Athlete and support staff views on menstrual cycle related needs through a mixed-method survey

Creating a framework for a Female Athlete Supportive Environment

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Master's program
Sports Studies, specializing in Coaching
Thesis
2025

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Degree
Master of Sports Studies

Report/thesis title
Athlete and support staff views on menstrual cycle related needs through a mixed-method survey. Creating a framework for a Female Athlete Supportive Environment

Number of pages and appendix pages
57 + 6

Abstract

While many hindering factors and barriers regarding the menstrual cycle related female athlete support have been identified in previous research, a more comprehensive and practical approach to female athlete specific support is yet to be taken. This thesis, therefore, aimed to look at the female athlete specific support from a more comprehensive perspective, intending to piece together the different contributing factors required in a female athlete supportive environment based on the findings of this study.

In the theoretical framework topics such as menstrual cycle and the gendered sporting context, menstrual health knowledge, menstrual cycle related communication, menstrual cycle and performance, as well as female athlete specific support were covered.

Two mixed-methods surveys were conducted between January and May of 2024, one for the female athletes and one for the support staff members working with female athletes. In total, 141 female athletes and 44 support staff members answered the surveys, representing 16 different sports globally. The survey responses were analyzed with quantitative and qualitative methods.

The survey analysis provided an understanding about the athletes' and support staff's actual level of menstrual health knowledge, current level of support available to athletes, and a comprehensive view on the barriers to such support.

Results of previous research regarding the level of menstrual health knowledge being low, especially regarding hormonal contraceptives, components of Female Athlete Triad, and in the case of athletes, defining amenorrhea, were confirmed. Further, this thesis confirmed previous research regarding the low level of menstrual health related support as only 13% of the athlete respondents reported receiving such support while 32% of the support staff reported menstrual cycle related support being available to the athletes in their sporting environment. This thesis further confirmed previous research as it relates to the current barriers regarding the menstrual

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cycle related support available to female athletes, namely: low menstrual health knowledge, lack of menstrual cycle related communication as well as menstrual cycle tracking without an impact in daily decisions regarding the athletes training, health and performance.

The development proposal of this thesis, based on the combined results of the questions on menstrual health knowledge, current support available to athletes, the barriers to menstrual cycle related support and the thematic analysis, resulted in the creation of the Female Athlete Supportive Environment – FASE – framework consisting of seven categories of support, namely *Education – Menstrual health knowledge*, *Performance considerations*, *Medical considerations, Communication considerations, Well-being considerations, Equipment considerations,* and *Research.*

The FASE framework enables transition from the current gendered sporting context to a sporting context that serves to support athletes regardless of their gender. However, more research is needed to successfully implement this framework and to harness it to benefit both the female athletes and their support staff in their daily sporting context.

Keywords
Menstrual cycle, Menstrual health knowledge, Menstrual health related support, Barriers to menstrual health related support, Female athletes, Support staff, Female athlete supportive environment, FASE

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1 Introduction

The increase in female athlete participation is starting to close the gender gap in sports participation. In fact, the Olympic Games in Paris in 2024 achieved, for the first time since the start of the modern Olympics in 1896, full gender parity (#GenderEqualOlympics). However, the number of female coaches has not followed the same trend and hence, the majority of female athletes are being coached by men. In fact, only 13% of female athletes are coaches by female coaches (International Olympic Committee, 2021).

Regardless of the growing female participation in sports, the quantity and quality of research on female athletes is still lagging. Most high-quality research within sports and exercise science is done on men. Hence, there is a gender research gap that impacts the way female athletes are trained, managed and supported. In fact, only 6% of all research within this field is done solely on women and, only fraction of it, is of high quality (Cowley et al., 2021). Due to this, there is a consequent lack of research on female athlete physiology, more specifically on the menstrual cycle, the causes of its irregularities or disturbances and lack of knowledge of how the menstrual cycle affects health and performance of female athletes. Further, there are also issues of sample sizes being too small and study designs being of poor quality (Badenhorst, 2024), further contributing to the gender data gap in sports and exercise science research. This gap, consequently, is also reflected in the low menstrual health literacy levels among female athletes and their support staff (McGawley, 2023).

As a result, female physiology expertise is rare within female sports, leading to best-practice guidelines and training programs being derived from research made on men without ensuring applicability (Sims, 2018). In fact, female athletes are too often being managed and trained like miniature men, due to the lack of female athlete specific guidelines based on high-quality scientific evidence (Elliott-Sale, 2021). This, consequently, is risking the female athletes reaching their full performance potential or, for an athlete so important, marginal gains, as the effects of oestrogen and progesterone fluctuations on the bodily functions, and especially on performance, are yet to be well-understood. In addition, however, there is also a reluctancy to produce research with an experimental design that incorporates female-specific considerations, such as the menstrual cycle, hormonal contraceptive use, and even pregnancy (Elliott-Sale, 2021). This, of course, is problematic, since there are significant differences between men and women regarding physiology, specifically reproductive endocrinology, and anatomy. It is clear that more research is needed to better understand female physiology and particularly menstrual cycle and hormonal contraceptive

use, and their impact on health, training and performance, to better manage, train and support female athletes.

There is evident lack of high-quality research on female physiology generally and more specifically on menstrual cycle and its impact on health, training and performance. In the limited amount of existing research on this subject, we can see that female athletes perceive their menstrual cycle to negatively impact their training, performance, and wellbeing (Read et al., 2022; Höök, 2021), but find it difficult to discuss menstrual cycle related issues, especially with male coaches and support staff (Brown, 2022; Laske, 2022; von Rosen, 2022, Höök, 2021) and due to the tabooed nature of the topic (Goorevich & Zipp, 2024). Similarly, coaches do not feel comfortable advising or supporting athletes based on their hormonal cycles, perceived lack of menstrual health knowledge being the identified key barrier (Solli et al., 2020; Larsen et al., 2023; Brown, 2022). Further, the existing research is unanimous in recognising the urgent need for educational interventions for both the athletes and the support staff in ensuring better communication and support in female sporting environments. However, while several studies have aimed to understand the level of menstrual health knowledge in female athletes (Andersson, 2023; McHaffie, 2022; Larssen, 2020), the understanding of the knowledge level of the support staff seems almost absent (Taim, 2024; Clarke, 2021).

Moreover, while many of the above discussed hindering factors and barriers (such as lack of research, knowledge, and communication) regarding the menstrual cycle related female athlete support have been identified in previous research, a more comprehensive and practical approach to female athlete specific support is yet to be taken. Rather, different contributing aspects regarding support have thus far been in focus. Further, there is a recognizable negative loop sustaining the status quo enveloping the gendered sporting context with its tabooed culture around menstruation and consequent lack of research. This loop results in maintenance of low levels of menstrual health knowledge and consequent barriers in menstrual health-related communication among athletes and their support staff. Poor menstrual health knowledge, in turn, impacts the quality and level of support provided to the athletes, potentially compromising their long-term health and the ability to perform.

This thesis, therefore, aims to look at the female athlete specific support from a more comprehensive perspective, intending to piece together the different contributing factors required in a female athlete supportive environment based on the findings of this study.

2 Theoretical framework

My intention in this section is to move from the research problem and aim to the theoretical framework of this thesis. With this theoretical framework as the backdrop, I will be able to end this section by formulating the research questions. I have found four areas of research as particularly relevant, given the aim of the thesis. This way of structuring previous research has helped me to step by step build the theoretical framework, in which I will cover the following themes: 1) Menstrual cycle and the gendered sporting context, 2) Menstrual health knowledge 3) Menstrual cycle related communication, 4) Menstrual cycle and performance, and 4) Female athlete specific support, moving from the broader perspective towards the more specific. The aim is to provide proper and most relevant context prior to introducing the research questions and the development purpose of this thesis following this section.

2.1.1 Menstrual cycle and the gendered sporting context

Menstruation is intimate, often concealed and causes embarrassment, shame (Amaral et al., 2011; Lee, 2009; Marván & Trujillo, 2010; Çevirme et al., 2010), psychosocial stress and social isolation due to menstrual cycle related pain, irregular menstrual cycle or heavy menstruation (O'Flynn, 2006; Santer et al., 2008; Barnard et al., 2003; Yamamoto et al., 2009). Brantelid (2014) interpret menstruation and its concealment as a social norm – ''every woman should have it, but no one should know about it'' – revealing a social context prohibiting the exposure of menstruation. Taboo, stigma, and the consequent silence around menstruation and menstrual cycle are also barriers to women's sport participation and a risk for disrupted cycles going unnoticed reflecting the gendered sporting context in which the masculine norm is maintained (Goorevich & Zipp, 2024). The exclusion of women from sport has historically been justified by the taboo and stigma related to menstruation (Cahn, 2015; Kissling, 1999) and persists still today in the form of misinformation of and stigma around menstrual health (Kissling, 1999). Further, Goorevich and Zipp (2024) identified several barriers to positive coach-athlete relationship related to menstrual cycle, namely discomfort, silence and misinformation which all relate to stigma. Ignorance, lack of efficacy and fear of reaction relating to pessimism and antagonism, and lastly gender stereotypes and gendered hostility as means of maintaining the masculine norm.

There is also the discomfort around or total absence of communication between the female athlete and especially their male coaches when related to menstrual cycle so that a female gendered staff member is needed to act as a mediator (Laske et al., 2024). Goorevich & Zipp (2024) reported

female athletes recognizing male coaches as unable to support them regards to their menstrual cycle due to male coaches' lack of menstruation experiences. However, as female coaches are recognised as able to provide such support, it reinforces menstruation as a siloed, taboo topic in the sporting context (Brown & Knight, 2022; Brown et al., 2021). The lack of female coaches, in turn, leads to a lack of communication opportunities for those athletes who are otherwise uncomfortable discussing issues related to their menstrual cycle. Further, the traditional male dominated sporting context is resisted and/or confirmed by female athletes, dependent on their previous gendered experiences (Goorevich & Zipp, 2024).

2.1.2 Menstrual health knowledge

Menstrual health, as it's defined, refers to a state of well-being, and includes the physical, mental and social aspects in relation to the menstrual cycle. To achieve menstrual health, access to age-appropriate and accurate information, resources, facilities and care, as well as to a safe supportive socio-cultural environment is required (Hennegan et al., 2021). Menstrual health literacy, furthermore, refers to the acquisition of the relevant knowledge and its application as it pertains to menstrual health-related issues (McGawley, 2023). Solli et al. (2020) has reported only 8% of elite female endurance athletes having adequate level of menstrual health knowledge while the athletes also recognized their coaches lacked such knowledge as well.

There is a need for the coaches and the support staff to be well-informed and educated about the nuances of female physiology regarding training and performance and more specifically, the menstrual cycle. However, most athletes perceive their coaches having poor or very poor knowledge related to the menstrual cycle (von Rosen et al. 2022).

When Brown et al. (2022) interviewed female coaches, it became apparent that there were discrepancies between the participants regarding their understanding of the impact the menstrual cycle might have in sport. Further, many of the female coaches viewed their knowledge to be limited, also recognising that their own menstrual cycle related experiences or rather the lack thereof (sometimes due to the hormonal contraceptive use), might not have prepared them for supporting female athletes since they were not able to understand what the athletes might be going through. Furthermore, the coaches' lack of experience working with female athletes appeared to contribute to lack of awareness of how the menstrual cycle impacts athletes. On the contrary, the participants who had personally experienced menstrual cycle symptoms or any other

issues related to it, felt better equipped to grasp what the athletes might be experiencing (Brown et al., 2022).

Clarke et al. (2021) recognises that male coaches may have difficulty understanding the impact the menstrual cycle might have on the athletes' ability to train, perform or recover. It has also been reported that male coaches agree less strongly than female coaches with statements regarding menstrual cycle health, for example the need for the coach to know whether or not the athlete has regular or irregular menstrual cycle, or their comfort in discussing such matters (Kroshus, 2014). Since the prevalence of amenorrhea is high in elite sports (Jones et al., 2024), it is of utmost importance that any menstrual irregularities are effectively identified to avoid its negative implications on athlete health (De Souza et al, 2014). Anderson et al (2023) reported that as many as 72% of the professional female football players failed to correctly define amenorrhea, in comparison to staff's 27%. However, and maybe more importantly, the players were much more accurately able to identify probable causes of menstrual cycle disruption (Anderson, 2023). Since the prevalence of menstrual abnormalities are estimated to affect one in every five exercising women, and about half of the female endurance runners (Cabre et al., 2022), it is important that athletes are educated about the adverse effects that this may indicate regarding their health and performance (Mountjoy et al, 2018). Furthermore, female athletes have reported that information regarding the long-term effects of contraceptives on health and performance, menstrual products, the impact of menstrual cycle on performance and strategies to manage these, as well as information regarding coach education and how to improve awareness, information directed to younger athletes as well as on menstrual cycle related communication pathways are valuable in enhancing menstrual health knowledge and awareness (Brown et al., 2022).

Many authors have stressed the importance and need for education interventions in sport settings to advance menstrual health literacy in athletes, coaches and support staff (Clarke et al., 2021; von Rosen et al., 2022; Larsen et al., 2020; Findley et al, 2020). Continued education is seen as a means to better symptom awareness, management strategies and a possible positive impact on training and performance optimisation (Plan international UK. Break the barriers: girls' experiences of menstruation in the UK. 2018).

Based on their cornerstone review, McGawley et al. (2023) have based their step-by-step guide for improving menstrual health literacy in sport on the following six recommendations: 1) ''assess the problem to identify what needs to change'' referring to the lack of quality research related to the impact of the menstrual cycle and hormonal contraceptive use on health, training and performance,

low menstrual health knowledge among athletes and practitioners, and inadequate menstrual cycle related communication between stakeholders 2) ‘’Detail the objectives and outcomes of the intervention strategies’’, referring to the need of increasing the volume of high-quality research, increasing menstrual health knowledge, and enhancing menstrual cycle related communication pathways 3) ‘’Detail the intervention strategies to address determinants of MHL’’, based on different factors contributing to low menstrual health knowledge and addressing them through strategies based on behaviour change theories 4) ‘’Organise the intervention strategies into a cohesive programme plan’’ such as an education aimed to improve menstrual health literacy 5) ‘’Develop a programme implementation plan’’ that is delivered by practitioners with menstrual health expertise, 6) ‘’Generate an evaluation plan to evaluate the programme effectiveness’’ by using different evaluation tools to assess first, baseline, secondly the changes in menstrual health literacy, and thirdly the success of the education intervention. And finally seeking participant feedback to improve the education.

2.1.3 Menstrual cycle related communication

Education strategies should also be developed to improve menstrual health-related communication between the female athletes and their coaches and support staff since menstrual cycle related communication between the female athletes and their, especially male-gendered, support staff is limited or absent (Brown et al., 2021, 2022; Clarke et al., 2021; Findlay et al., 2020; Höök et al., 2021; Kroshus et al., 2014; Solli et al., 2020). According to Laske et al. (2024), 54% of female athletes are willing to talk about their menstrual cycle while only 8% remember their coach ever having asked about them having a regular cycle. Furthermore, Laske et al. (2024) report female athletes rather talk about menstrual cycle in general than address their own menstrual cycle indicating the menstrual cycle still being a taboo topic. Goorevich and Zipp (2024) reported athletes of all levels not discussing menstruation due to coaches’ unawareness, fear of consequences, disapproval or discomfort. However, the athletes agreed that communication with the coaches would result in improved performance, coach-athlete relationships, and removal of the stigma related to menstruation. Meanwhile, Höök (2021) identified knowledge, interpersonal, and structural aspects as main barriers to communication. The knowledge barrier referring, among other things, to limited knowledge or lack of menstrual cycle related guidelines and difficulties implementing menstrual cycle related research into the sporting context. The interpersonal barrier entailing feelings of discomfort in discussing issues related to the menstrual cycle or hormonal contraceptive use with coaches or teammates, the menstrual cycle perceived as a taboo topic,

uncertainty in how to support the athletes and the dynamics of coach-athlete relationship. The structural barrier emphasizing the lack of education and formal forums to discuss menstrual health related topics or issues, lack of structured ways of menstrual cycle related communication among different stakeholders, and the endurance athlete or coach 'dilemma' referring to ''the importance of athletes being light weight and training enough versus having a regular MC.''

The menstrual cycle related communication has reported working better in individual sports compared within team sports (Höök et al., 2021; Laske et al., 2024). However, Chelsea FC Women, US Women's National Team and other team environments have shown to be successful when adjusting training load based on the menstrual cycle (Read et al, 2021).

Sharan et al. (2024) uncovered four themes of menstrual cycle related barriers in the coach-athlete relationship, namely menstrual cycle as a taboo topic, lack of knowledge and awareness, and lack of communication. The identified facilitators, on the other hand, were the ''presence of female coaches, positive experiences of communicating about the menstrual cycle, and trust''.

Laske et al. recommend improving the communication behaviours of the support staff, especially efforts for removing the communication barriers between the female athletes and male coaches, but also increasing the number of female coaches to facilitate better menstrual cycle related communication. Findlay et al. (2020) also recommend a communication mediator to improve coach-athlete communication.

2.1.4 Menstrual cycle and performance

Menstrual cycle is an important health marker for women, starting around the age of 13 and ending in menopause some forty years later (Reece & Barbieri, 2010). It is a naturally occurring 21 – 35-day cycle of fluctuating sex hormones, oestrogen and progesterone, as well as luteinising and follicle stimulating hormones (Grieger, 2024). The menstrual cycle has four distinct phases; follicular phase, ovulation, luteal phase, and the menstruation (Dhanalakshmi, 2024). However, it has also been suggested that the menstrual cycle can be divided into six phases, as suggested by Janse de Jonge et al. (2019) as the follicular and luteal phases are further divided into early follicular phase (both estrogen and progesterone levels being low), late follicular phase (estrogen increases up to ovulation), early luteal phase (progesterone surges), mid-luteal phase (estrogen and progesterone levels high), and the late luteal phase (estrogen and progesterone decline before menstruation).

Due to lack of quality research, it remains unclear as to how the fluctuating sex hormone levels over the menstrual cycle impact training and performance, even though we know that in addition to reproductive function, the menstrual cycle impacts a number of tissues (e.g. nerve, connective, muscle, epithelial), systems and processes of the body (e.g. thermoregulation, cognition, substrate metabolism, immunity, cardiovascular, ventilation etc.) (Laske, 2024; Elliott-Sale, 2021). However, research indicates that female sex hormones, according to influence adaptations in the muscle in the form of hypertrophy, force development, and lactate metabolism (McClung et al., 2006). Further, while muscle activity potential, force production, and performance are all influenced positively by estrogen, progesterone's influence, an inhibition of cortical excitability, is a negative one (Smith et al., 2002; Gordon et al., 2013; Pallavi et al., 2013; Phillips et al., 1996). It is therefore hypothesized that the late follicular phase provides opportunity for the greatest strength and power outcomes due to estrogen being high (and progesterone being low), whereas the opposite is the case in the luteal phase due to the elevated progesterone levels (Tenan et al, 2016). Energy metabolism is also influenced by the female sex hormones as estrogen has an ability to enhance fat utilization, which is demonstrated in the mid-luteal phase as an increased reliance on lipid metabolism, carbohydrate utilization being higher in the early follicular phase (Willet et al., 2021). This means that mid-luteal phase might be beneficial for endurance performance (Tarnopolsky, 2008) while the late follicular phase might be favorable for high-intensity interval training due to enhanced glucose utilization (Sylow et al., 2017).

Most athletes experience negative physical, affective and psychological symptoms related to their menstrual cycle, with menstrual cramps, back pain and headaches being the most common (Martin et al, 2018; Findlay et al, 2020; Brown et al, 2021). Even anxiety and other mood changes, as well as reduced energy levels and sleep disturbances have been commonly reported to impair performance of female athletes (Bruinvels et al, 2021; Brown et al, 2022; Kullik, et al, 2024). Symptoms are also highly individualised, most prevalent in late luteal and early follicular phases, and perceived by athletes to negatively impact their performance (Read et al., 2022; Findlay et al, 2020; Roffler, 2024). In a qualitative study, Read et al (2022) interviewed 15 elite female football players with all of them experiencing negative symptoms related to the menstrual cycle, especially during and right before menstruation, stomach pain being the most commonly reported symptom. Further, one third of the rugby players in the study by Findlay et al (2020) reported heavy menstrual bleeding impairing performance. Even the athlete motivation and competitiveness are found to be impacted by the menstrual cycle with 'favourable' subjective responses reported from late follicular to ovulatory phase (Paludo et al. 2022).

Around fifty percent of elite female athletes are on some sort of hormonal contraceptives, of which the oral contraceptives are most common (Martin et al., 2018; Schaumberg et al. 2013). Hormonal contraceptives (HC) are used to manage menstrual cycle symptoms in form of manipulation of the timing of menstruation, its frequency and volume (Martin et al., 2018; Clarke et al., 2021). However, the reported side-effects experienced by 24% of the HC-using athletes, are many, such as reduction in testosterone levels ((Martin et al. 2018, Edwards D. & O'Neal J.L., 2009) potentially impairing muscle growth, impaired thermoregulation (Lei et al, 2018), increased inflammation (Brynhildsen, 2014), depletion of vital nutrients (Palmery et al., 2013), mood changes, weight gain and poor skin quality (Martin et al., 2018). HC-mediated cycles also fail to indicate the quality of female reproductive health due to the suppression of the natural hormones (Martin et al., 2018).

Relative Energy Deficiency in Sport (RED-S) replaced the term Female Athlete Triad in 2014 to include both female and male athletes. The most common consequences of RED-S are amenorrhea, absence of menstruation, and oligomenorrhea, irregular and inconsistent menstruation. The main contributing factor is low energy availability, or LEA, due to a combination of low energy intake and high expenditure leading to the disruption of physiological processes in the body, such as the menstrual cycle, which in turn, may lead to decreased bone mineral density (Verhoef, 2021). As many as 61% of female athletes suffer from menstrual disorders, such as amenorrhea (absence of menstruation), according to Gimunová et al. (2022). Unfortunately, as many as 40% of female athletes underreport menstrual cycle related disorders and the awareness of them has been reported being low among the athletes and their support staff (De Souza et al., 2010, Mountjoy et al., 2014, 2018, Troy et al., 2006). Reported by Verhoef (2021), normalising the absence of menstruation and not seeing it as a problem, feelings of shame and taboo, performance prioritisation and denial were the most common reasons for the athletes to not report amenorrhea.

Regular menstrual cycle tracking as a means to monitor female athlete health might be part of the solution to the above-mentioned issue, and provide support in diagnosing of RED-S and other menstrual cycle related disorders (Pantano, 2006, Janda et al., 2017). Cycle tracking can also support the management of training loads and recovery strategies, even though there is a clear need for further experimental research related to training prescription based on menstrual cycle phase (Thomson et al., 2019). In the absence of evidence-based guidelines, however, the British Association for Sport and Exercise Sciences (BASES) and the Australian Institute of Sport (AIS) recommend that menstrual cycle tracking is used to monitor health rather than to enable training

based on different phases of the menstrual cycle (Australian Institute of Sport). Further, there is a need for better alignment between the athlete and support staff, according to McHaffie et al. (2022), highlighting the importance of taking into consideration the negative menstrual cycle symptoms impact on performance capabilities. For example, Armour et al., (2020) report that athletes' training prescription remains unchanged regardless of athletes' perception on menstrual cycle symptoms negatively affecting their speed, agility and strength.

2.1.5 Female athlete specific support

Athletes report coaches having a responsibility to support them in managing menstruation and hence perceive it also important for the coaches to both understand the menstrual cycle and its impact on athletes, and further believing in coaches' ability to support them cope better throughout their menstrual cycle (Goorevich & Zipp, 2024). However, if the coaches and support staff lack menstrual health knowledge and education, they presumably also lack strategies on how to best manage and optimise female athletes' training, performance and health. Menstrual cycle symptoms, together with other female athlete specific issues, such as breast injuries, saddle sores and pelvic floor dysfunctions impact female athletes (de Jager, 2024).

The majority of female athletes suffer from menstrual cycle related adverse effects on performance (Findlay et al, 2020; Martin et al, 2018; Bruinvels et al, 2016). Elite female football players perceive their speed, recovery times, power output and recovery negatively impacted during and prior to menstruation, as well as feeling more fatigued, and having a poorer confidence, focus, and ability to handle criticism. Regardless, there is no systematic way to manage symptoms, nor is there enough awareness of symptom alleviating medication usage (Read et al, 2022). However, results from ongoing research indicate that cyclical and individualised periodisation might be able to prevent negative symptoms of the menstrual cycle, for instance, through better timing of speed sessions or better recovery strategies during menstruation (Bruinvels et al, 2021).

Menstrual health support in elite women's football, however, is regarded as minimal or seen only as relating to data collection in form of menstrual cycle tracking which in turn is perceived not having any real impact on decision making of the support staff (McHaffie et al, 2022). In fact, neither female athletes nor their coaches adjust training loads based on the menstrual cycle as reported by over 30% of female athletes in an Australian study examining the athlete perceptions of the challenges associated with training and competing when menstrual symptoms are present (Armour et al., 2020). However, menstrual cycle tracking can be a viable support option and can

help athletes and support staff to develop individualised plans to enhance athlete well-being and optimise training and performance. Further, menstrual cycle tracking can enhance communication between the coaching/support staff and the athletes through better identification and understanding of individual athlete's support needs (Kulik, et al. 2024). To improve the understanding of the how and the why of menstrual cycle monitoring, Badenhorst suggests that the athletes and support staff should be equipped with the education and the resources to accomplish this (Badenhorst, 2024). Currently menstrual health is not a topic covered by coach educations impacting the coaches' and support staff's ability to support their athletes (Clarke et al., 2021; Kroshus et al., 2014) regardless of them having voiced their interest in learning more about the topic in order to create a more supportive environment for the female athletes (Brown et al., 2021; Clarke et al., 2021; Schofield et al., 2022b). There is evidence, however, suggesting that even if more menstrual cycle knowledge is acquired by coaches and support staff, its usability remains vague due to the complex nature of the information (e.g. communication, understanding and awareness) (Höök, 2021). Therefore, if the coaching and support staff want to understand the physiological nuances related to working with female athletes, the key considerations are to monitor and manage their training and physical performance (Clarke et al., 2021) although there might not yet be enough evidence to support ''individualised training based on menstrual cycle phases or characteristics'' (McNulty, 2024). An individualised recovery and support may, however, be provided to female athletes whose physiology is taken into account in planning (Clarke et al., 2021). To achieve this, both coaches and athletes need to have awareness and transparency regarding the provided health data, subsequent management of the menstrual cycle based on this data while maintaining individual's privacy. To accomplish this, Badenhorst introduces 'Menstrual Health Manager', a framework with which to inform decisions on menstrual health monitoring with an aim to enable organisations to follow the academic guidelines. Menstrual Health Manager is based on a decision-tree model, in which each of the yes or no answer guides the user to a specified outcome helping to understand which health or menstrual health monitoring method, tool or process should be considered (Badenhorst, 2024).

Meanwhile, Findlay et al (2020) offer practical recommendations regarding female athlete support emphasizing menstrual cycle education, regular cycle phase and symptom monitoring, menstrual cycle profiling and the importance of an identified point of contact whom the athletes feel comfortable approaching with any issued relating to their menstrual cycle.

Further, Goorevich and Zipp (2024) propose a gender-responsive coaching model around menstruation, acknowledging firstly the importance of adapting to the menstrual cycle related needs of the athlete, understanding the impact of menstrual cycle on performance and health and normalising these practices in coaching methodologies while gaining experience in working with female athletes who menstruate - all of these emphasizing the importance of integration and proactivity also recognised by Brown & Knight (2022), Clarke et al. (2021) and Höök et al. (2021). Secondly, tolerance and trust, in the gender-responsive coaching model, are central in acknowledging the importance of open communication and understanding of the needs and experiences of the athletes as they relate to the menstrual cycle. And thirdly, the model highlights the importance of protecting the athletes' privacy and their choices as they relate to their health (Goorevich and Zipp, 2024).

2.1.6 Bridging the theoretical framework and the purpose

The above theoretical framework has covered research on the topics relevant to this thesis, namely on the gendered sporting context, menstrual health knowledge, and communication, performance, and female athlete specific support as they relate to the menstrual cycle. This research is important identifying the different factors and barriers in the context of female athlete support and further in formulating the research questions and in guiding the chosen methodological framework for this thesis. Due to the complexity of this research area, various approaches are needed to be able to uncover the subtleties and the deeper meaning of data and, hence, a need to both further confirm existing theories but also the need to deepen and develop them has strongly guided the selection of the methodological approach of this thesis.

Further, the recognition of the need for creating a female athlete supportive environment by de Jager et al. (2024), in which open communication and education together with performance and well-being support are at the centre underlies the importance of, not only more research about the above discussed topics, but the importance of bridging the gap between research and application by creating a framework for female athlete supportive environment, it therefore leading us to the specific research questions and the developmental purpose of this thesis.

3 Research questions and development purpose

Following the research problem, aim and the theoretical framework, this thesis intends to answer the following research questions:

- What is the current level of actual menstrual health knowledge among the athletes and the support staff?
- What is revealed about the current level of menstrual cycle related support available to female athletes?
- What can be disclosed about the current barriers regarding the menstrual cycle related support available to female athletes?

The development purpose of this thesis is to identify the contributing factors required in a female athlete supportive environment and to create a support framework to enable support staff to provide high-quality, female athlete specific support to female athletes in their daily sporting context.

4 Methods and implementation

4.1 Study design: A mixed-method approach

This study initially started within a sports technology company environment with an aim to both advance the female athlete specific research and to harness the results in product development. An expert group consisting of global sports technology experts; data scientists, performance strategists and applied sports scientists, was established to discuss and inform the research aim and questions. This expert group setting allowed for a variety of competencies, experiences and backgrounds to influence the formation of the research project. After having done a collective and informal literature review of existing research, the group decided to move forward by creating two anonymous, mixed-method surveys to collect the required data as this data collection method was seen as the most suitable for reaching the widest possible respondent base. Also, to collect quality descriptive and explanatory data, a survey that is designed by care, is an excellent choice according to Williams et al., (2021). A mixed-method approach allows for different methods of data collection making it especially useful when trying to understand more complex issues or phenomenon and to generate a more thorough understanding of the investigated phenomenon (Burke Johnson & Onwuegbuzie, 2004; Leavy, 2022) than what a single method approach would be able to provide. For this particular study a mixed-method approach would enable both a quantifiable and a more in-depth understanding of the menstrual health related knowledge level, current support related to menstrual cycle available to the athletes, and current barriers to such support.

During the survey development phase, phrasing of the questions and the order of the questions were extensively discussed among the expert group. Customer feedback was also acquired on a couple of occasions via on-line meetings to gain valuable insights from the customer perspective to enhance the survey content. Both versions of the survey were also sent to different stakeholders and company members for pilot-testing, to develop both the questions and the questionnaire itself. Feedback was gathered to decide what questions to keep and what to discard, and to make any other adjustments needed for the formulation of the final versions of the surveys. Thus, the surveys used in this thesis is the result of an iterative process that involved a variety of experts to improve its validity in collecting the required data, given the research questions. The two surveys ended up having categorical questions (yes or no, or choosing answers from different categories), ordered questions (order of importance, semantic differential scales), and open-ended questions as per the differentiation by Williams et al., (2021).

The athlete survey consisted of 39 questions, and was organised into following topics: sporting context, level and experience, educational background, the actual menstrual health knowledge, menstrual cycle related communication and education, training and performance, and menstrual health support. The athlete survey questions can be found in the appendix of this thesis.

The support staff survey, on the other hand, consisted of 36 questions, and was organised in a similar way, covering first the sporting context, experience of working with female athletes and the current role as well as education level as it relates to the menstrual cycle. Questions regarding the actual menstrual health knowledge, the current support provided to the athletes, tracking and monitoring practices as well as questions on additional support measures and communication were also asked. The support staff survey questions can also be found in the appendix of this thesis.

4.2 Data collection: Sampling, Recruitment

Purposeful sampling, according to Patton (2002), ‘’is a technique widely used in qualitative research for the identification and selection of information-rich cases for the most effective use of limited resources’’. Key factors in identifying and selecting individuals are them having the interest, experience or knowledge of the studied phenomenon and at the same time an interest in participating in the research, as well as being able to communicate about their opinions and experiences in a clear and reflective way (Cresswell & Clark, 2011; Bernard, 2002; Spradley, 1979)

In the beginning, it was discussed in the expert group, to only study the sport of football due to the group having numerous contacts in football clubs and organisations. However, to maintain the generalisability of the results and to gain the largest variation of perspectives, the group decided to recruit participants from different sports and from different levels of expertise. The age of the athletes was also discussed, and while the inclusion of the underaged or academy age athletes was considered, the decision to limit the recruitment to athletes of over 18 years of age was made to avoid the extra burden of ethical and practical considerations the inclusion of under aged athletes would bring. It was discussed, however, that a separate, but similar study could be conducted in the future to study that specific population more closely.

Further, an important decision related to the studied sample or population was the inclusion of the support staff, a decision based on the realisation that by including both groups would provide a much richer data that would unravel deeper context and a level of understanding to the studied phenomenon.

The recruitment process was initiated by contacting specific individuals and sporting organisations in which the different members of the project initiation group had direct contacts in, either as company customers or otherwise known to the group members (e.g. previous colleagues). The specific regions of the recruitment outreach were Europe, United Kingdom, and the United States. The recruitment of participants was done mainly by email and by using an information leaflet, and in some cases, by digital meetings in which the same information was covered verbally. Recruited individuals and organisations were also offered an opportunity to ask any questions regarding the study either via email or a digital meeting to ensure transparency and to allow for an informed decision about participation. Later, the recruitment process was extended to the social media platforms to reach even wider participation levels than what direct contacting allowed.

A cloud-based on-line survey-development-software, Survey Monkey, was used for its easy to use and flexible design and for its ability to scale and speed up (Williams et al., 2021) the distribution of the survey. The survey was made in two versions; the athlete version and the support staff version. The survey links were distributed both through emails to relevant stakeholders and via accessing the survey link on social media platform. These methods of distribution were chosen to maximise the reach for as many participants globally as possible. Once the participant clicked on the survey link, the initial survey page then further directed the participants to answer either the athlete or the support staff survey version, anonymously.

4.3 The empirical data

A total of 141 female athletes from 15 different sports globally and 45 support staff members from 11 different sports globally answered the athlete survey and the support staff survey respectively.

The majority of the athlete respondents were between 18 – 24 years of age with most of the respondents having completed parts of college or university studies (52%), while 21% had completed high school, 13% completed college or university and 9% had either started or finished graduate school (MSc or PhD). Football was the most common sport played by 31% of the respondents, followed by multisport participants (13%), gymnasts (11%), rowers (9%), and swimmers (9%). Other sports, such as volleyball, track and field, field hockey, basketball, rugby, athletics, Gaelic football, netball and lacrosse players were also represented by athletes in this study although in smaller numbers. Of the athlete respondents, 60% were amateur, 31% semi-professional, and 10% professional athletes.

Of the support staff respondents 18 were male and 25 female and there were two who preferred not to be open about their gender. 16 worked in professional sports, 11 in semi-professional and 18 in amateur sports environments. The majority (53%) of support staff worked within football, followed by multisport (16%), basketball (9%), and the rest (2 – 4% respectively) with field hockey, tennis, acrobatics and tumbling, equestrian, rugby, track and field, triathlon, and volleyball. The majority (44%) of the support staff respondents worked in medical staff roles, such as physiotherapist, athletic trainer or sports rehabilitator/therapist and as a medical director while 36% worked in performance roles such as a performance director or strength and conditioning coach. The rest worked in different roles such as head coaches (n=2), assistant coach (n=1), sports scientists (n=3), dietitian, sports psychologist, or epidemiologist (n=1). 84% percent had been working with female athletes more than 3 years, and 53% more than 6 years.

4.4 Data analysis

This section presents the theoretical framework for how the survey data has been analysed.

The first stage of the data analysis was what Williams et al. (2021) call data exploration. This meant going through the data to see what the data set looked like and to identify what was missing and what needed to be done prior to cleaning the data. Data cleaning was then conducted to remove any input errors. For example, those athletes that answered ‘’Staff’’ or left the question ‘’In which sport do you participate?’’ empty, were removed from the athlete dataset.

The second stage of the data analysis was categorisation of the quantitative open questions. Such questions were for example the following: In which sport do you participate? What is the typical duration of one complete menstrual cycle? What is amenorrhea? and What happens to natural hormones when the contraceptive pill is taken? The categorisation of the answers to these types of questions required a lot of work. The structure for the categorization of each question was as follows:

Q: the question

- “Proposed category”: [“answer 1”, “answer 2”, … , “answer n”] ,

If a new line was used, each answer was presented in a line. Longer answers took multiple lines (finished sentences contained '', at the end of the line).

Given the mixed-method approach, and the different types of quantitative and qualitative survey questions, the data had to be analysed through different analytical approaches.

While the first and second research questions were analysed by using the quantitative descriptive analysis methods, as described above, the third research question was analysed by using the content and thematic analysis methods.

Content analysis and thematic analysis are frequently used data analysis approaches when analysing qualitative data, but due to the ambiguity of their boundaries, they are often used interchangeably (Vaismoradi, 2013). These approaches are mostly established on the assumption that data reflects the truthful reality of the studied individuals' behaviour, attitudes and motives (Sandelowski, 2010; Ten Have, 2004). In content analysis, conceptual constructions of the studied phenomenon are used while in thematic analysis, interpretation is applied to different aspects of the researched topic (Elo & Kyngäs, 2008; Braun & Clarke, 2006).

Content analysis was used to describe the frequency of responses within each category or theme, and hence, the corresponding size of each theme. Drisko & Maschi (2014) define content analysis as ''a family of research techniques for making systematic, credible, or valid and replicable inferences from texts and other forms of communication''. While basic content analysis can be seen as a quantitative data analysis method that employs descriptive statistics, the interpretive content analysis, in contrast, uses the coding of unstructured data, which falls under the qualitative research techniques. Systematic, methodological and transparent are key words describing content analysis of good quality, and it cannot be divided either into quantitative or qualitative distinctions since many of the content analyses deploy both of these research techniques. However, some of the content analysis might only focus on more interpretive, narrative techniques (Drisko & Maschi, 2014).

Thematic analysis involves creating themes that, according to Braun & Clarke (2006) ''represent some level of patterned response or meaning within the data set''. In practical terms, the themes were created along the coding of the data, as suggested by Fugard & Potts (2019) and derived from the interaction between the empirical data and the theoretical framework informing the naming of the themes to correspond to the existing research. Further, the data from the athletes

and the support staff were compared for similarities and for identifying overlapping themes to form a comprehensive view of the data-set covering both the athlete and support staff responses.

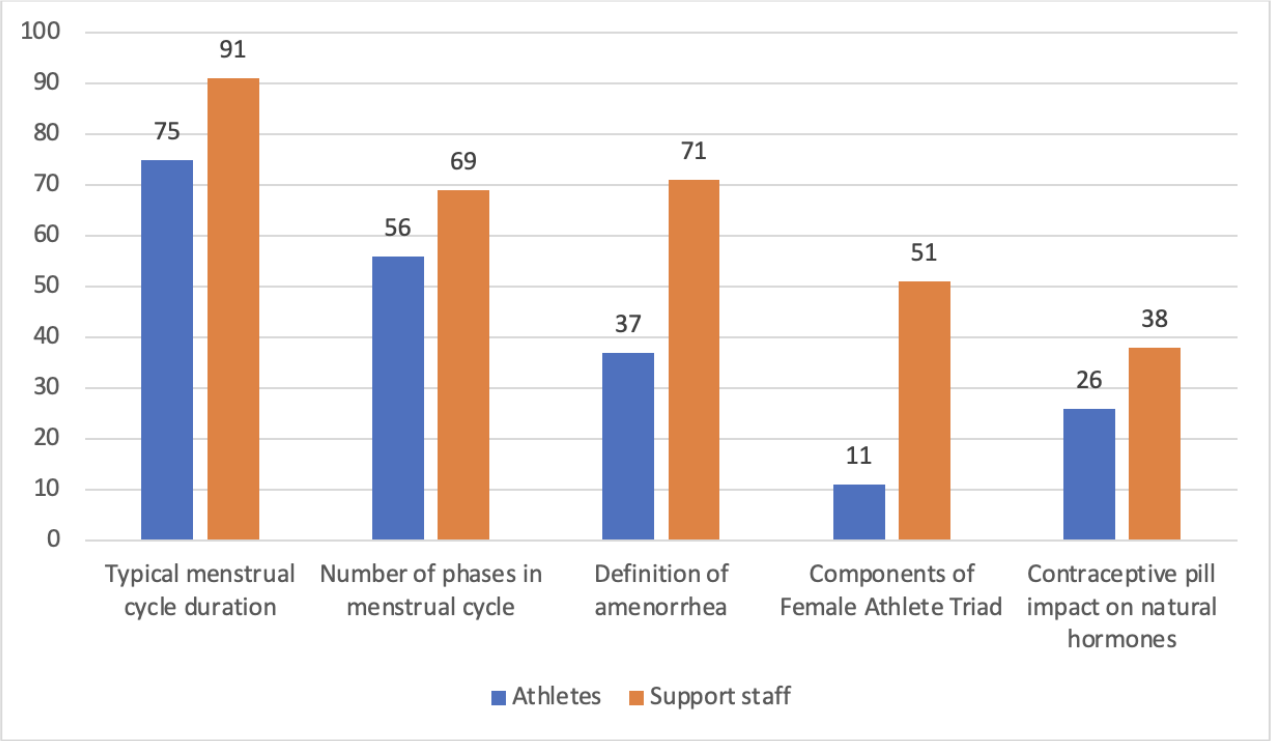
Through the coding of the responses, the themes appeared naturally as the responses revealed similarities in meaning. For example, words such as awareness and understanding were frequent and created a theme ‘’awareness and understanding’’. However, as more responses were coded, this particular theme grew both in size and took on a more concrete meaning, which through the analysis merged with educational needs as education was interpreted or analysed as a precursor to awareness and understanding. The staff responses strengthened this interpretation/analysis as the support staff talked more frequently about ‘’knowledge’’ and ‘’education’’ as vehicles in increasing awareness and understanding of the matters related to the menstrual cycle. To finalise the category, a merging of the support staff coded theme and the athlete coded theme were merged giving way to the FASE category named *Education – Menstrual Health Knowledge*. A similar way of working was done to form the other themes.

5 Results

The results are presented in the following order. Firstly, presenting the results related to the menstrual health knowledge between the athletes and the support staff and answering the first research question: What is revealed about the current level of actual menstrual health knowledge among the athletes and the support staff? Secondly, looking at the current menstrual health related support and answering the second research question: what is revealed about the current menstrual cycle related support available to female athletes? These first two research questions are aimed to establish an understanding of the research population regarding their current knowledge-level and the current level of support available to the athletes. The third research question, “what can be disclosed about the current barriers regarding the menstrual cycle related support available to female athletes?” is answered as an effort to form an in-depth understanding of the current challenges and barriers in supporting female athletes and their specific needs, and to understand the underlying support needs of the athletes together with the opinions of the support staff in being able to provide better support to female athletes.

5.1 Menstrual health knowledge

Menstrual health knowledge is a pre-cursor to more effective menstrual cycle and hormonal contraceptive related communication between athletes and support staff (McCawley et al., 2023). However, when analysing the results to answer the research question ‘’what is revealed about the current level of actual menstrual health knowledge among the athletes and the support staff’’’, it becomes evident that there are gaps in the menstrual health knowledge of both the athletes and the support staff and reveal the support staff having an overall better menstrual health knowledge in comparison to the athletes as illustrated below (picture 1).



Picture 1. Menstrual cycle knowledge – Comparison of correct answer percentages between athletes and support staff

75% of the athletes in comparison to 91% of the support staff were able to answer correctly regarding the length of the typical menstrual cycle, whereas only roughly half of the athletes knew the correct number of menstrual cycle phases compared with 69% of the support staff. The questions regarding the absence of menstruation, amenorrhea, and the components of Female Athlete Triad revealed the biggest discrepancies in knowledge between the athletes and the support staff. In turn, the question about what happens to natural hormones when the pill is taken, turned out to be the one with the least number of correct answers; only 26% of the athletes and 38% of support staff got the answer right. When a previous study by Anderson (2023) objectively assessed the menstrual cycle and hormonal contraceptive knowledge of female football players, professional and developmental, and their staff, they too showed better knowledge of menstrual cycle than of hormonal contraceptives. Further, only 31% of the questions regarding hormonal contraceptives, in the study by Anderson, were answered correctly compared with the 38% reported by Larsen et al. (2020), similar percentages of correct answers were confirmed even in

the current research population. Furthermore, when the support staff in the current study were asked if they were aware of the impact of contraceptive use on hormonal responses during the menstrual cycle, the majority (84%) answered being aware there is an impact, but not knowing the details, while 10% revealed not knowing how contraceptive use impacts on the menstrual cycle. Only 14% answered having full understanding of the impact of contraceptive use on the menstrual cycle.

To summarise the results about the current level of actual menstrual health knowledge among the athletes and the support staff, the support staff had an overall better knowledge level in comparison to the athletes. The biggest knowledge gap was related to the hormonal contraceptive pill and its impact on natural hormones as well as to the components of female athlete triad. Additionally, while 89% of the athletes struggled to define amenorrhea as absence of menstruation, 71% of the support staff were able to do so.

5.2 Current menstrual health related support available to the athletes

To answer the second research question, namely ‘what is revealed about the current menstrual cycle related support available to female athletes?’, the athletes were asked what types of support or interventions had been provided to them during different phases of the menstrual cycle, in which they got to select all that apply: equipment (pads, tampons, period shorts etc.), psychological support or counselling, recovery techniques, medical interventions (heat pack for cramp, NSAIDS, etc.), or other support that they were, in that case, asked to specify.

Only 13% of the athletes reported receiving specific support or interventions related to their menstrual cycle. When the support staff were asked if the athletes in their program received specific support, 32% answered yes, 36% no, and the rest did not know whether the athletes in their program received specific support or not. Lack of support specific to female athlete needs, especially related to the menstrual cycle, is problematic since it has an impact on the athletes’ health, well-being and performance (Brown et al., 2022). However, as concluded by von Rosen et al. (2021) ‘’the support need is seldom gained through the support systems offered by the sport community’’.

The below table 1 illustrates the answers regarding the specific support available to the athletes versus support provided to the athletes by the support staff.

Table 1. The current support available to athletes

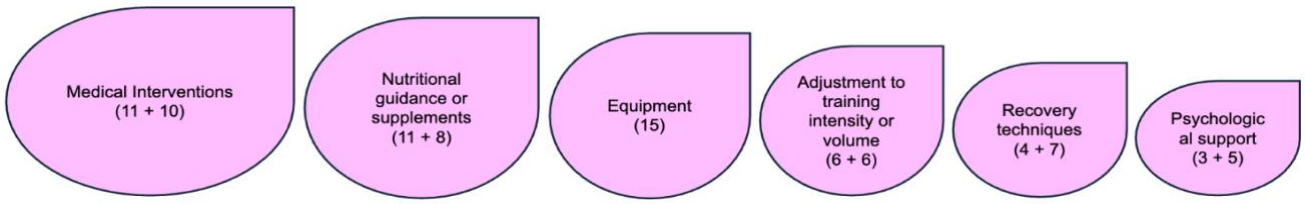
13% of the athlete respondents reported receiving the following type of support:

- *15 x Equipment – pads, tampons, period shorts etc*
- *11 x Nutritional guidance or supplements*
- *11 x Medical interventions (heat pack for cramps, NSAIDS, etc.)*
- *6 x Adjustment to training intensity/volume*
- *3 x Psychological support or counselling*
- *4 x Recovery techniques*
- *1 x Easy access to team doctor*

32% of the support staff respondents reported providing the following type of support to the athletes:

- *8 x Nutritional guidance or supplements*
- *10 x Medical interventions (heat pack for cramps, NSAIDS etc.)*
- *6 x Adjustments to training intensity or volume*
- *5 x psychological support or counselling*
- *7 x recovery techniques*
- *Education on their cycle and compassion around how this can make some athletes feel while at training*
- *Birth control as indicated*
- *On a case by case basis.*

It is apparent, that there are commonalities in the types of support when comparing the athlete and the support staff answers. The only discrepancies are, equipment, mentioned only by the athletes and, education, mentioned only by the support staff, while ‘’easy access to team doctor’’, answered by athletes, and ‘’birth control’’, answered by support staff, could both be interpreted as functions of medical support. Overall, the athletes receive most support in form of equipment to manage their menstrual bleeding or medical interventions to manage their symptoms related to their menstrual cycle.



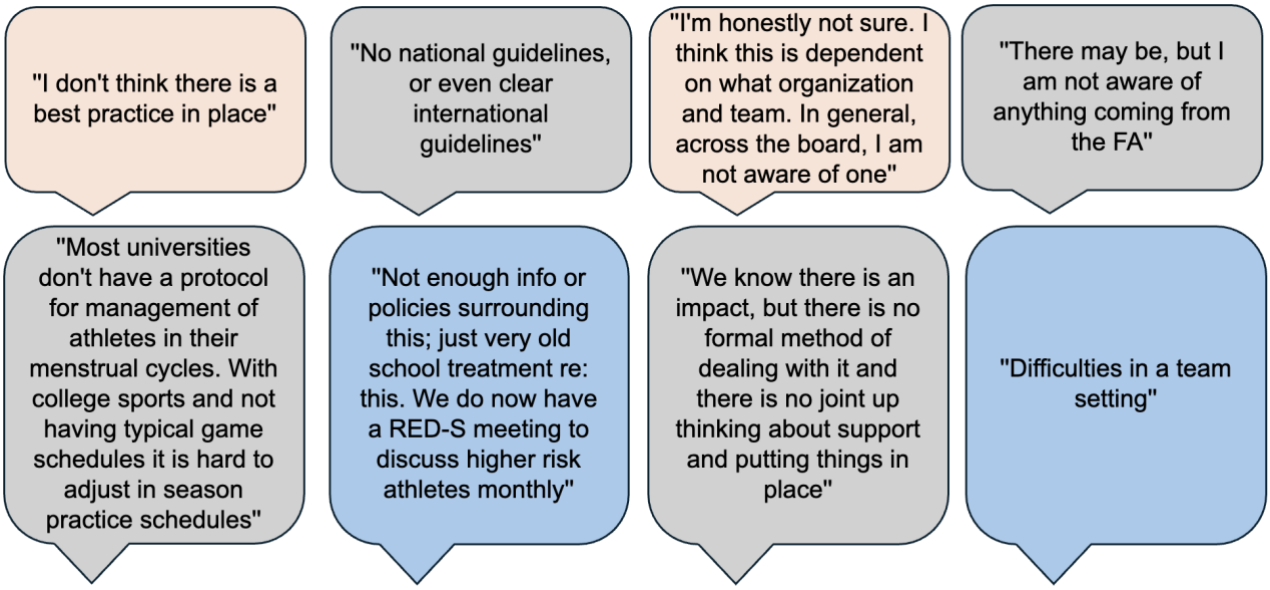
Picture 2. illustrates the type of support in order of frequency when both the athlete and support staff answers are combined.

What is revealed about the current menstrual cycle related support available to female athletes? Currently, only 13% (n=18) of the athletes reported receiving specific support or interventions related to the menstrual cycle, while 32% (n=14) of the support staff reported such support or interventions being available to the athletes in their program. The most commonly reported means of support was related to medical interventions, nutrition and equipment.

5.3 Current barriers in providing menstrual health related support

To answer the third research question, ‘‘what is disclosed about the current barriers regarding the menstrual cycle related support available to female athletes?’’ several survey question responses were analysed with the thematic analysis methods to form as holistic a picture as possible.

Almost every (95%) support staff respondent claimed that there isn’t currently any established best practice support for female athletes in relation to their menstrual cycle. However, two responses revealed that there are some ‘‘good recommendations’’ for how to support female athletes, but the level of support varies ‘‘based on the environment, full time vs part time, and there is a lot of misinformation e.g. modifying training around the menstrual cycle’’ and that ‘‘best practice is these days developed within elite environment’’. However, the main result was further confirmed by the following responses (picture 3):



Picture 3. Support staff responses regarding current barriers in providing menstrual health related support

When further analysing support staff’s answers, the following themes were identified as the current barriers in providing female athlete specific support: gendered sporting context, lack of *open* communication, low menstrual health knowledge, training & performance considerations related to the menstrual cycle, and lack of research and education. Also, the need of individualised approach and menstrual cycle tracking came up as something that requires time and resources (of which not all environments have). From the athlete responses identified barriers were related to acceptance,

lack of open communication, low menstrual health knowledge, training & performance considerations related to menstrual cycle. Additionally, lack of education came up frequently and even lack of research was mentioned a few times.

The main difference between the athlete and support staff responses were the high number (n=32) of athletes being unsure or not knowing of any additional measures that could be taken to better support them, which could possibly be a reflection of poor awareness of the topic or low menstrual health knowledge or both.

In an effort to understand the similarities and differences of the support staff and athlete responses, the following analysis was done. *Gendered sporting context* expressed by the support staff is reflected in athletes' experiences of such an environment as low acceptance, judgement and feelings of shame around the issues related to the menstrual cycle. *Lack of research and education*, as represented in the responses from both groups, in turn, reinforcing the status quo. Regarding the similarities in the responses, *lack of open communication* and low *menstrual health knowledge*, as well as lack of *training & performance considerations* were experienced by and reflected in both the athletes and support staff responses. The support staff bringing up the individualized support as something that requires time and resources could be analysed as being reflected in the athletes' responses as lack of medical and performance related support, such as nutrition, sleep and recovery considerations related to menstrual cycle since these types of support and management would require much more of the support staff in form of time and resources. However, these could also be included in the *training & performance considerations*, depending on the level of granularity chosen.

5.3.1 Gendered sporting context

Gendered sporting context around the menstrual cycle, and aspects related to it, were identified as a barrier (11%) when the support staff survey respondents were asked to explain why there were no established best practice around how to support female athletes in relation to their menstrual cycle. The following quotes from the support staff survey respondents illustrate the issue (picture 4).

Picture 4. Some of the female gendered support staff responses on why there are no established best practice on how to support female athletes in relation to their menstrual cycle

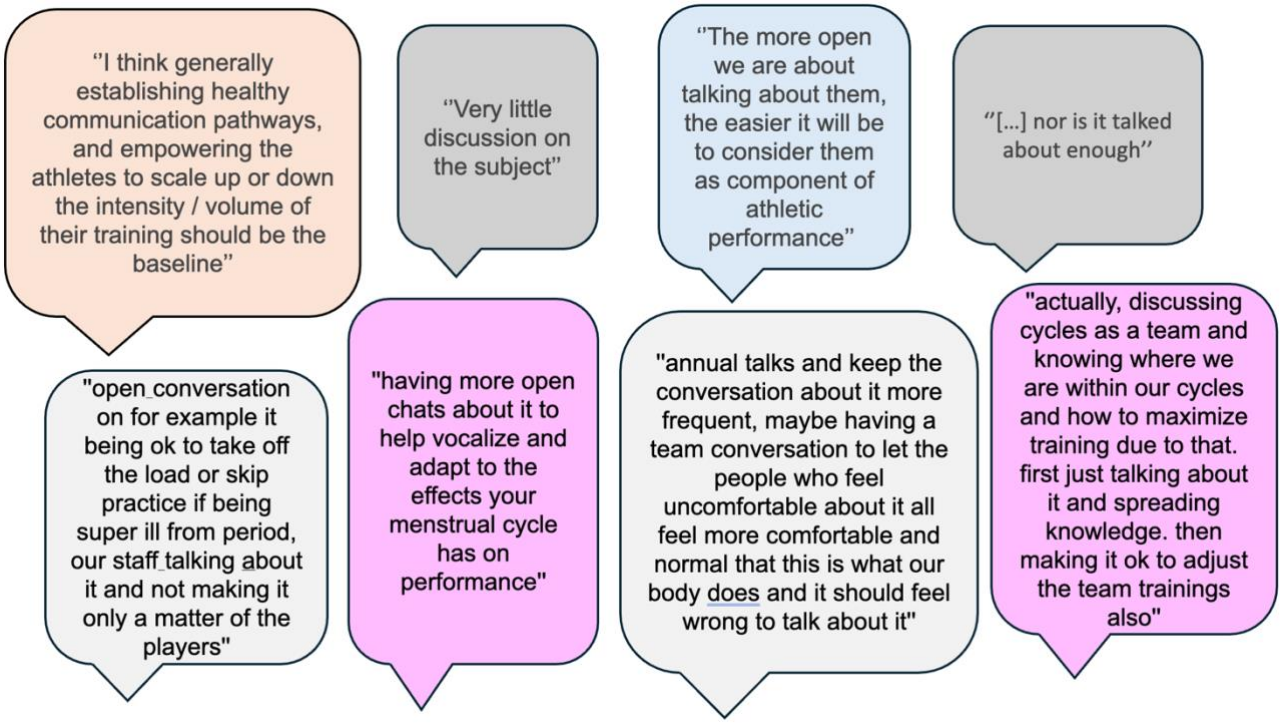
These responses, by some of the female members of the support staff, disclose the menstrual cycle being a sensitive, shameful and ‘’hush hush’’ topic, while the sporting context is built for the male athletes and being non-considerate of the specific needs of the female athlete. Menstrual cycle and hormonal contraceptive use being a taboo ridden topic has also previously been confirmed by research when 40% of the athletes in a study agreed or strongly agreed this being the case (von Rosen, 2022). Further, Athletes’ responses around the experiences of lack of acceptance when it comes to the menstrual cycle related matters, is in this thesis, analysed as reinforcing the perception of a gendered sporting context. As one of the athletes mentioned ‘’ [I wish] that it wasn’t a shame to not be able to go to practice because of your cycle or ongoing period’’. Even the following athlete responses illustrate this issue when one of them says [there’s a need for] ‘’acceptance of missing practice/adapting practice when unable to compete as normal’’, and another athlete writes that ‘’just accepting that it’s okay to not perform your 100% when you’re not capable to do so’’. Additionally, normalised conversations together with more accepting and non-judgemental environment were some of the factors revealed by the athletes when asked what would make them more comfortable talking about the menstrual cycle issues. Together with their demand of more staff-initiated conversations, 30% of the athletes’ responses referred to the athletes’ needs of a more open, supportive environment as per this analysis.

As previously confirmed by research, the coach-athlete relationship takes place within a sociocultural context, in which the female athlete’s experience and voices related to their coaching experiences are often left unnoticed (Fasting et al., 1999; MacKinnon, 2011). Consequently,

coaching practices fail to take the specific needs of female athletes into consideration (Norman, 2013), while the athletes feel the need to conceal any issues related to their menstrual cycle due to the tabooed nature of the topic (Brown et al., 2022). The recognition of this wider context can clearly be analysed as being a barrier to providing more specific support to female athletes. The above analysis is also reinforced by the below reported and discussed lack of open communication.

5.3.2 Lack of communication

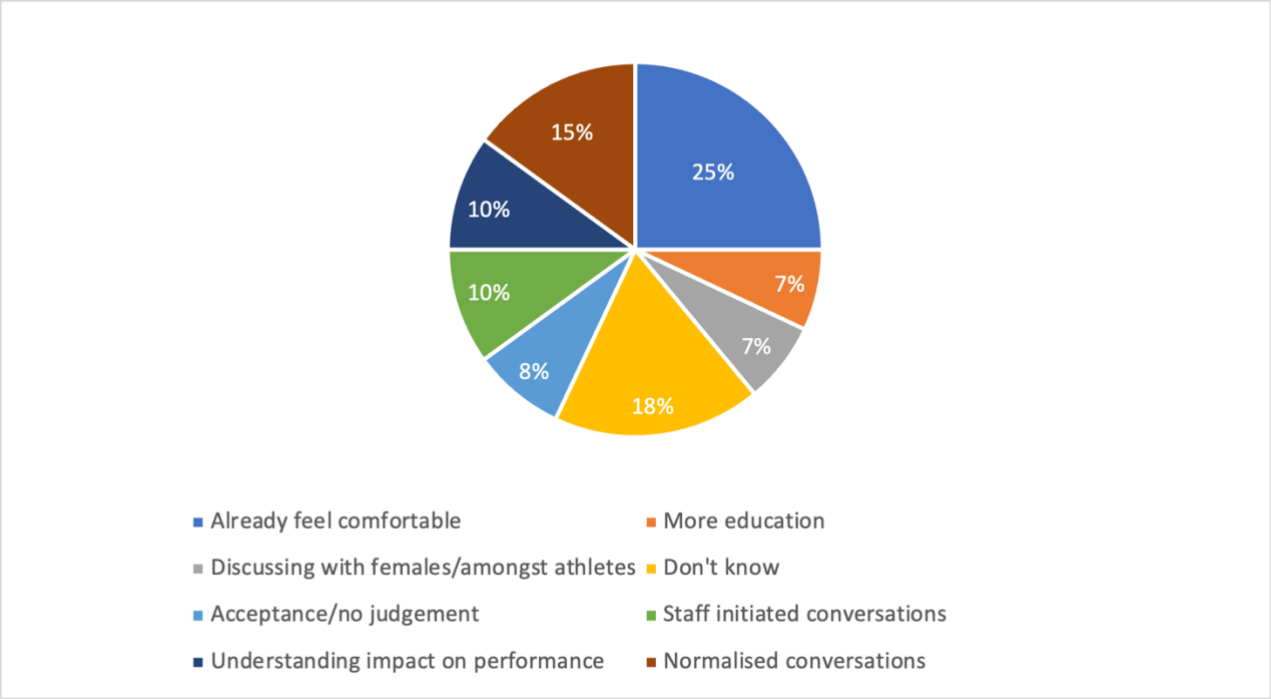
Lack of open communication was identified from both the athletes (11%) and the support staff (9%) survey responses as a current barrier in providing proper support to female athletes as illustrated by the following quotes (picture 5).



Picture 5. Athlete and support staff responses regarding lack of communication as a barrier of female athlete support

When the athletes were asked, 75% revealed being more comfortable discussing menstrual cycle issues with female staff members. This result confirms also Brown et al. (2022) conclusion that female athletes feel more comfortable talking to female coaches and support staff about the menstrual cycle and issues related to it. In the current study, 44% of the athletes revealed there not being open conversations around menstruation and the menstrual cycle in their team. The graph 2

below illustrates the factors that would make the athletes more comfortable talking about menstrual cycle issues in their team or sporting context.



Picture 6. Athlete responses (in percentage) to the question: What would make you more comfortable talking about menstrual cycle issues in your team?

25% of the athletes say that they already feel comfortable talking about menstrual cycle issues in their team or sporting context. However, 18% of the athletes do not know what would make them feel more comfortable. Normalised conversations together with more accepting and non-judgemental environment make up 23% of the responses and could both relate to aspirations of open communication as well as to a less-gendered, or more female athlete supportive, sporting context as previously discussed. If staff-initiated conversations are added to these, we are looking at 30% of the answers referring to the athletes' needs of a more open, supportive environment, based on the interpretation. Furthermore, 7% of the athletes mention the possibility of talking with a female or amongst athletes as a factor that would make them more comfortable.

When asked about who the athletes feel most comfortable talking to about any menstrual cycle related issues or questions the athletes may have, the survey responses by the athletes showed that health care providers (n=55), females (n=47), family and friends (n=41), and athletes (n=29) are mentioned most frequently, either separately or in combination with other stakeholders/groups.

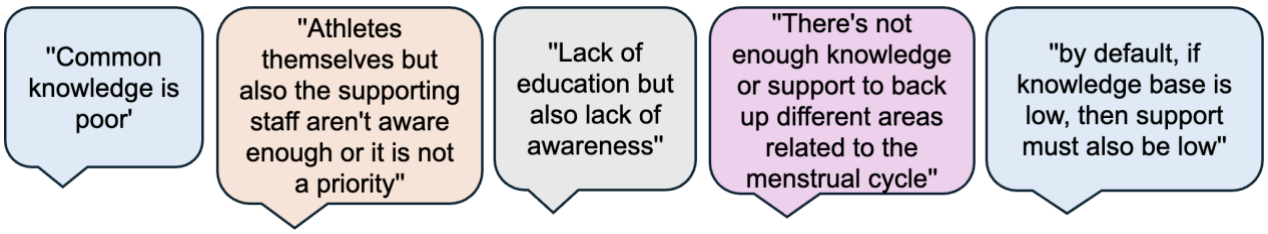
Revealingly, the coaches are only mentioned 7 times in this context. This result confirms also the previous research by Findlay et al. (2020) and Santer et al. (2008) that most female athletes prefer medical care providers instead of non-experts when asking for advice. Further, ‘’awkwardness, embarrassment, gender and the perception of coach’s inability to help them’’ are found to be the reasons for athletes not feeling comfortable confining to their coaches about menstrual cycle related matters (Findlay et al., 2020). Therefore gender, according to Kroshus et al. (2014), can be viewed as a communication barrier since male coaches, in comparison to female coaches, seem to be less aware of the menstrual cycle issues and the consequences related to them, such as of cases of amenorrhea, and being uncomfortable discussing such issues with their athletes. Further, even Bergström et al. (2023) concludes that coach-athlete communication related to the female hormonal cycle is limited and suggested using a female support staff to mediate any menstrual cycle related communication with the players, or alternatively to use a tracking app to do the same. Bergström also found, that the female athletes did not feel comfortable discussing their menstrual cycle with their male coaches, a result reinforced by the results of the current study.

Lastly, the athletes of the current study expressed needing more education (7%) and wanted to understand the impact of menstrual cycle on performance (10%) to be more comfortable talking about any menstrual cycle issues in their team. These seem to reinforce Badenhorst’s (2024) conclusion that lack of menstrual health knowledge is suggested to be the primary barrier in hindering coach – athlete communication. A positive coach-athlete relationship, when founded upon ‘’athlete-centredness, reinforced by shared knowledge, open communication, trust, mutual respect and clearly defined roles’’ can significantly impact the chances of developing successful athletes (Poczwardowski et al. 2002; Jowett & Cockerill, 2003). Conversely, poor coach-athlete communication is one of the predictors of poor performance (Greenleaf et al., 2001).

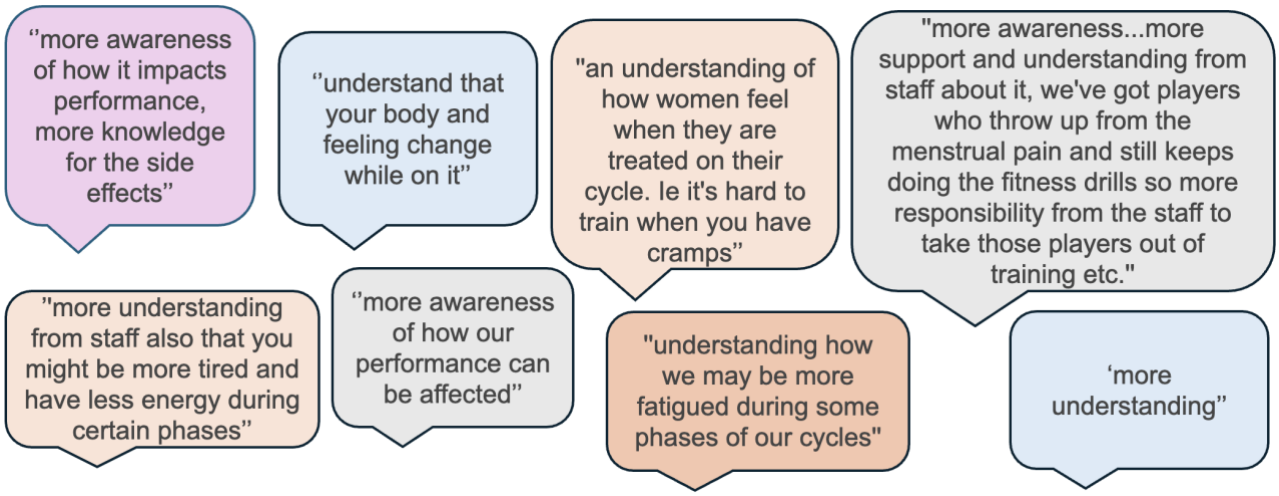
5.3.3 Lack of research, education, and menstrual health knowledge

The lack of research investigating the menstrual cycle and hormonal contraceptive use and their impact on health and performance in athletes contributes to low menstrual health literacy among female athletes and their support staff (McGawley, 2023). The lack of research can also be viewed as a contributing factor to the lack of education interventions, which in turn reinforce the established low level of menstrual health knowledge among female athletes and their support staff. Therefore, as menstrual health knowledge, education and research are interrelated, and in part inter-dependent, they are discussed here concurrently. Further, since the terms [lack of] ‘awareness’, ‘understanding’ and ‘knowledge’ related to the menstrual cycle were used

interchangeable by the survey respondents – the athletes (11%) referring mostly to ‘awareness’ or ‘understanding’ while the support staff (11%) referring mostly to ‘knowledge’ – they are analysed under one term, namely ‘menstrual health knowledge’. Below are illustrations (Picture 7 and Picture 8) of the expressions used by both the support staff and the athlete respondents.

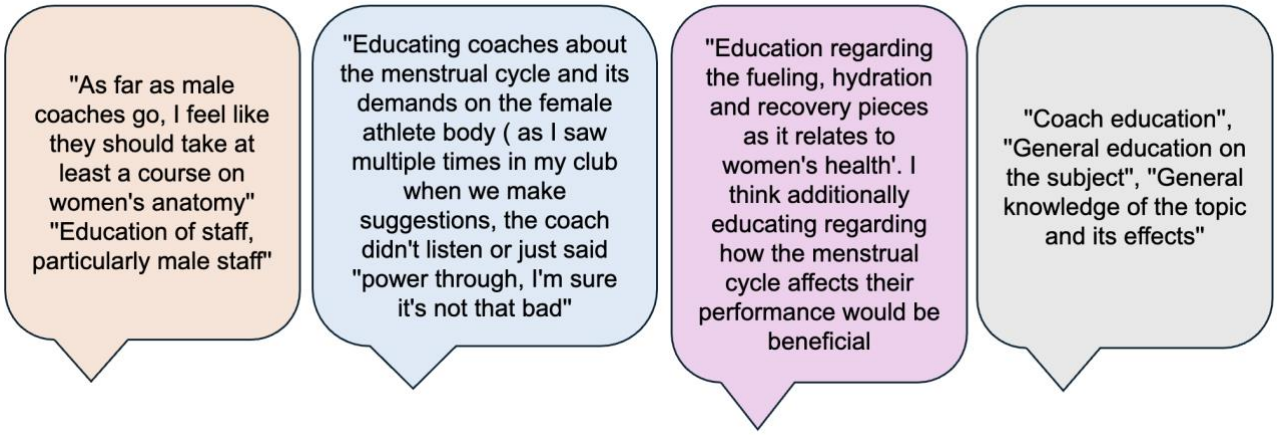


Picture 7. The support staff recognise the need lack of knowledge related to the menstrual cycle

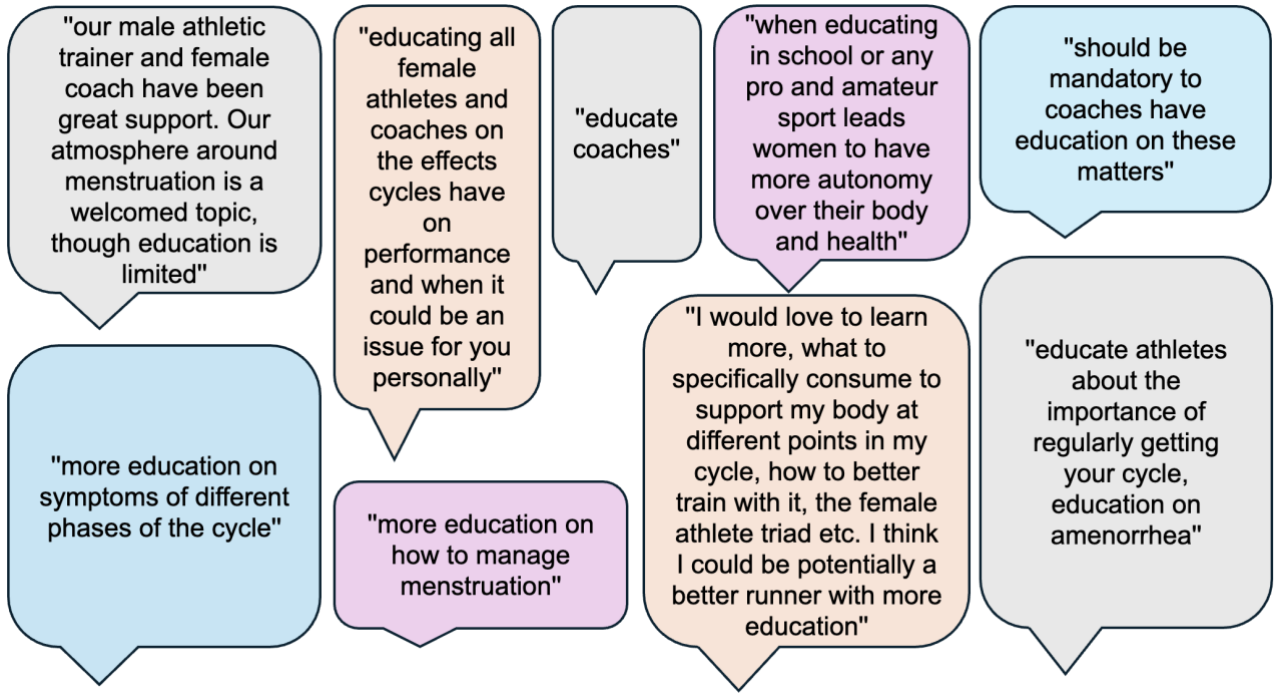


Picture 8. Athletes recognise the need for more knowledge related to the menstrual cycle, its symptoms and impact on performance

Further, lack of education was recognised by 25% of the support staff and 18% of the athletes as barriers of better support as illustrated by the support staff (Picture 9) and athlete responses (Picture 10) in the illustrations below, revealing the need for more education regarding the management of symptoms, performance, and menstrual cycle related dysfunctions such as amenorrhea or female athlete triad.



Picture 9. Support staff responses regarding the need of education.



Picture 10. Athlete responses regarding the need for more education

Referring also to the menstrual health knowledge results of the current study, it can be pointed out that there are gaps in essential pieces of knowledge, especially related to Female Athlete Triad (or relative energy deficiency in sport as per its current term) and the hormonal contraceptive impact on physiology, that should be interpreted as barriers to providing menstrual health related support

to female athletes. This gap of knowledge could also be seen as a risk to long-term health and performance of female athletes.

Regarding education, only 7% of the athletes reported their team running specific education around the menstrual cycle. However, the menstrual cycle as a topic had been covered in the majority (77%) of the athletes' formal education, whereas the 44% of the support staff respondents who had received education or training about managing the menstrual cycle's effects on athletic performance, 45% were self-taught, 20% had received the education through informal, peer-to-peer training and 15% via in-house training course or education course provided by the national association or league (15%). Only one support staff respondent had received the relevant education during his/her schooling.

Many authors have stressed the importance and need for education interventions in sport settings to advance menstrual health literacy in athletes and support staff (Clarke et al, von Rosen et al, Larsen et al.; Findley et al, 2020). Continued education is seen as a means to better symptom awareness, management strategies and a possible positive impact on training and performance optimisation (Plan international UK. Break the barriers: girls' experiences of menstruation in the UK. 2018). In addition to educational interventions, more research is desperately needed to better understand how the menstrual cycle impacts on health, training and performance and the causes of menstrual cycle disturbances to better support female athletes. This need is also reflected in the responses of the support staff (18%) and, to a lesser degree, the athletes (4%) as they recognised the lack of research as a barrier to better support (Picture 11 and 12, respectively).

Picture 11. Staff responses on lack of research

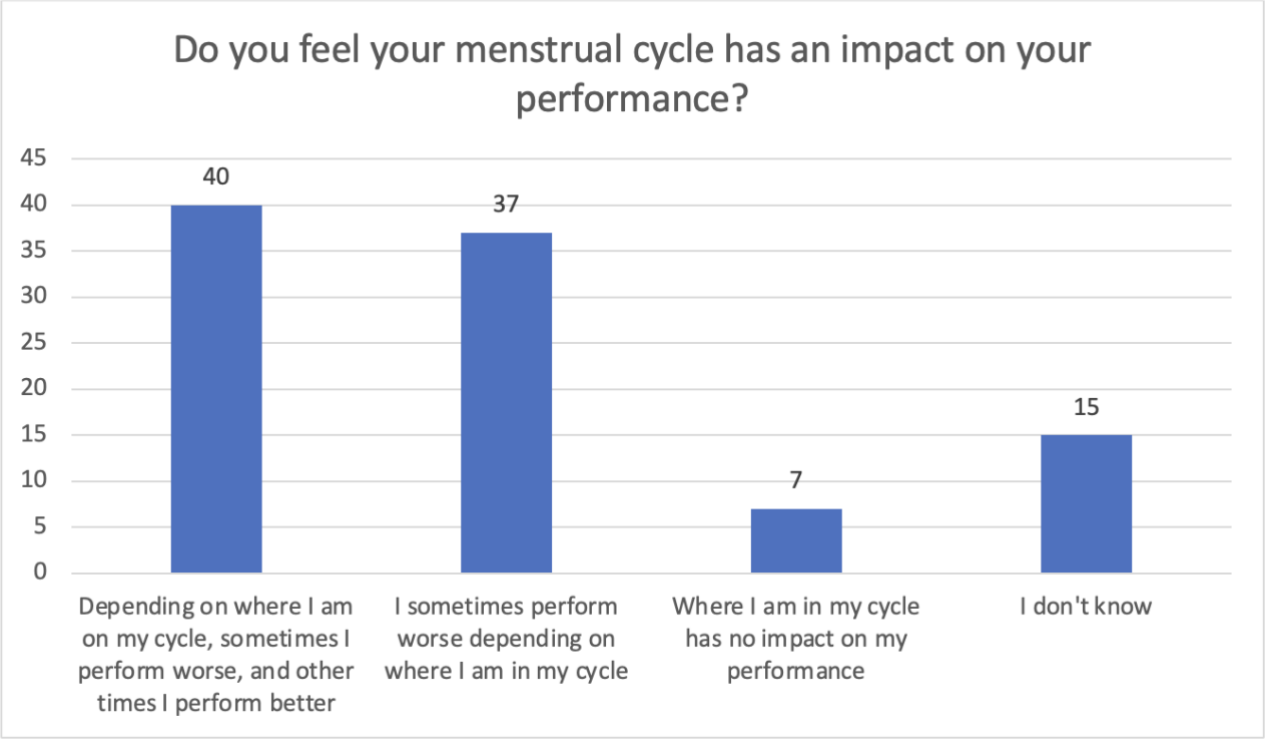
Picture 12. Athlete responses on lack of research

5.3.4 Training & performance considerations

Training and performance considerations consists of different factors identified from both the athletes and the support staff survey responses related to the optimisation of training through adjustments of load, intensity or modality, cycle and symptom tracking as well as other support means related to health, such as blood tests or wellness monitoring. In total, the athletes referred to training and performance considerations 29 times, while the support staff made 28 comments related to it.

The majority (84%) of the support staff, had not previously worked in a sports environment that monitored athletes' menstrual cycles. In fact, only seven had worked in such an environment. While 96% of the support staff were aware of the potential effects of the menstrual cycle on athletic performance and 58% claimed to be somewhat knowledgeable regarding their knowledge about the different phases of the menstrual cycle and their impact on athletic performance, currently only 20% of the support staff respondents monitored their athletes' menstrual cycles in their programs. Interestingly, 18% did not know whether their athletes were monitored or not. Moreover, 23% of the support staff tracked contraceptive use and type of contraceptives in their organisation.

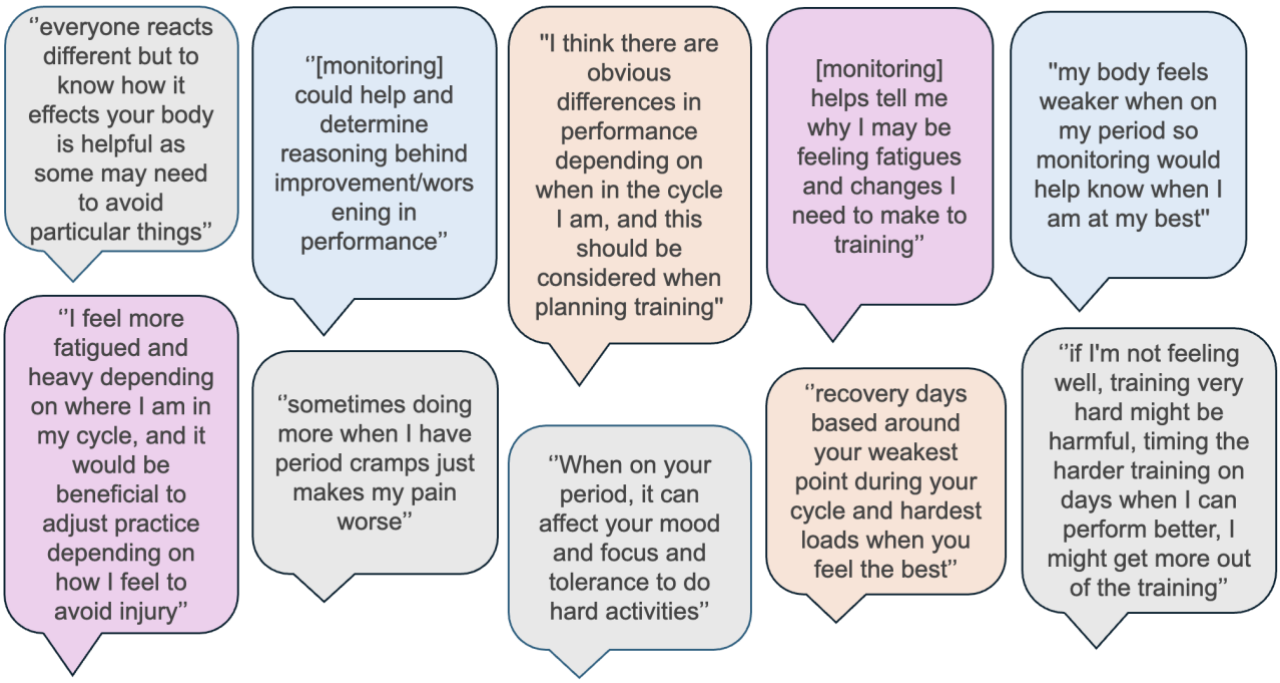
When the athletes were asked if they felt their menstrual cycle had an impact on their performance (Picture 13), the majority disclosed it impacting their performance depending on which phase they were in. In fact, 40% of the athletes agreed with the following statement: ''Depending on where I am in my cycle, sometimes I perform worse, and other times I perform better''. While 37% agreed with ''I sometimes perform worse depending on where I am in my cycle''. Only 7% claimed that the cycle had no impact on their performance, while 15% were unsure. Based on the answers, one could conclude that the majority (77%) recognise the menstrual cycle having an impact on performance.



Picture 13. Menstrual cycle's impact on performance perceived by athlete respondents (in percentages)

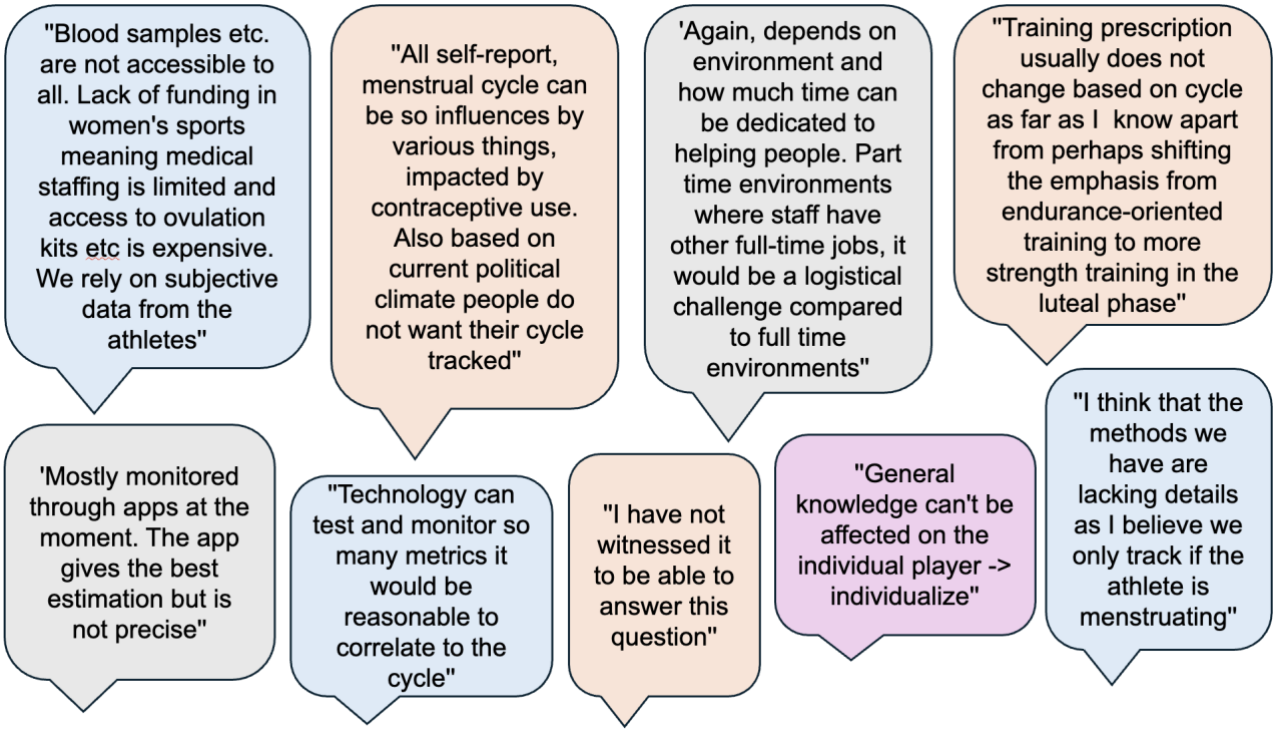
Further, half of the athletes believed that monitoring their training load based on where they were in their menstrual cycle was or would be beneficial to their performance. The following illustration (picture 14) with direct quotes from the athlete survey respondents explain some of the findings and demonstrate their awareness over the menstrual cycle's impact on their performance, emphasizing the fluctuating energy levels and feelings of being weaker or more fatigue during the

menstruation.



Picture 14. Athlete responses regarding the menstrual cycle, its impact on performance and the need for monitoring

When asked if the methods currently available to monitor the menstrual cycle in athletes were suitable to assess its effect on athlete health and performance, 36% of the support staff did not think so, while 55% were unsure. The uncertainty can be demonstrated by the following survey responses.

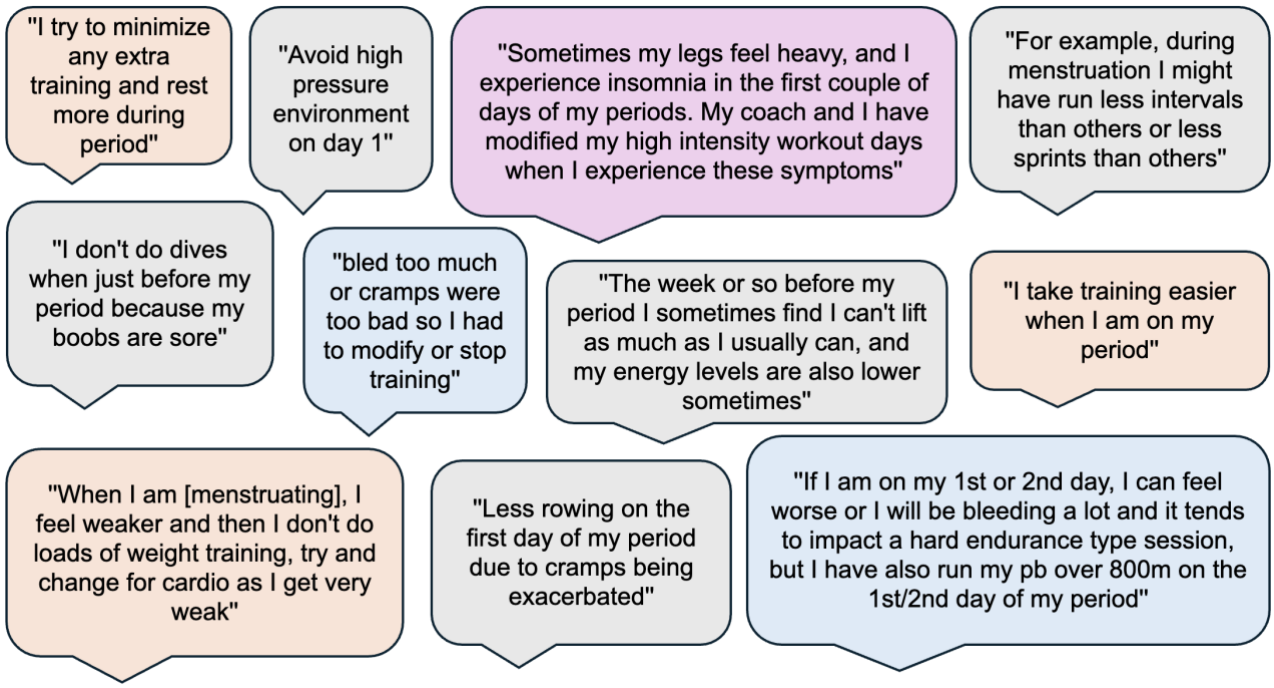


Picture 15. Support staff responses on suitability of current monitoring methods in assessing effect on athlete health and performance

The above responses exemplify several barriers regarding the monitoring methods and their suitability to assess athlete health and performance; lack of funding reflected in limited (medical) staffing, current political climate on willingness to disclose such information due to fear of it being used against one, unchanging training prescription regardless of menstrual cycle phase, objective hormone testing only possible via expensive blood samples or ovulation kits making them inaccessible by almost everyone, and lastly, the need to individualise regardless of limited staffing and resources. Technology is brought up as having the capacity to monitor the menstrual cycle together with other metrics, which can be seen as an opportunity instead of a barrier.

The majority of athlete respondents had not experienced any health or performance benefits from monitoring their training load based on the phase of the menstrual cycle. This was due to various reasons such as never having done so, not being sure how to adapt training based on their cycle, or that they never had tracked their cycle for health or performance benefits. What also came up in the responses was the fact that the athletes were not in control of adjusting their training because they ‘’don’t choose [their] training’’ or ‘’in the team it’s not possible’’. One athlete also mentions that they used to track their menstrual cycles, but was not sure if it ever impacted the training load.

While 14% of the athletes had never tracked their cycle, more than half (63%) of the athletes currently track their menstrual cycle, a tracking app being the most commonly used menstrual cycle tracking method among the respondents. Nevertheless, 38% of the athletes were unsure of the benefits of tracking their cycles, the reason possibly being the fact that most (77%) of the athlete respondents had either never adapted their training, or had never had their training be adapted, based on where they were in their menstrual cycle. The adaptations of the 31 athlete respondents whose training had been adapted, were due to menstrual cramps, pain, fatigue or feeling of weakness, sleep disturbances, sore breasts or even dizziness. Four athletes described the adjustment depending on how they felt. Most of the adaptations to a lighter training load, according to the responses, were made during the menstruation or the days leading into it (Picture 16).



Picture 16. Athlete responses illustrating adjustments due to menstrual cycle symptoms

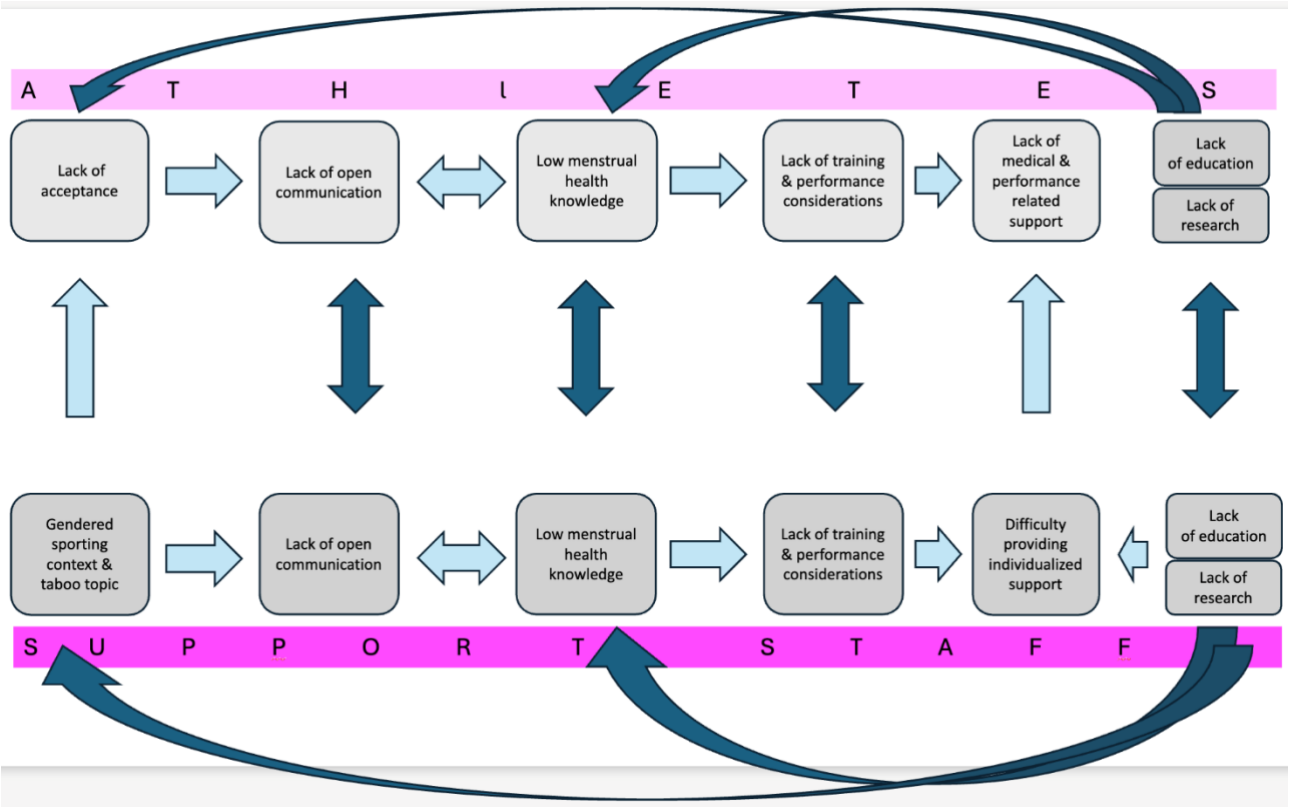
According to Solli et al. (2020), lack of menstrual health knowledge may explain the fact that athletes rarely plan or modify their training load based on their menstrual cycle.

In the current study, the majority (90%) of the athletes had never missed a competitive game or event for menstrual cycle related reasons. Those who had missed a game or an event, nonetheless, had done so due to cramps and pain – ovarian cyst rupture and endometriosis were

mentioned in relation to these, heavy bleeding, gastrointestinal issues (diarrhoea, vomiting), due to emotional dysregulation or fear of not having enough toilet stops when travelling due to heavy bleeding. These results confirm the results of previous research and the fact that the majority of female athletes suffer from menstrual cycle related adverse effects on performance (Findlay et al., 2020; Martin et al., 2018; Bruinvels et al., 2016). For example, elite female football players perceive their speed, recovery times, power output and recovery negatively impacted during and prior to menstruation, as well as feeling more fatigued, and having a poorer confidence, focus, and ability to handle criticism. However, results from ongoing research might indicate that cyclical and individualised periodisation might be able to prevent some of the negative symptoms of the menstrual cycle, for instance, through better timing of speed sessions or better recovery strategies during menstruation (Bruinvels et al., 2021). However, for the individualised support and periodisation to become a reality, better and more consistent cycle tracking and symptom monitoring, possibly together with being able to cross-reference the athletes' menstrual cycle with performance and health data should be implemented across female sports.

5.3.5 Summary of the thematic analysis

To summarize the thematic analysis of the findings for the third research question, namely,''what can be disclosed about the current barriers regarding the menstrual cycle related support available to female athletes'', the following illustration (Picture 17) is used.



Picture 17. The arrows between the athletes and support staff either illustrate the similarities in barriers (two-way arrow) or a barrier as a reflection in athletes' experiences (light blue arrow). The smaller arrows represent either a consequence or a relationship of one barrier to another. The bent arrows reflect the lack of education and research as low menstrual health knowledge among the athletes and the support staff.

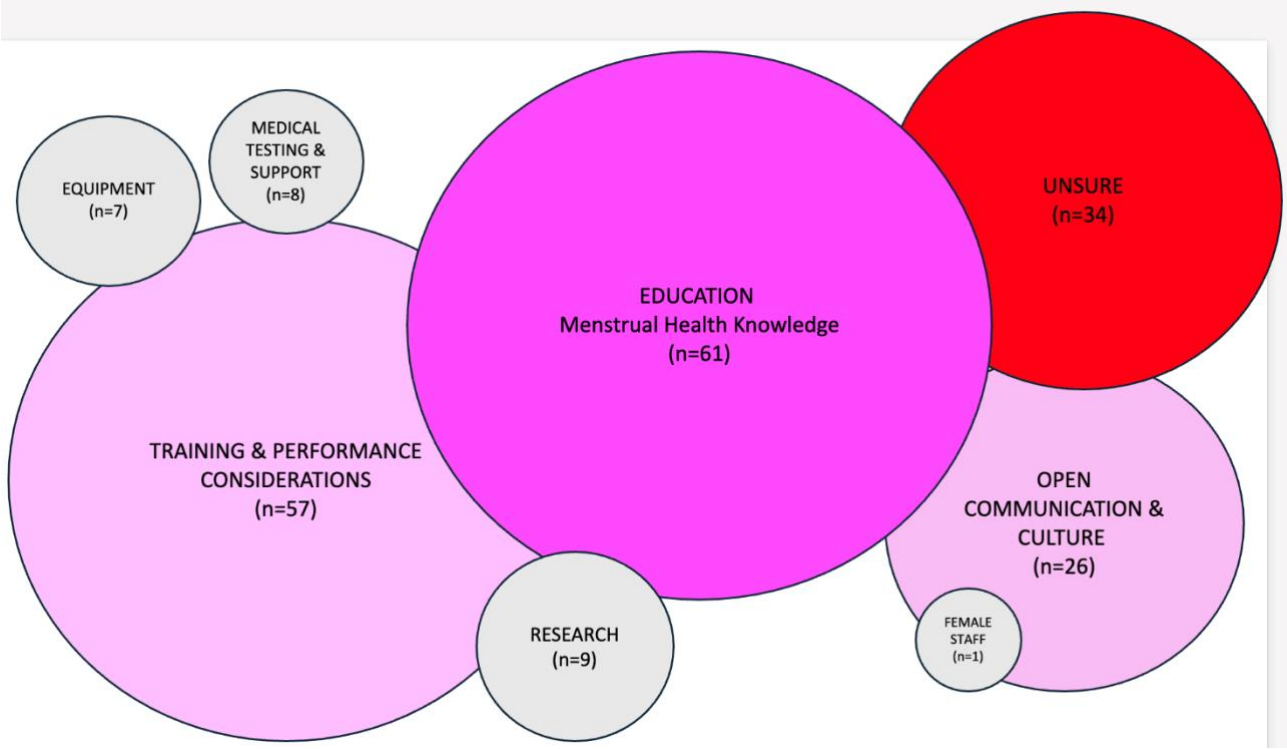
The above flow chart is an effort to understand the current barriers and their relationships to each other. The explanation of the flow chart is as follows. The gendered sporting context - built for male athletes by male coaches in which the female athlete specific needs are not taken into consideration, which in turn is reflected by the lack of sports exercise and medicine research on women as well as the problematic nature of coach-athlete dynamic in male coach – female athlete relationship and its communication limitations - is experienced by the athletes as judgemental and non-accepting leading to a culture characterised by lack of open communication (regarding the menstrual cycle related issues). Low menstrual health knowledge, also due to lack of education and research, in turn reinforces the dysfunctional communication patterns. Low knowledge is reflected in the quality and quantity of the practical support contributions, e.g. low level of menstrual cycle tracking practices, making it difficult to provide athletes individually tailored medical and performance support. Lack of research and education feeds back to low menstrual health knowledge as well as to the gendered sporting context, thus maintaining the status quo.

6 Presenting the development proposal

The development aim of this thesis was to understand the different contributing factors required in a female athlete supportive environment based on the analysis of the survey findings and to find a concrete way of utilizing these findings to benefit female athletes and their support staff in their daily sporting context.

While recognising that many of the key concepts regarding female athlete specific support have been identified and discussed in previous research, a comprehensive support framework for female athletes is yet to be created. To bring the results and findings of the current study into life, the development proposal of this thesis, therefore, is the construction of a Female Athlete Supportive Environment (FASE) framework. This framework has been constructed through answering the question: ‘’what do the survey findings tell us about the contributing factors required in a female athlete supportive environment and how to concretely utilize the findings to benefit the female athletes and their support staff in their daily sporting context?

Both the female athletes and the support staff answered questions regarding support. More specifically, both of the groups answered the question ‘’what additional measures could be taken to better support you and your teammates/female athletes during the different phases of their menstrual cycle?’’. The responses had many similarities as both of the groups referenced to the need for more education - although terms such as ‘awareness’ and ‘understanding’ were also used and, in this analysis, were fused together to form one uniform entity referring to the need for more menstrual health knowledge as also discussed previously - and training and performance related considerations, as well as the need for more open communication and therefore more open culture, forming the three big elements for better support as illustrated below. In the athlete group there were also those who were unsure of what additional measures of support could be taken, which is analysed as a reflection of the athletes’ lack of awareness, knowledge and education as it relates to the menstrual cycle and health. The other measures referenced to by both the athletes and the support staff were the need for more research, medical related support, equipment, and increasing the number of female staff, which was in the conjunction of this specific question only referred to once. It is, however, important to remember, that the need for more female staff has been also indirectly referenced to in the responses to the question asking who the athletes felt most comfortable talking to about menstrual cycle related issues, in which females were frequently referenced to.



Picture 18. The elements of support ordered by frequency of responses. The elements of support as referenced to by the athletes and support staff, with education/ increasing menstrual health knowledge, training and performance considerations, and open communication and culture being the three main elements while more research, relevant equipment, medical related support and female staff being the smaller elements. Additionally, some of the athletes felt unsure of what additional support means could be taken, illustrated as the red circle. The uncertainty is analyzed suggesting a lack of relevant awareness, knowledge, and/or education of the responding athletes.

6.1 The creation of Female Athlete Supportive Environment – FASE

To construct the FASE framework, the previously discussed and analysed, current barriers of support and, the above-discussed, additional measures of support, were merged to form a complete picture of the female athlete specific support elements.

The athletes of the current study expressed also the need for more education and wanted to understand the impact of menstrual cycle on performance to be more comfortable talking about any menstrual cycle issues in their team. This illustrates the fundamental need of menstrual health knowledge and -literacy through education. Lack of education was, indeed, recognised by the

support staff and the athletes as a current barrier of better support. Furthermore, referring also to the menstrual health knowledge results of the current study, it can be pointed out that there are gaps in essential pieces of knowledge that should be interpreted as barriers to providing menstrual health related support to female athletes. This gap of knowledge could also be seen as a risk to long-term health and performance of female athletes. When the current barriers are merged together with the above-discussed additional support measures referenced to by the athletes and the support staff, increased menstrual health knowledge (and literacy) through education forms another category of FASE framework, namely *Education – Menstrual Health Literacy*.

While 96% of the support staff were aware of the potential effects of the menstrual cycle on athletic performance and 58% claimed to be somewhat knowledgeable regarding their knowledge about the different phases of the menstrual cycle and their impact on athletic performance, currently only 20% of the support staff respondents monitored their athletes' menstrual cycles in their programs. Further, the majority of the athletes recognise the menstrual cycle having an impact on performance and half of the athletes believed that monitoring their training load based on where they were in their menstrual cycle was or would be beneficial to their performance. In total, the athletes referred to training and performance considerations 29 times, while the support staff made 28 references related to it. Consequently, when both the current barriers and additional measures of support are merged, they form the fourth category of FASE, namely *Training & Performance considerations*. This category, however, can be further divided into smaller categories, as the training & performance considerations category includes references also to support needs such as nutrition, sleep, and recovery. To separate these from the training & performance considerations category, a category of *Well-being Considerations* is formed.

Lack of open communication was identified from both the athletes and the support staff survey responses as a current barrier in providing proper support to female athletes. Additionally, the support staff mentions the need for more female coaches conjointly with the need for more open communication. Athletes, moreover, make several references to the need for more female support staff/coaches indirectly when discussing barriers of communication and support. Thus, when merged together with the above-discussed references to more open culture and communication, this forms one of the categories of FASE framework, namely *Communication Considerations*.

Further, both the lack of research and the need for more research were identified by and referenced to by both the athletes and the support staff of this study, forming yet another category of FASE, namely *Research Considerations*.

Medical testing and screening needs were recognised by the support staff as additional measures of support, while the athletes referenced to lack of medical support as a current barrier. The merging of these forms the *Medical Considerations* category of FASE.

Lastly, equipment was referenced to by both the athletes and the support staff and forms yet another category of FASE, namely *Equipment Considerations*.

To summarise the categories of FASE, the following illustration (Picture 19) was created.

Picture 19. Illustrating the FASE and describing the seven categories and their relationships

The explanations of the FASE categories and their contents are as follows.

Education – Menstrual Health Literacy, is the prerequisite to female athlete specific support, allowing for enhanced communication among the athletes and support staff and, thus, facilitating in creation of a more open culture with a power to change the whole sporting context from gendered to more accepting or neutral in nature. McGawley's (2023) model for improving menstrual health literacy could be one example of how to effectively transform the paradigm.

Performance considerations refers to training planning, testing and performance management through menstrual cycle phase and symptom monitoring allowing for individualized support.

Medical considerations, in turn, refers to the medical testing and screening, and management of any menstrual cycle related issues or dysregulations, or other female athlete specific medical support. Menstrual Health Manager, a model created by Badenhorst (2024), could serve as a practical tool in guiding both athletes and support staff in decisions related to the menstrual health of athletes.

Communication considerations category refers to the need of a culture with open communication, established communication pathways, and the possible need for female support staff members in facilitating communication, as suggested by Findlay et al. (2020). Further, the model suggested by Höök et al. (2021) could be considered to reshape the current communication, or the lack thereof, practices in a sporting context.

Further, *Well-being considerations* takes into account psychological well-being as well as nutrition, sleep and recovery aspects of support, given that both athlete wellness and menstrual cycle are being tracked and monitored allowing for individualized and phase specific support of athletes.

Equipment considerations refers to the easy access to and availability of materials or equipment, such as pads, tampons, or gear used to facilitate the menstruation management or the menstrual cycle related symptoms.

And lastly, *Research* – more high-quality research serves as a prerequisite to better education and improved menstrual health knowledge impacting, in turn, the improvement of more informed support practices of female athletes.

7 Discussion

This thesis answered the research questions by, on the one hand, confirming previous research by Andersson et al. (2023) and Larsen et al. (2020) relating to the current level of menstrual health knowledge among the athletes and the support staff, the results pointing out the obvious lack of actual menstrual cycle knowledge, especially knowledge about the hormonal contraception and Female Athlete Triad. Also, especially the athletes had difficulties defining amenorrhea, confirming the results by Andersson et al. (2023). A limiting factor regarding Female Athlete Triad that is currently called RED-S to include male athletes as well. Not all respondents may have been familiar with the term Female Athlete Triad. The reason why the Female Athlete Triad was chosen over RED-S was the aim of that section/question to gauge people's awareness and understanding of concepts surrounding the menstrual cycle in particular. Initially the expert group felt that the Female Athlete Triad was potentially more widely known than RED-S due to it being a relatively recent concept. Also, what comes to amenorrhea, language might have been a limiting factor in correctly defining this term – the surveys were delivered only in English, which could be a limiting factor in itself considering there were also non-English speakers answering them. Further, previous research by Read et al. (2022), McHaffie et al. (2022) and von Rosen et al. (2022) were confirmed by this thesis, namely that there is a lack of menstrual health related support as only 13% of the athlete respondents in this study reported receiving such support while 32% of the support staff reported menstrual cycle related support being available to the athletes in their sporting environment.

This thesis further confirmed previous research as it relates to the current barriers regarding the menstrual cycle related support available to female athletes, namely: low menstrual health knowledge as a barrier confirmed research by Solli et al. (2020), von Rosen et al. (2022), Brown et al. (2022), Clarke et al. (2021), and Larsen et al. (2020). Menstrual cycle related communication as a barrier confirmed research by Brown et al., (2021, 2022), Clarke et al., (2021), Findlay et al., (2020), Höök et al., (2021), Kroshus et al., (2014), Solli et al., (2020). Menstrual cycle tracking without an impact in daily decisions regarding the athletes training, health and performance also confirmed the results of previous research (Carmichael et al., 2024, Armour et al., 2020). For the individualised support and periodisation to become a reality, better and more consistent cycle tracking and symptom monitoring, possibly together with being able to cross-reference athletes' menstrual cycle data with performance, testing and medical data, should be implemented across female sports.

The development purpose of this study was to concretely utilize the findings to benefit female athletes and their support staff in their daily sporting context resulting in the creation of the FASE framework, which can be used as a tool in taking concrete steps when moving from theory to practice, from research to application. This framework can be also widened to include other aspects related to the female athlete support. However, it is important to remember that the awareness of the gendered sporting context identified both by previous research and the respondents of this study, highlights the importance of finding ways to break free from the structures maintaining the status quo to facilitate the implementation of new structures such as the suggested FASE framework.

In this analysis, and supported by previous research (Goorevich & Zipp, 2024), the gendered sporting context in which the male athlete is the norm, deprive the female athlete from being able to fully establish herself in the sporting realm, mainly due to, both historically and even currently recognized stigma and silence around the female athlete specific support needs, not least related to the menstrual cycle. This fundamental barrier can, however, be dismantled through a number of conscious actions with the above-mentioned education in menstrual health of all stakeholders leading to a more open culture with open communication pathways free from myths and stigma. This in turn enables the provision of female athlete specific, as well as individually tailored, training and performance support, among other relevant support elements, to optimize female athlete health and performance and hence, enables changing the current gendered sporting context to a sporting context that serves to support athletes regardless of their gender. However, all relevant levels within the sporting context, from the national governing bodies, to league governing bodies, to clubs and sports organizations – the implementation needs to be structured, linked to club or competition licensing with proper and relevant, female athlete specific education requirements. It is also important that research interacts with the practical day-to-day sporting context and further develops the practical application and vice versa.

Overall, the process of completing this thesis has been a demanding journey due to its complexity and multi-method approach. Taken into consideration that there were two surveys to analyze in an effort to form a unified picture of, not only the surface level knowledge, but also the more subtle meaning of the numerous verbal responses by both the athletes and the support staff, a maximum effort was required to be able to finalize this thesis. The strength of this thesis, however, lies in these effort-demanding aspects, such as the two surveys, a wide, global cohort from multiple

sports and levels, as well as the inclusion of both the athletes and support staff respondents. In retrospect, limiting the study to more defined aspects might have been easier.

To conclude, due to the complex and multi-disciplinary nature of this research area, it requires expertise and skills from different fields of study, as well as implementation and change-management skills together with the ability to collaborate in multi-disciplinary sporting organizations to be able to move from theory to concrete implementation of this research, which would be the natural next step moving forward.

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9 Appendices

Menstrual cycle survey – Athletes

About this survey

Why is the research being conducted

The menstrual cycle is one of the defining features of the female athlete. Anecdotally, the level of awareness and knowledge among female athletes and support staff is mixed, and there is an absence of studies in this area to understand how much coaching staff and other sports practitioners are equipped to support their female athletes around the menstrual cycle. Equally, there is very little knowledge around how much of an impact the high-performance environment athletes perform within has on the support they receive in this area. The aim of this survey is, first and foremost, to help fill this knowledge gap. We foresee that obtaining a greater understanding of the gap between athletes and their support teams will inform future research in this area in the medium to long term, and support education initiatives in the short term. Other impacts of this research will be to extend the conversation around the menstrual cycle, and other aspects specific to female sport. Ultmately, we see the results of this project improving strategies that support female athletes around the menstrual cycle, and ultimately better health and performance outcomes.

What you will be asked to do

During the survey a series of questions will be presented for you to complete. These will include questions about your knowledge of the menstrual cycle, your experiences within sport and how the culture in sport impacts conversations and athlete support around the menstrual cycle.

Anonymity

The survey is completely anonymous. We will NOT ask you for any personal information - name, email address or any other personally identifiable information - which would allow you to be identified, and we are using the "Anonymous Responses" Survey Monkey feature

so your IP address cannot be captured (see here for more detail). We will publicise the results of the survey via the same channels where we sought your participation. If you require further information please email (email address)

Eligibility

To be eligible to participate, you must currently be either a female athlete, or actively working with professional athletes in female sport in some capacity.

Risks to you

In the case of this research, there are no foreseeable risks to you. If you experience something that you aren't sure about, please contact us immediately at (email address) so we can discuss the best way to manage your concerns.

About you

- In which sport do you participate?
- If applicable, what is the league you compete most in?
- Age
  - Under 21
  - 21 - 24
  - 25 - 28
  - 29 - 32
  - Over 32
- What is the highest level of education you have achieved?
  - Completed High School (or equivalent)
  - Some College / University
  - Completed College / University
  - Some Graduate School (MSc or PhD)
  - Completed MSc Completed PhD
  - Other (please specify)
  - None of the above
- Was the menstrual cycle a topic covered in any of your formal education?
- What type of athlete are you?
  - Amateur

○ Semi-professional
○ Professional

Menstrual Cycle Knowledge

In this section we're aiming to gauge the level of knowledge around the menstrual cycle in general. Please attempt to answer these without online or other assistance. We expect a broad spectrum of responses here - some who don't know the answers to any of the questions and some people who know the answers to all - so please don't be disappointed or discouraged if you are closer to the first group

● What is the typical duration of one complete menstrual cycle?
● How many phases are in one typical complete menstrual cycle?
● What is amenorrhea?
● What components make up the Female Athlete Triad?
● What happens to natural hormones when the contraceptive pill is taken?

Cultural Understanding

Some questions below refer to your team. Please consider this to include managers, coaches, physios, athletic trainers, as well as fellow athletes in the same program e.g. Track & Field, or playing group e.g. first-team squad

● Who do you feel most comfortable talking to about any menstrual cycle related issues / questions you may have?
● How comfortable are you discussing menstrual cycle-related issues with male or female staff members? I am more comfortable discussing menstrual cycle issues with male staff members I am equally comfortable discussing menstrual cycle issues with male and female staff members I am more comfortable discussing menstrual cycle issues with female staff members
● How comfortable do you feel talking to your fellow athletes / players about concerns related to the menstrual cycle? Not comfortable at all Slightly uncomfortable Fairly comfortable Extremely comfortable Please consider your team to include managers, coaches, physios, athletic trainers, as well as fellow athletes in the same program e.g. Track & Field, or playing group e.g. first-team squad

● Are there open conversations around periods / menstruation and the menstrual cycle in your team?
● What would make you more comfortable talking about menstrual cycle issues in your team?
● Does your team run specific education around the menstrual cycle?
● Do you feel your coaches take this education into consideration?

Experiences

● Do you feel your menstrual cycle has an impact on your performance? Where I am in my cycle has no impact on my performance I sometimes perform better depending on where I am in my cycle
● Have you ever adapted your training, or has your training ever been adapted, based on where you were in your menstrual cycle?
● Have you ever had to miss a competitive game / event for a reason related to your menstrual cycle?

Menstrual Cycle Monitoring

● Do you think monitoring your training load based on where you are in your menstrual cycle is beneficial to your performance? Yes No I don't know
● Have you ever tracked your menstrual cycle? I currently track my cycle I tracked my cycle in the past, but I don't track it now I have never tracked my menstrual cycle
● How do you track your menstrual cycle? If you tracked your cycle before but you're not doing so currently, please tell us how you tracked it before
● Have you experienced any health or performance benefits from monitoring your training load based on the phase of your menstrual cycle?
● Within your team are there any specific supports or interventions available to you related to your menstrual cycle?
● What types of support or interventions have been provided to you during different phases of the menstrual cycle? (Select all that apply)

Equipment

pads, tampons, period sports shorts etc Adjustments to training intensity, volume or modality Nutritional guidance or supplements Psychological support or counselling Recovery techniques Medical interventions (heat pack for cramps, NSAIDS, etc.) Other (please specify)
● What additional measures could be taken to better support you and your teammates during the different phases of their menstrual cycle?

Additional Comments

Is there anything else you would like to share or comment on regarding the menstrual cycle and athlete support in sport?

Menstrual cycle survey – Support staff

About this survey

Why is the research being conducted

The menstrual cycle is one of the defining features of the female athlete. Anecdotally, the level of awareness and knowledge among female athletes and support staff is mixed, and there is an absence of studies in this area to understand how much coaching staff and other sports practitioners are equipped to support their female athletes around the menstrual cycle. Equally, there is very little knowledge around how much of an impact the high performance environment athletes perform within has on the support they receive in this area. The aim of this survey is, first and foremost, to help fill this knowledge gap. We foresee that obtaining a greater understanding of the gap between athletes and their support teams will inform future research in this area in the medium to long term, and support education initiatives in the short term. Other impacts of this research will be to extend the conversation around the menstrual cycle, and other aspects specific to female sport. Ultimately we see the results of this project improving strategies that support female athletes around the menstrual cycle, and ultimately better health and performance outcomes.

What you will be asked to do

During the survey a series of questions will be presented for you to complete. These will include questions about your knowledge of the menstrual cycle, your experiences within sport and how the culture in sport impacts conversations and athlete support around the menstrual cycle.

Anonymity

The survey is completely anonymous. We will NOT ask you for any personal information - name, email address or any other personally identifiable information - which would allow you to be identified, and we are using the "Anonymous Responses" Survey Monkey feature so your IP address cannot be captured (see here for more detail). We will publicise the results of the survey via the same channels where we sought your participation. If you require further information please email
(email address)

Eligibility

To be eligible to participate, you must currently be either a female athlete, or actively working with professional athletes in female sport in some capacity.

Risks to you

In the case of this research, there are no foreseeable risks to you. If you experience something that you aren't sure about, please contact us immediately at (email address) so we can discuss the best way to manage your concerns.

About you

- What is your gender?
  - Female
  - Male
  - Non-binary
  - Prefer not to say
  - Other (please specify)
- What type of sport do you work in?

○ Amateur
○ Semi-professional
○ Professional
● In what sport do you currently work?
● If applicable, what league does your team play in?
● What is your current role?
○ Doctor
○ Physiotherapist / Physical Therapist
○ Strength and Conditioning Coach
○ Sports Scientist
○ Athletic Coach
○ Athletic Trainer
○ Athletic Therapist
○ Graduate Sport Rehabilitator
○ Performance Director / Head of Services Club, National / International League or National Governing Body administrative staff
○ Head Coach / Manager
○ Other (please specify)
● How long have you been working with female athletes?
○ <3 years
○ 3-6 yrs
○ 6+

Menstrual Cycle Awareness

● How would you rate your knowledge about the different phases of the menstrual cycle and their potential impact on athletic performance?
● Are you aware of any potential effects of the menstrual cycle on athletic performance?
● Have you received any education or training about managing the menstrual cycle's effects on athletic performance?
● What did that training consist of?

Menstrual Cycle Knowledge

In this section we're aiming to gauge the level of knowledge around the menstrual cycle in general. Please attempt to answer these without online or other assistance. We expect a broad spectrum of responses here - some who don't know the answers to any of the questions and some people who know the answers to all - so please don't be disappointed or discouraged if you are closer to the first group

● What is the typical duration of one complete menstrual cycle?
● How many phases are in one typical complete menstrual cycle?
● What is amenorrhea?
● What components make up the Female Athlete Triad?
● What happens to natural hormones when the pill is taken?

Contraceptive Use

● Is contraceptive use and the type of contraceptives tracked within your organisation?
● Are you aware of the impact of contraceptive use on hormonal response during the menstrual cycle?

Athlete Monitoring

● Do you think there is an established best practice around how to support athletes in relation to their menstrual cycles?
● Have you previously worked in a sports environment that monitored athletes' menstrual cycles?
● Do you think the methods currently available to monitor the menstrual cycle in athletes are suitable to assess its effect on athlete health and performance?
● Is the menstrual cycle of the female athletes in your program monitored?
● How frequently are female athletes' menstrual cycles monitored?
● Which methods are used to monitor the menstrual cycle in athletes?

Athlete Support

● Do athletes in your program receive specific support or interventions to address the effects of the menstrual cycle on health and performance?
● What types of support or interventions are available to female athletes related to their menstrual cycle?

● Are the treatments or interventions provided to female athletes because of menstrual cycle issues tracked by the club?
● In your opinion, what additional measures could be taken to better support female athletes during the different phases of their menstrual cycle?

Athlete Feedback and Communication

● How important do you think open communication about menstrual cycle-related issues is for optimizing female athletes' performance and well-being?
● Rank the following groups in order by which athletes in your program feel most comfortable discussing menstrual cycle related issues:
○ Coaches
○ Medical staff
○ S&C
○ Fellow athletes/players

Additional Comments

Is there anything else you would like to share or comment on regarding the menstrual cycle and athlete support in sport?