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A formative investigation assessing menstrual health literacy in professional women's football

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ABSTRACT

The aim of this study was to assess and compare menstrual health literacy in professional women's football. A three-section questionnaire was completed by professional players ($n = 25$), development players ($n = 22$) and staff ($n = 19$). The mean total knowledge score (out of 19) was lower for development players (5.4 ± 2.9) than professional players (7.8 ± 3.2) and staff (9.1 ± 4.8) ($p < 0.001$). No group achieved $>50\%$ correct answers. For each group, knowledge of the menstrual cycle (MC) was greater than knowledge of hormonal contraceptives (HC) ($p < 0.001$). Previous MC and HC education did not correspond to higher knowledge scores in professional players ($p = 0.823$) or development players ($p = 0.274$). In professional and development players, comfort of communication was influenced by the sex of whom they were communicating with ($p < 0.001$), with a preference for females. In conclusion, results from the present study suggest refined education strategies and new approaches are required for both players and staff to improve menstrual health literacy in professional women's football.

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KEYWORDS

Female athlete health; education; elite athletes; youth athletes; staff

Introduction

The menstrual cycle (MC) is a vital physiological process commonly associated with negative symptoms (American College of Obstetricians and Gynecologists 2015). Cramps, back pain, and headaches are most frequently reported by elite athletes (Martin et al. 2018). To alleviate such symptoms, hormonal contraceptives (HC) are commonly used in this population (Martin et al. 2018; Clarke et al. 2021), including 28% of elite female football players (Parker et al. 2021). HC influence the body's natural production of reproductive hormones via provision of synthetic hormones (Lobo and Stanczyk 1994). The ability to manipulate the timing, frequency and heaviness of bleeding is positively associated with HC use by elite athletes (Martin et al. 2018). However, in suppressing natural hormones, HC-mediated cycles cannot be used to indicate good reproductive health (Nattiv et al. 2007). Further, there is high inter-individuality in the response to HC, with 24% of athletes reporting negative side effects, such as weight gain, mood changes and poor skin quality (Martin et al. 2018).

To make informed decisions concerning reproductive health and HC use, players should firstly have knowledge of their own MC. The ability to apply knowledge and confidently engage with others to maintain or restore reproductive health can be defined as menstrual health literacy (Roux et al. 2023). In accordance with Nutbeam's Health Outcome Model, menstrual health literacy incorporates knowledge (functional health literacy), communication skills (interactive health literacy) and problem-solving skills (critical health literacy) (Nutbeam 2000; Roux et al. 2023). As a biopsychosocial phenomenon,

knowledge and attitudes of the MC will influence an individual's interpretation of the associated biological changes, and vice versa (Chrisler and Gorman 2016). Therefore, improving menstrual health literacy, through knowledge and communication, might positively influence how an individual experiences their MC, alongside an increased ability to maintain good reproductive health. To date, research on menstrual health literacy in the sporting context has primarily centred around functional and interactive health literacies (McGawley et al. 2023). Critical health literacy, on the other hand, has received less attention, resulting in a scarcity of information regarding the ability of players, coaches, or support staff to critically evaluate information relating to the MC (McGawley et al. 2023).

Functional menstrual health literacy in elite athletes appears insufficient. To date, one study that objectively assessed MC and HC knowledge, using a questionnaire, concluded knowledge to be low (Larsen et al. 2020). Questions in this study included those pertaining to the hormones involved, typical MC lengths, possible MC disruption, and the logistics of pill consumption (Larsen et al. 2020). However, HC knowledge questions related to oral contraceptives only, which excludes more than 20% of elite athletes using a different type of HC (Martin et al. 2018; Larsen et al. 2020). It is widely acknowledged that a large number of elite athletes are aware their knowledge of the MC and HC requires improvement (Solli et al. 2020; von Rosen et al. 2022). In a study of 1086 Swedish and Norwegian athletes from 57 different sports, only 24% of athletes reported their knowledge to be good or very good, using a Likert scale (von Rosen et al. 2022). Most athletes (88%) attributed their

knowledge acquirement to their own research, with only 12% acquiring knowledge within the sporting context (von Rosen et al. 2022). These findings emphasise the need for improved education provision within the sport setting to advance menstrual health literacy.

Considering the multi-disciplinary support offered by staff within professional football, appropriate functional menstrual health literacy is warranted for those with direct contact with players. Although objective assessment of coach and support staff knowledge is unknown, most athletes perceive that their coaches' knowledge is either poor or very poor (von Rosen et al. 2022). Female athletes have reported that improving coach knowledge would improve the openness of conversation pertaining to the MC (Brown et al. 2020). Given the role that communication plays in developing effective coach–athlete relationships, research-informed education interventions that target both coaches and support staff could prove beneficial (Jowett 2017; Brown et al. 2020). To develop such interventions, research objectively assessing the functional, interactive and critical menstrual health literacies of coaches and support staff is necessary.

Interactive menstrual health literacy could also be important for the identification of MC irregularities, such as amenorrhea (absence of menses) and oligomenorrhea (cycle length >35 days). These irregularities are considered a key component of Relative Energy Deficiency in Sport (RED-s); an evolution of the Female Athlete Triad (Mountjoy et al. 2018). RED-s is a consequence of chronic low energy availability, associated with negative health and performance implications, such as metabolic dysfunction and decreased training response (Mountjoy et al. 2018). Coaches and support staff are uniquely positioned to provide support and challenge existing misconceptions on the MC and HC (Lee 2008; Rubinsky et al. 2018). Knowledge about MC irregularities, such as the cessation of menstruation, will enable them to motivate players to seek female-specific health care to restore their reproductive health.

Staff may also be needed to provide emotional support and reduce distress surrounding menarche and subsequent menstruation. This is of particular importance in youth settings where menarche commonly occurs between age 11 and 16 (Macgeorge et al. 2011; Rubinsky et al. 2018). The importance of communication and support is further amplified in youth environments due to, (1) the prevalence of negative symptoms experienced and, (2) the anecdotal lower confidence of younger athletes to have conversations about the MC and HC. However, differences in menstrual health literacy between senior and youth athletes has not yet been examined. Thus, more research is needed to determine whether additional support in youth environments is truly warranted.

Comfort in communicating about the MC and HC appears to be influenced by gender. Interviews conducted with elite female athletes suggest they are more comfortable discussing the MC with female members of staff rather than male counterparts (Brown et al. 2020; Findlay et al. 2020; McHaffie et al. 2022). Female athletes state that males do not understand their experiences (Brown et al. 2020) and that the MC itself remains a taboo topic of conversation (McHaffie et al. 2022). These findings are particularly relevant for women's football given that in a recent survey of performance staff (e.g., strength & conditioning

coaches, physiotherapists), 73% were male (Sportsmith 2022) and in the professional game, 72% of coaches are male (Female Coaching Network 2022). Research has not examined whether the sex biases reported by elite senior athletes are also present at the youth level or within a staff cohort.

Elite players perceive decreases in physical and psychological football performance due to negative MC-related symptoms (Read et al. 2022). Whilst some players using HC might experience a reduction in negative symptoms, HC do not allow for the detection of MC irregularities and are also associated with negative side effects (Nattiv et al. 2007; Martin et al. 2018). Thus, evidence-based interventions that enable sporting organisations, such as professional football clubs, to maximise female athlete health support is necessary. For this, an understanding of their population's menstrual health literacy is required. This can be evaluated by assessing knowledge and comfort communicating about such topics, within both staff and playing groups. As previously highlighted, studies in this area have focussed on athletes only, at senior level, and are not specific to the professional football environment. Therefore, the aim of the present study was to provide an initial exploration and comparison of knowledge and comfort communicating about the MC and HC between professional players, development players and staff. The secondary aim was to investigate whether (1) current and/or previous HC use, (2) previous education on the MC and/or HC, and (3) academic education influenced menstrual health literacy. As a formative study, it is our intention that these insights will inform the development of educational strategies and improvements in female athlete health support.

Materials and methods

Study design

This study was descriptive in nature, describing the menstrual health literacy of professional players, development players, and staff at a single professional football club. Participants were recruited through purposive total population sampling, whereby all players and staff at the club, at the time of data collection, volunteered to participate.

Participants

Upon receipt of ethical approval from the University of Chester Research Ethics Committee (No. 1813/21/RA/SES), 25 professional female football players (age 26 ± 4 y; 13 h/week training; 1–2 matches/week), ($n = 15$; previous MC/HC education), 22 development female football players (age 18 ± 1 y; 4.5 h/week training; 1 match/week) ($n = 2$; previous MC/HC education) and 19 members of staff (7 × coach, 5 × physiotherapist, 4 × sports science, 2 × performance analyst, 1 × psychologist; 13 male, 6 female; age 35 ± 6 y; ($n = 7$; previous MC/HC education) were recruited. Informed consent and parental consent (players <18 years old; $n = 15$) were collected. It was a requirement that all participants could understand written English. There were no other exclusion criteria based on the premise that all participants were players or staff at the club.

Data collection

An online questionnaire was developed to assess functional and interactive health literacy. The three-section questionnaire was completed by all participants in the presence of the researcher to prevent discussion with peers or researching of answers. The questionnaire was in English and took approximately 10 minutes to complete.

Section one of the questionnaire collected participant demographic data including sex, age, HC use (excluding male staff), and previous education on the MC or HC. Highest standard of academic education was also collected, for which the categories were as follows: (1) lower than GCSEs/currently working towards GCSEs, (2) GCSEs or equivalent, (3) A-levels or equivalent, (4) bachelor's degree, (5) master's degree, and (6) doctorate.

Section two of the questionnaire assessed knowledge of the MC and HC (functional menstrual health literacy). The knowledge assessment was an adapted version of the questionnaire originally developed by Larsen et al. (2020), in which interactive and critical health literacy were not addressed or measured. From a possible 12 questions asked by Larsen et al. (2020), 9 questions were included in the present study. Three questions were excluded because either the answers could be disputed, or they did not relate to our study aim. An additional four questions assessed knowledge of other aspects of the MC (e.g., ovulation) and other HC (i.e., non-oral contraceptive) to provide a broader scope of assessment. Knowledge of HC was assessed using 14 questions: 10 multiple choice questions with a minimum of 4 answer options and 4 open-ended short answer questions. All questions had an option of 'I am not sure' or the option to leave the answer blank. Knowledge was scored by allocating 1 point to each correct answer; MC knowledge (Questions 1 to 5), HC knowledge (Questions 6 to 14) and total knowledge score (Questions 1 to 14). Question 1, 3 and 6 had >1 correct answer; hence, the highest score that could be achieved was 8, 11 and 19 for MC knowledge, HC knowledge and total knowledge, respectively.

Section three assessed individual comfort when communicating about the MC and HC with different individuals (interactive menstrual health literacy). For this purpose, the player version and coach version were modified to reflect the personnel with whom they interact with at the club. Participants were instructed to state how comfortable they were in discussing the MC and HC with different individuals using a 5-point Likert scale ranging from 'very uncomfortable' (1) to 'very comfortable' (5). In the players' questionnaire, the individuals referred to were as follows: male coaches, female coaches, male support staff, female support staff and teammates. In the staff questionnaire, the individuals referred to were as follows: players, male support staff and female support staff.

Statistical analysis

IBM SPSS Statistics Version 26 was used to complete the statistical analysis. Participant demographic data were described using descriptive statistics. The non-parametric Kruskal–Wallis test was used to compare scores between professional players, development players and staff. If statistically significant differences were observed, a Mann Whitney U *post-hoc* was conducted. To assess the relationship between participants' highest standard of academic education and knowledge, the Kendall's Coefficient of Rank Correlation (tau-sub-b, τ_b) was used. The Mann-Whitney U test was used to assess differences in total knowledge score, between those who had previously received education on the MC and HC and those who had not. The Friedman test compared participants' level of comfort when communicating with different stakeholders; if statistically significant differences were observed, a post-hoc Wilcoxon Signed Rank test was conducted. Data were presented as mean $\pm$ SD, as well as frequencies and percentages. Statistical significance was set at $p \leq 0.05$.

Results

Functional menstrual health literacy

No group scored greater than 50% for total knowledge of the MC and HC (Table 1). The total knowledge of development players was lower than professional players ($p = 0.020$) and staff ($p = 0.008$). In each group, the percentage of correct answers was higher for the MC-related questions when compared to the HC-related questions ($p < 0.001$) (Table 1).

The questionnaire item, the corresponding correct answer, and the number of correct responses for MC, HC and total knowledge for professional players, development players and staff are displayed in Table 2.

Professional players who currently use (20%), or previously had used (36%), HC scored higher than those who had not ($U = 24.50$, $p = 0.011$). In development players ($U = 42.00$, $p = 0.565$) and staff ($U = 24.50$, $p = 0.865$), there was no difference in total knowledge between those who have/had used a HC and those who had not.

In both professional players ($U = 71.00$, $p = 0.823$) and development players ($U = 10.50$, $p = 0.274$), there was no difference in total knowledge between those who had previously received education on the MC or HC and those who had not. However, in the staff group, those who had previously received education scored higher than those who had not ($U = 17.50$, $p = 0.038$).

In professional players, there was a positive correlation between highest standard of academic education and total knowledge ($\tau_b = 0.475$, $p = 0.005$). In development team players ($\tau_b = 0.051$, $p = 0.784$) and staff ($\tau_b = 0.209$, $p = 0.275$), there was no correlation between highest standard of academic education and total knowledge.

Table 1. MC, HC and total knowledge scores for professional players, development players and staff.

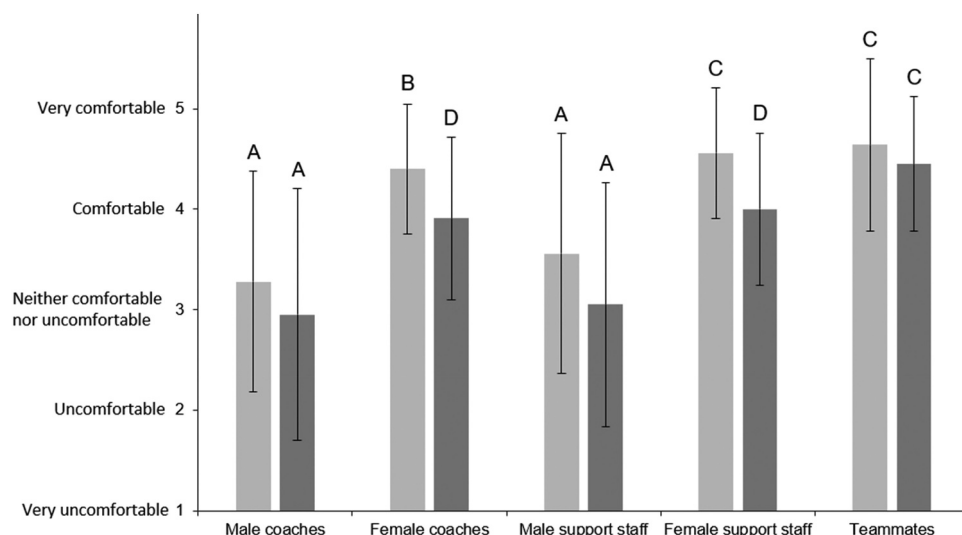
	Professional players	Development players	Staff
MC knowledge score out of (8% correct)	4.6 $\pm$ 1.5 (58%)	3.6 $\pm$ 1.5 (46%) *	5.1 $\pm$ 2.3 (63%)
HC knowledge score out of (11% correct)	3.2 $\pm$ 2.5 (40%)	1.7 $\pm$ 2.0 (16%) *	4.0 $\pm$ 3.1 (36%)
Total knowledge score out of (19% correct)	7.8 $\pm$ 3.2 (41%)	5.4 $\pm$ 2.9 (28%) *	9.1 $\pm$ 4.8 (48%)

Values are mean $\pm$ SD. Scores marked with an asterisks are significantly different ($p < 0.05$).

Table 2. Responses to questionnaire items contributing to MC knowledge score, HC knowledge score and overall knowledge score for professional players, development players and staff.

Question	Correct answer	Number of participants answering correctly (%)		
		Professional players	Development players	Staff
1. Name the female ovarian hormones that fluctuate throughout the MC? ^{*SAQ} (1 point for each)	Progesterone	6 (24%)	5 (23%)	9 (47%)
2. What is the typical duration of one complete MC? (Number of days between the beginning of one period and the start of the next period) *	Oestrogen 28 days	11 (44%) 25 (100%)	10 (45%) 13 (59%)	11 (58%) 17 (89%)
3. Please select what you think are the possible reasons for MC disruption? (1 point for each)	Low energy availability – consuming energy (food/drinks) below what is needed to fuel training/matches)	18 (72%)	11 (50%)	14 (74%)
	Increased stress (feeling less able to cope with the demands of family/work/home life)	20 (80%)	16 (73%)	17 (89%)
	Use of a HC	17 (68%)	15 (68%)	12 (63%)
4. What is amenorrhea? *	A condition of the absence of menstruation (periods)	7 (28%)	3 (14%)	12 (63%)
5. Approximately when in the MC does ovulation (release of an egg) occur?	The middle	12 (48%)	12 (55%)	9 (47%)
6. Which of these HC methods provide long-lasting (>2 months) contraception with one administration? (1 point for each)	Intrauterine system (coil)	10 (40%)	4 (18%)	9 (47%)
	Implant	14 (56%)	8 (36%)	12 (63%)
	Injection	8 (32%)	5 (23%)	8 (42%)
7. One type of oral contraception is called the mini pill. How many hormones are in this form of contraception? ^{*SAQ}	1	5 (20%)	1 (5%)	5 (26%)
8. A type of oral contraception is called the combined oral contraceptive pill. How many hormones are in this form of contraception? ^{*SAQ}	2	5 (20%)	1 (5%)	6 (32%)
9. What happens to the natural ovarian hormones produced by the body when the combined oral contraceptive pill is taken? *	They decrease	4 (16%)	1 (5%)	8 (42%)
10. If an individual was using a combined oral contraceptive pill would they experience changes in cycle length?	No	2 (8%)	2 (9%)	4 (21%)
11. For a combined oral contraceptive pill user, how many days in a row should the 'active' pills be taken? *	21	11 (44%)	4 (18%)	10 (53%)
12. For a combined oral contraceptive pill user, how many days in a row should be non-pill or placebo ('inactive') pill days? *	7	9 (36%)	5 (23%)	9 (47%)
13. What may happen when 'inactive' pills are skipped, and 'active' pills are continuously taken in their place? *	Menstruation does not occur	4 (16%)	2 (9%)	5 (26%)
14. When taken properly, how effective is the combined oral contraceptive pill at preventing pregnancy? ^{*SAQ}	99–100%	7 (16%)	5 (23%)	1 (5%)

^{a*} are the items taken from Larsen's et al. (2020) questionnaire. Questions marked with ^{SAQ} are short-answer questions.

**Figure 1.** Comfort communicating about the MC and HC with key stakeholders in professional players (light grey bars) and development players (dark grey bars). Values are group mean $\pm$ SD. Means labelled with the same letter are not significantly different.

Interactive menstrual health literacy

There were differences in both professional players' ($X^2 = 46.59$, $p < 0.001$) and development players' ($X^2 = 57.161$, $p < 0.001$) comfort communicating about the MC and HC with different stakeholders (Figure 1). Professional players were more comfortable than development players discussing the topics with female coaches ($p = 0.033$) and female support staff ($p = 0.009$). Both professional players and development players were least comfortable with male coaches and male support staff.

There was no difference in staff members' comfort in communicating about the MC and HC with different stakeholders ($X^2 = 1.862$, $p = 0.394$).

Discussion

The main findings of the present study were that professional football players, development players and staff scored less than 50% for total MC and HC knowledge, albeit all participants had greater MC knowledge compared to HC knowledge. Development players' MC and HC knowledge was lower than professional players and staff. In addition, professional and development players were less comfortable discussing the MC and HC with males compared to females. However, this sex bias was not present within the staff cohort.

A pertinent finding was the lack of knowledge about HC, given its importance in equipping players with the appropriate information to make informed decisions regarding their use. In the current study, only 31% of HC-related questions were answered correctly across all participants, which was slightly lower than the 38% of correct answers reported by Larsen et al. (2020). Of note, only 18% of development players answered HC-related questions correctly, even though 50% were either current or previous users. Current and/or previous HC use was associated with greater scores in professional players; a finding that has been reported in both athletic (Larsen et al. 2020) and non-athletic populations (Bryden and Fletcher 2001; Philipson et al. 2011). Despite HC users scoring higher than non-users, over 50% of questions were still answered incorrectly, suggesting that there remains a need for improved information provision for players considering HCs. An improvement in functional menstrual health literacy would also likely translate into improved interactive health literacy in terms of better communication (Roux et al. 2023). This would increase the likelihood of players seeking advice and information, possibly from those more knowledgeable, for example, general practitioners or club doctors.

The ability to identify menstrual irregularities is important in elite sport given the prevalence of amenorrhea, and the associated negative health implications (De Souza et al. 2014). However, only 28% and 14% of professional and development players, respectively, were able to correctly identify the definition of amenorrhea, compared to 63% of staff. These low percentages in players reaffirm those reported by Larsen et al. (2020) (18%) in elite athletes responding to the same question. Given that amenorrhea is a key component of Relative Energy Deficiency in Sport (RED-S), football players should be informed about the negative implications of menstrual irregularities on health and performance (Mountjoy et al. 2018). Despite not

being able to define amenorrhea, a much higher percentage of players in the present study were able to correctly identify probable causes of MC disruption. Consensus statements have provided guidance for those working with female athletes, which is likely to have enabled practitioners to better inform athletes about the potential causes of RED-s (Mountjoy et al. 2018).

Previous education on the MC and HC corresponded with higher knowledge in staff but not players at either level. Firstly, this suggests that although interventions at a staff level have had a positive effect, they remain inadequate to achieve a knowledge score greater than 50%. Secondly, it appears that previous efforts to educate players on MC and HC topics have not been effective. Qualitative research in football players suggests that support in this space is limited to data collection, for example MC tracking, rather than practices that improve knowledge of either staff or players (McHaffie et al. 2022). Therefore, efficacious educational interventions are required, which should be built into a long-term strategy, rather than employing single 'one-off' sessions (Peralta et al. 2017). Effective integration of an intervention can be seen by Roux et al. (2023), who delivered a 16-week holistic program, which led to improvements in menstrual health literacy.

For professional players, a higher standard of academic education was associated with higher knowledge scores. This same association was also reported by Larsen et al. (2020), although the magnitude of improvement was not statistically significant. Those who had completed GCSEs scored lower than those with a bachelor's degree. This is expected considering that MC education was not provided in the schools of over half of UK secondary school teachers (Brown et al. 2022).

Professional players demonstrated greater interactive menstrual health literacy than development players. This finding is consistent with those of Brown et al. (2020), who suggested that increasing age may increase the openness or likelihood of conversations. There are several barriers to communicating about such topics, proposed by Höök et al. (2021), which may serve as an explanation for these findings. Firstly, MC knowledge of the athlete may pose as a barrier (Höök et al. 2021). As presented in the current study, development players have lower knowledge levels, which in turn may lead to a reluctance to initiate discussions. The second potential barrier may relate to the quality of interpersonal relationships (Höök et al. 2021). Development players spend significantly less time in the football environment than professional players, resulting in less time to develop relationships, reducing the likelihood of discussing such topics. The final proposed barrier is structural in nature (Höök et al. 2021), and aligns with the current study as most development players had not received formal education on the MC or HCs. Thus, potentially preventing creation of an environment conducive of such conversations (Höök et al. 2021; Clarke et al. 2021).

Despite differences in professional and development players' interactive menstrual health literacy, there was congruence between the two samples in relation to the presence of a sex bias. Both groups were more comfortable discussing the MC and HC with female coaches and support staff, compared to male counterparts. Sex bias in relation to discussing these topics in a sporting context is a common finding (Solli

et al. 2020; Findlay et al. 2020; Brown et al. 2020; von Rosen et al. 2022). Female athletes have reported that men 'don't get it' or 'feel awkward' discussing the MC (Brown et al. 2020). Given that in the women's professional game 72% of coaches are male, this finding is particularly relevant for football (Female Coaching Network 2022). Nevertheless, it is important to highlight that several players in the current study selected 'very comfortable' in discussing MC and HC, regardless of sex, consistent with findings reported by Findlay et al. (2020).

Job role also appears to influence professional players' comfort discussing the MC and HC. For example, players reported more comfort communicating with female support staff compared to female coaches. This finding has also been reported in international rugby players (Findlay et al. 2020) and Scandinavian athletes across multiple sports (von Rosen et al. 2022). Athletes are more likely to seek support from medical staff in relation to MC and HC, as opposed to coaches (von Rosen et al. 2022), and feel more comfortable doing so (Findlay et al. 2020). Professional and development players also reported being more comfortable communicating with teammates compared to staff. This finding presents an opportunity to harness this comfort and develop opportunities for players to share experiences and ask questions they are less comfortable asking staff (e.g., via player mentorship interventions). Conversely, communication between teammates may promote the dissemination of inaccurate information when knowledge is low, as found in the present study.

Despite an impact of sex and job role on both professional and development players' comfort, there was no influence of either factor on staff. This finding may be explained by the heterogenous nature of the staff sample which included both males and females and the different job roles. There were a wide range of responses, therefore it is possible that coaches and/or males may have been less comfortable than medical staff and/or females, as reported in previous studies (Sherman et al. 2005; Kroshus et al. 2014).

It is important to acknowledge some of the limitations within this study. Firstly, the population was limited to a single professional football club, and therefore the results might not be transferable to other professional football clubs or sport organisations. Secondly, the small sample size of each group and the heterogeneous nature of the staff sample reduced the statistical power in data analysis (Button et al. 2013). This meant that comparisons between different staff job roles and sex could not be assessed. Moreover, despite assessing functional and interactive menstrual health literacies, the present study did not consider the final level of Nutbeam's (2000) Health Outcome Model, critical literacy; the ability to appraise information. Finally, the data collected in the study was quantitative in nature, and therefore a qualitative approach is necessary to understand the context of the results (Almalki 2016). To address these limitations, future research should aim to use a validated quantitative and qualitative assessment of functional, interactive and critical menstrual health literacies at multiple football clubs, allowing for greater sample sizes and transferability of results.

In conclusion, this formative investigation in professional football found that players and staff scored less than 50% for total knowledge related to the MC and HC. Given the MC is

a vital physiological process and HC are used to control the MC and manage associated symptoms, insights from the present study demonstrate that considerable research is needed to develop evidence-based education strategies to improve menstrual health literacy. It is recommended that long-term, holistic education strategies start at the youth level, and delivery is tailored to encourage optimal engagement. Further research is necessary to determine if improved functional menstrual health literacy translates to improved interactive menstrual health literacy in professional women's football.

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Disclosure statement

IR and RKR are employees of the Gatorade Sports Science Institute, a division of PepsiCo, Incorporated. SM is a paid consultant of the Gatorade Sports Science Institute, a division of PepsiCo, Incorporated. RA completed this study in completion of PhD co-funded by the University of Chester (Sustainable Futures Scholarship) and the Gatorade Sports Science Institute, a division of PepsiCo, Incorporated. The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of PepsiCo nor the professional club where participants are contracted.

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Data availability statement

The data are not publicly available to ensure that the privacy of the research participants and football club is not compromised, despite all data being kept in an anonymous form.

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