulate their cycle and cope with the negative symptoms of menstruation (Brown et al., 2020; Findlay et al., 2020). In our study, 35% of participants were actively taking BC, which is lower than but comparable to other athlete samples (Findlay et al., 2020; Martin et al., 2018). Although some women disclosed that they were on BC for contraceptive methods, others reported using BC to manage physical symptoms, and multiple participants expressed that they used BC to manipulate or suppress their menstrual cycle, suppression was most commonly, but not exclusively related to competition, a fencer said, “I take birth control so if I travel for competition I would normally skip my period” (P60, 33). Although, other athletes described using BC not to

just avoid menstruation during competition, but to avoid menstruation all together, “I had an IUD inserted in October 2019, have not had a menstrual cycle since” (P78, 29, long distance running).

### 3.4. Limitations and recommendations

Due to the retrospective nature of data generation in the current study, the main limitation is a possibility that temporal fluctuations in athletes’ perceptions and experiences were not captured. For example, it is possible that more accurate data could be collected through prospective longitudinal descriptive approaches regarding menstrual history and experiences in sport. Recognizing that this line of inquiry is underrepresented in the sport literature there are countless ways to continue researching women athletes’ menstrual function and dysfunction. Recommendations for future research that stem directly from our findings include: continuing to explore and describe menstrual function and dysfunction in sport; explore and describe social norms, taboo, and stigmas that build contexts of concealment and normalization of dysfunction; explore socio-cultural factors that reinforce normalization of menstrual dysfunction and act to suppress or control women athletes reproductive health; communication patterns of athletes, coaches, and support staff regarding menstruation and reproductive health; explore how medical professionals are trained and deliver care regarding menstrual function and dysfunction; and to apply multidisciplinary longitudinal designs to account for how athlete perceptions might change over time.

## 4. Conclusions

Although researchers have previously speculated that menstrual dysfunction might vary based on competition level (De Souza et al., 2014), the findings from this study suggest that there are not differences in rates or experiences of menstrual function and dysfunction based on competition level, sport type, or sport category. This research also clearly highlights that most athletes experience some form of menstrual dysfunction, and due to the normalization of dysfunction in sport contexts (Verhoef et al., 2021), they often do not seek assistance. To promote health and well-being, individuals in sport contexts, sport associations, and medical professionals should promote open dialog, provide ongoing training, make accommodations, and work to understand the shared and unique challenges that women face and specifically how individual athletes want to be supported related to menstrual function and dysfunction to foster environments where athletes can thrive rather than hide.

### Declaration of competing interest

None.

The authors on this manuscript have no conflicts of interest to declare.

### Data availability

The authors do not have permission to share data.

### Acknowledgements

The first author was supported by a Saskatchewan Health Research Foundation Postdoctoral Research Fellowship.

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