Barriers to Effective Conversation about the Menstrual Cycle between Athletes and Support Staff

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Barriers to Effective Conversation about the Menstrual Cycle between Athletes and Support Staff

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Abstract

Introduction: Research on the menstrual cycle and its influence on an athlete's health, wellbeing and performance is limited and inconclusive. However, there remains a general consensus that the menstrual cycle, menstrual dysfunction and hormonal contraceptive use has some influence on the physical, physiological and psychological health of an athlete and consequently will affect an athlete's health, wellbeing and athletic performance. It would be assumed, then that monitoring the effect of the menstrual cycle would be a priority amongst Support Staff working in female sport and that conversations surrounding athletes' menstrual health would be commonplace. However, it is currently unknown whether conversations surrounding these topics are taking place between Support Staff and athletes. The low level of knowledge that elite athletes and Sport Coaches possess on the menstrual cycle and hormonal contraceptives (as studied previously) suggests that either these conversations are not happening, or that they're ineffective in transferring useful information. The primary objective of this study was to determine whether these conversations are taking place and to investigate the barriers to effective conversation about the menstrual cycle between Support Staff and female athletes.

Methods: The study was a cross-sectional survey with 26 participants who serve as Support Staff for a range of professional female sports including the Women's Big Bash League (Cricket), the Suncorp Super Netball, Women's Australian Football League and the Women's National Rugby League. A 36-item questionnaire was developed to determine the quantity and quality of conversations that take place between Support Staff and female athletes within the female professional sporting environment. The questionnaire investigated the role of three contextual factors (opportunity, environment

and responsibility) and how these factors influence conversation between Support Staff and female athletes surrounding the topic of the menstrual cycle, menstrual dysfunction and hormonal contraception. Demographic information was collected, and the influence of opportunity (i.e., time), environment (i.e., team culture) and responsibility (i.e., their perceived level of responsibility towards the athletes) on conversation was explored between participants from different professions and sporting codes.

Results: Within these four sporting codes, opportunity does not appear to be a barrier to the quantity of conversation occurring between Support Staff and female athletes, with 89% of Support Staff reporting having the opportunity to ask questions of their athletes. The cultural environment appears to be generally supportive, however there remains a large proportion of Support Staff that are uncomfortable raising issues surrounding the menstrual cycle, and knowledge of these topics is not prioritised amongst Support Staff. For instance, there was a discrepancy amongst Support Staff raising issues surrounding period pain and menstrual cramping when compared to topics such as muscle injury and soreness amongst athletes. Gender also plays an influential role, with 60% of female Support Staff compared to 27% of male Support Staff agreeing that knowledge of the menstrual cycle, menstrual dysfunction and hormonal contraception is 'extremely important'. While most Support Staff included knowledge and support of the menstrual health of athletes as their responsibility, 20% of Support Staff were unclear as to whether discussing the menstrual cycle with athletes was expected of their role. Similarly, there remains more than a quarter of Support Staff who are unclear as to whose role it is to refer athletes with suspect menstrual disturbance to specialist practitioners. Finally, 8% of Support Staff had never had a discussion with female athletes about their menstrual cycle. These results suggest that responsibility, at least in

some instances, remains a barrier to effective conversations about the menstrual cycle between athletes and Support Staff.

Conclusion: It appears as though the menstrual cycle is not extensively discussed between female athletes and Support Staff. Given that many still view the menstrual cycle as a sensitive or awkward topic to broach, in concert with the reported ambiguity surrounding responsibility and the discrepancy in attitudes towards the menstrual cycle between male and female Support Staff, it is likely that these conversations take place infrequently. This could have negative repercussions, as without knowledge and communication surrounding an athletes menstrual health, Support Staff will be less likely to identify and address menstrual disorders, which are common amongst athletes and can negatively impact an athlete's performance, health, and wellbeing.

Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

(Catherine Paice)___  _

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1 Introduction

Females' experience the menstrual cycle from ~13-50 years of age and undergo fluctuations in their female sex hormones, particularly oestrogen and progesterone (Oosthuyse & Bosch, 2010). This fluctuation of hormones is unique to females and it is suggested that female athletes would benefit from sex-specific research that considers the effects of the menstrual cycle on athletic performance (McNulty et al., 2020; Oosthuyse & Bosch, 2010). Alongside the growth in female sport, it is imperative that the research investigates elite female athletes' to develop a body of literature to promote general health and wellbeing and to subsequently optimise the female athletes' training and performance. To date, research investigating the unique physiology of female athletes is lacking and thus warrants further examination (McNulty et al., 2020).

For elite, pre-elite and development athletes to perform at a highly competitive level, a team of multi-disciplinary Support Staff comprised of sport scientists and sports medicine practitioners assist them (Australian Institute of Sport., October, 2018). Support Staff can have a decisive influence on their athletes as the athletes are reliant on the advice and decisions of Support Staff highlighting the complex nature of a coach-athlete relationship (Heather et al., 2021). Due to the relationship developed between Support Staff and athletes, particularly the Sport's Coach, Support Staff are well positioned to have conversations with athletes in which they share personal health-related issues (Poczwardowski et al., 2002). The presence of menstrual disturbances can have deleterious health effects for female athletes, consequently negatively impacting on their health, wellbeing, and athletic performance (Mountjoy et al., 2018). Thus,

conversations between female athletes and their Support Staff relating to the menstrual cycle are of interest.

Promoting effective conversation between Support Staff and athletes allows for better monitoring and management of the athletes menstrual cycle, with the ultimate goal of improving health, training and subsequent athletic performance (Côté & Gilbert, 2009; Poczwardowski et al., 2002). Support Staff are best placed to promote impactful conversation surrounding the menstrual cycle among elite female athletes. Findlay et al. (2020) reported that a number of athletes did not feel comfortable discussing their menstrual cycle and have specifically expressed a reluctance to confide in their Support Staff (Findlay et al., 2020). In addition, a number of athletes reported greater negative feelings towards menstruating whilst training and concluded this may be due to athletes feeling more comfortable in a training environment to report discomfort in comparison to a competition environment. Similar reasoning could suggest why some athletes are reluctant in confiding in Support Staff regarding their menstrual cycle, these athletes may feel like they don't have a safe environment to discuss this topic. Many athletes also reported awkwardness, embarrassment, gender and a coach's inability to do anything, as their reason for not confiding in Support Staff regarding their menstrual cycle (Findlay et al., 2020). This reflects a missed opportunity for Support Staff to provide education and support for athletes experiencing menstrual disorders.

To explore the barriers to effective conversation surrounding the menstrual cycle, three major themes were identified; opportunity, environment and responsibility.
The opportunity for effective conversations between athletes and coaches about the menstrual cycle are influenced by two known factors: the ability to have a one-on-one

conversation and to have this in a private environment (Lunenburg, 2010). Therefore, ensuring the opportunity for an appropriate physical setting (e.g. a one-on-one meeting) has been identified as an enabler to effective conversation (Armour et al., 2020; Lunenburg, 2010).

The literature (Kroshus et al., 2014; Larsen et al., 2020; Pantano, 2006; Pantano, 2017) has previously identified a lack of knowledge surrounding the menstrual cycle pertaining to both Support Staff and female athletes. It is also known that a lack of knowledge can impede people from engaging in conversation surrounding that topic (Curry et al., 2015; Mukherjee et al., 2016; Pantano, 2006). Based on this existing research, a lack of knowledge was assumed to be a barrier to conversations about the menstrual cycle between athletes and Support Staff, and thus, knowledge level was not thoroughly explored within this study. Certain studies have investigated the influence of Support Staff gender as it relates to menstrual cycle knowledge, however generally no gender-based differences have been found (Mukherjee et al., 2016; Pantano, 2006; Pantano, 2017). Nevertheless, in a recently published survey (Heather et al., 2021), the gender of Support Staff was identified as the most frequently reported barrier to communication amongst female athletes (Heather et al., 2021). It is important to note that this finding is not universal, with some athletes reporting an indifference to the gender of Support Staff (Findlay et al., 2020). However, the gender of Support Staff may add further challenges to the team environment, particularly when considering 'sensitive' topics such as the menstrual cycle and use of contraception.

There is inconclusive evidence amongst Support Staff to determine a consensus regarding the perceived importance of these topics as Support Staff have reported that

knowledge about the menstrual cycle, menstrual disturbances and hormonal contraception is not important (Mukherjee et al., 2016; Pantano, 2006; Pantano, 2017). It would be expected that if the environment that female athletes are training within does not perceive knowledge surrounding the menstrual cycle, menstrual disturbances and hormonal contraception is of importance, conversations about the menstrual cycle between Support Staff and female athletes is unlikely to occur.

The level of perceived responsibility amongst Support Staff to identify/manage athlete menstrual disturbances has not been previously explored. One study suggested it is the responsibility of the Sport Coaches and Performance Staff to refer an athlete to an appropriate health care professional when risk factors have been identified (Pantano, 2017), which would include menstrual disturbances which can have deleterious health impacts. However, in an IOC consensus statement (Mountjoy et al., 2014) it was reported that almost half of medical staff are unclear of their responsibility when treating or referring patients with symptoms associated with the Female Athlete Triad (Curry et al., 2015; Mountjoy et al., 2018), which is now known as RED-S and relates directly to an athletes' menstrual health. This suggests a level of ambiguity surrounding the perceived responsibility of Support Staff when dealing with menstrual-cycle related issues. Without appropriate education or clear knowledge of their responsibility to the athlete, it is difficult for Support Staff to properly identify and manage the signs and symptoms of menstrual dysfunction (Curry et al., 2015; Heather et al., 2021; Hines et al., 2019; Kroshus et al., 2014).

The primary aims of this study are to (1) investigate the quantity and quality of conversation surrounding the menstrual cycle between Support Staff and elite athletes

and (2) determine the barriers to effective conversation surrounding the menstrual cycle between Support Staff and elite athlete.

2 Review of the Literature

2.1 Sport and Exercise Medicine Research in Elite Female Athletes

The increased participation, exposure and professionalisation of women's sport is a consequence of heightened discourse and action on women's participation, leadership, equal pay, safeguarding policies and media coverage (Bowes et al., 2020; UN Women, 2020). The increased professionalism of female sport has provided the opportunity for female athletes to maximise their performance potential (Emmonds et al., 2019). Sport organisations including Women's Big Bash League (Cricket), Suncorp Super Netball, Women's Australian Football League and Women's National Rugby League are leading the way for female athletes to become professional in their chosen sport. Increased financial aid that has been provided to these sports clubs has allowed access to Performance Staff including professional Sports Coaching, Sport Science, and Sports Medicine support (Emmonds et al., 2019). Despite the increased financial aid, these sporting clubs, at most, only offer part-time contracts for their female players (Cleary, 2021; Houston, 2020; Keoghan, 2020; Lawson, 2019).

Despite the growing participation, exposure and professionalism of women's sport, women remain significantly under-represented in sport and exercise medicine research compared to their male counterparts (Bruinvels et al., 2017; Costello et al., 2014; Hackney, Kallman, & Ağgön, 2019). The role of Performance Staff is to implement evidence-based practice to promote an athlete's health, wellbeing and to develop athletic performance (Emmonds et al., 2019), however, there is a lack of female

representation within sports and exercise medicine research (Costello et al., 2014; Hagstrom et al., 2021). Amongst original and epidemiological sports science research, female only cohorts account for 4-13% (Hagstrom et al., 2021). This lack of research in female high-performance sport (Emmonds et al., 2019; Hagstrom et al., 2021) may limit the amount of female-specific knowledge that Performance Staff can utilise when working with their athletes.

It is well established that there are many physiological differences between men and women that can impact health, wellbeing and athletic performance (Bossi et al., 2013; Bruinvels et al., 2017). Differing physiological responses between males and females, such as the menstrual cycle, are likely to alter the clinical effectiveness of applying and implementing research which was conducted on male athletes to female athletes. (Costello et al., 2014; Emmonds et al., 2019). These different physiological responses in females include sex hormone concentrations, as well as the inflammatory process (Stupka et al., 2000) and signalling responses (West et al., 2012) which attenuates damage and/or inflammation and accentuates tissue repair in females (Tiidus et al., 2009). The added complexity of the menstrual cycle due to the fluctuations in the hormonal profile of females is considered a major barrier to the inclusion of females in clinical trials (Bruinvels et al., 2017; Costello et al., 2014; Savage & Clarkson, 2002; Tiidus et al., 2009; Willoughby & Wilborn, 2006). Furthermore, within the limited body of research, the menstrual cycle tends to be observed during the early follicular phase when endogenous hormones are at their lowest (Bruinvels et al., 2017; Hackney, Kallman, & Eser, 2019; Oosthuyse & Bosch, 2010). As Hagstrom et al. (2021) noted, although there is variability in hormone fluctuations during the menstrual cycle, there are comprehensive methodological recommendations available for conducting quality

research throughout the menstrual cycle (Elliott-Sale, McNulty, et al., 2020; McNulty et al., 2020). Considering this research, the hormonal fluctuation experienced by women, during the menstrual cycle, does not provide adequate reasoning to exclude females from sport and exercise medicine research.

2.2 The Menstrual Cycle

The menstrual cycle is a vital biological rhythm in which regular fluctuations in female steroid hormones occur during ovulatory menstrual cycles (Janse De Jonge et al., 2019; McNulty et al., 2020). During the menstrual cycle, ovarian hormones (oestrogen and progesterone) fluctuate predictably over a 23 – 38-day cycle in women between the ages of approximately 13-50 years', in a circa-mensal rhythm termed eumenorrhea (ACOG, 2006; Elliott-Sale, Ross, et al., 2020; Mountjoy et al., 2014). The menstrual cycle remains subject to large inter- and intra- individual variation (Elliott-Sale, Ross, et al., 2020). The menstrual cycle is divided into (1) the early follicular phase, (2) the late-follicular phase, (3) the ovulatory phase and (4) the mid-luteal phase (see **Fig. 1**.) (Elliott-Sale et al., 2021; Janse De Jonge et al., 2019; Oosthuyse & Bosch, 2010). The onset of bleeding indicates the early follicular phase of the menstrual cycle and typically lasts until day 5. During this phase the lowest concentrations of oestrogen and progesterone occur and follicles are grown under the influence of the hypophyseal follicle-stimulating hormone (FSH). The secretion of luteinising hormone (LH) is induced due to the slow increase of oestrogen levels surrounding this follicle. Phase 2, the late-follicular phase, occurs in the 14-26 h prior to ovulation. Phase 2 occurs when oestrogen levels are at their highest concentration and progesterone remains low. A surge in LH occurs and about one day later Phase 3, the ovulatory phase, occurs. Over days 14-15 during the ovulatory phase, endometrial thickness increases in preparation

for receiving an embryo and the is marked by medium oestrogen concentration whilst progesterone remains low (Elliott-Sale, Ross, et al., 2020). Phase 4, the mid-luteal phase, occurs when progesterone concentrations are at their highest and oestrogen levels are higher than Phases 1 and 3 but lower than Phase 2 (Elliott-Sale et al., 2021; Elliott-Sale, Ross, et al., 2020). Phase 4 in eurmenorrheic cycles occurs within 7 days of ovulation confirmation (Elliott-Sale et al., 2021; Elliott-Sale, Ross, et al., 2020). At the end of Phase 4, production of progesterone ceases, oestrogen levels continue to decrease, FSH secretion enhances, and the cycle begins again (Constantini et al., 2005). These hormonal variations are shown in **Figure 1**. Despite the recent surge in studies (Elliott-Sale et al., 2021; Elliott-Sale, Ross, et al., 2020; McNulty et al., 2020) detailing the hormonal profile that typically occurs during the menstrual cycle, within sport and exercise science research there remains no consensus describing the menstrual cycle phases and corresponding hormonal profiles (Elliott-Sale et al., 2021)

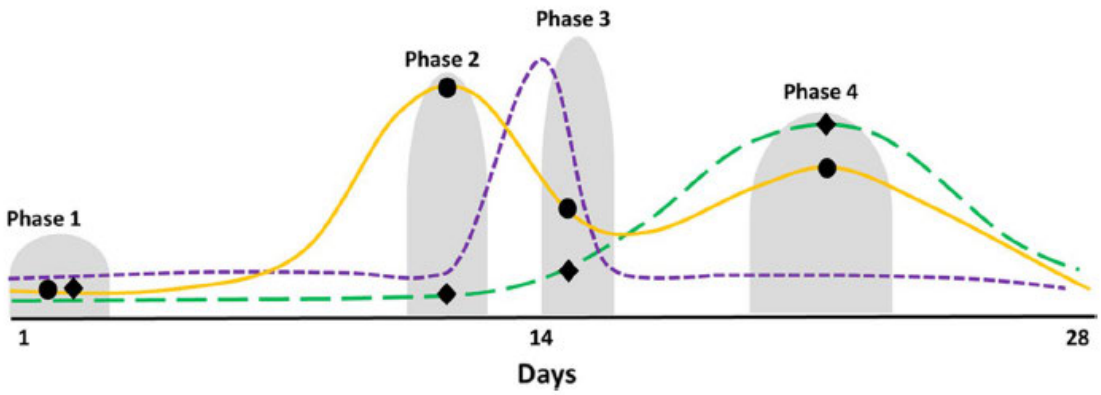


Figure 1. Overview of the hormonal changes across a typical 28-day menstrual cycle which was developed by Elliott-Sale and Colleagues (2021). The green line represents progesterone, the solid gold line represents oestrogen, the short dash purple line represents luteinising hormone. Mean concentrations of oestrogen during each phase and progesterone are represented by the black dots and black diamonds respectively. Figure sourced from Elliott-Sale et al. (2021).

2.3 Impact of menstrual cycle on physical and physiological determinants of performance

The research surrounding the effect of the menstrual cycle on athletic performance remains inconclusive. Research has identified the ovarian hormones influence on various physiological systems, such as respiratory drive (Janse De Jonge, 2003; Oosthuyse & Bosch, 2010), the immune system (Schuurs & Verheul, 1990), metabolism (Benton et al., 2020), thermoregulation (Grucza et al., 1993; Janse De Jonge, 2003) and the cardiovascular system (Lebrun et al., 2013). However, the extent to which the cyclical fluctuations in oestrogen and progesterone might affect performance is not fully understood and a consensus regarding the effects of the menstrual cycle on exercise performance has not been reached (Armour et al.; McNulty et al., 2020; Oosthuyse & Bosch, 2010).

Certain studies have shown no difference in athletic performance i.e., muscle strength (Elliott et al., 2005; Janse De Jonge, 2003), VO_{2peak} (Casazza et al., 2002) and power output (Vaiksaar et al., 2011a) across the menstrual cycle (Bemben et al., 1995; Casazza et al., 2002; De Souza et al., 1990; Dean et al., 2003; Elliott et al., 2005; Janse de Jonge et al., 2001; Jurkowski et al., 1981). For example, Janse de Jonge et al. (2001) investigated the influence of the menstrual cycle on the skeletal muscle contractions of 19 eumenorrheic women. The tests to measure muscle function were conducted during the early follicular (EF) phase, the late follicular (LF) phase and the mid-luteal (ML). When measuring isokinetic knee flexion and extension strength and fatiguability, as well as handgrip strength, no significant changes were found using muscle function parameters throughout the menstrual cycle among 19 participants (Janse de Jonge et al., 2001). No correlations were found between the fluctuations in oestrogen, progesterone,

FSH and LH and muscle contractile characteristics (Janse de Jonge et al., 2001). The research surrounding blood lactate and ventilatory thresholds typically displays similar results, suggesting that menstruation does not influence athletic performance (Dean et al., 2003; Dombovy et al., 1987; Schoene et al., 1981; Smekal et al., 2007; Vaiksaar et al., 2011b).

In contrast, certain studies (Ansdell et al., 2019; Campbell et al., 2001) have found hormonal fluctuations to influence athletic performance throughout the menstrual cycle. These studies suggest that exercise performance requiring maximal intensity and measures of muscular strength have been found to be best when performed during menstruation (Brooks-Gunn et al., 1986; Davies et al., 1991; Redman & Weatherby, 2004). One study (Ansdell et al., 2019), investigating eumenorrheic women across the menstrual cycle during EF, LF and ML phases, observed significant changes across menstrual cycle phases when measuring a participants maximal voluntary contraction using an intermittent isometric fatiguing task of the knee extensors. Furthermore, voluntary activation using transcranial magnetic stimulation to activate the knee extensors was greatest on day 14 during the LF phase immediately prior to ovulation (Ansdell et al., 2019). This indicates that the menstrual cycle may have an impact on the neuromuscular function and fatigability of the knee extensors and consequently influencing athletic performance requiring lower limb function (Ansdell et al., 2019).

One study reported a 2% lower VO_{2max} during the ML in comparison to the EF (Lebrun et al., 1995). In comparison, Forsyth and Reilly (2005) found that during the LP, the exercise intensity corresponding to 4mmol/l lactate thresohld was higher when compared to the FP. Similar studies (Jurkowski et al., 1981; McCracken et al., 1994)

found that during exercise there is decreased blood lactate accumulation during the LP and by implication, a benefit to the menstrual cycle during lactate threshold training (Forsyth & Reilly, 2005; Jurkowski et al., 1981; McCracken et al., 1994).

It is possible the lack of conclusive evidence relating to the effect of the menstrual cycle on performance may result from the athletes perceived negative effects of the menstrual cycle rather than the menstrual cycle impacting the physiological system to an extent it influences atheletic performance (Findlay et al., 2020; McNulty et al., 2020). For example, an athlete may expect themselves to perform worse at certain stages of their cycle and this could influence their athletic performance. Furthermore, many of the inconsistencies between studies are likely a result of varied methods for determining menstrual cycle phase, the definition of different menstrual cycle phases and the choice of exercise testing days (Redman & Weatherby, 2004) and the type of exercise performance tested (e.g., aerobic capacity, maximal strength, etc.). Despite conflicting evidence surrounding the menstrual cycle and determinants of athletic performance, further studies using the methodological recommendations put forward by Elliott-Sale et al. (2021) are required as there is no clear consensus to date. In summary, menstrual phase has been found to occasionally influence athletic performance however, there remains several studies that have found conflicting results.

2.4 Menstrual dysfunction and health

Compared to the general population, female athletes are more likely to experience menstrual dysfunction (Mountjoy et al., 2014; Nazem & Ackerman, 2012). The combination of low energy availability, menstrual dysfunction and low bone mineral density was previously defined as the Female Athlete Triad (Findlay et al., 2020;

Nazem & Ackerman, 2012; Pantano, 2006). Current research surrounding the Triad has evolved into relative energy deficiency in sport (RED-S) which is presented in **Figure 2** (Findlay et al., 2020; Mountjoy et al., 2014; Nazem & Ackerman, 2012). Clinical evidence identified this phenomenon is not a Triad but rather a syndrome resulting from relative energy deficiency impacting psychological (Drinkwater et al., 2005; Mountjoy et al., 2014), bone health (De Souza et al., 2008; Mountjoy et al., 2018; Papageorgiou et al., 2018), and physiological functions (Mountjoy et al., 2014). The long-term health consequences of RED-S are not fully understood, however, there is known risk to bone health resulting from an increase in stress hormones with low energy availability leading to bone loss and consequently a negative influence on an athletes health and performance (Keen & Drinkwater, 1997; Mountjoy et al., 2014). Sports that promote aesthetics are at a higher prevalence of experiencing secondary amenorrhea, the absence of the menstrual cycle for three consecutive cycles (Mountjoy et al., 2014; Nazem & Ackerman, 2012; Torstveit & Sundgot-Borgen, 2005). Endurance athletes are more likely to suffer primary amenorrhea, referring to no menstrual cycle by age 15, and oligomenorrhea, which refers to the absence of a menstrual cycle for more than 35 days (Redman & Loucks, 2005). When detected early, athletes are likely to receive early treatment and are more likely to avoid acute and long-term consequences (Kroshus et al., 2014).

Another common type of menstrual dysfunction experienced by athletes is menorrhagia, or heavy/prolonged menstrual bleeding (Bruinvels et al., 2016). Heavy menstrual bleeding is likely to cause iron deficiency and anaemia, however, less than half of affected athletes reported seeking medical help despite the possible impact on athletic performance (Bruinvels et al., 2016). With coach's recommendations, 78.9% of elite

female athletes in a study of 90 elite UK athletes reported using iron-supplements (Bruinvels et al., 2016). This raises concerns, as the athletes are missing an opportunity to be examined by a medical doctor when the doctor can determine whether iron-supplements is necessary. There could be underlying issues causing iron deficiency (if it is indeed even present) that the female athlete is experiencing that go undetected. This further highlights the need for athletes and Support Staff to have frequent conversations about the menstrual cycle to ensure the athletes health and performance is prioritised (Bruinvels et al., 2016).

Menstrual dysfunction is a multi-faceted syndrome that can occur due to a variety of reasons, emphasising the importance of continuous monitoring of the menstrual cycle among elite female athletes (Kroshus et al., 2014). As menstrual dysfunction is more prevalent among female athletes and can detrimental to an athletes health and performance, it would be expected that Support Staff and athletes prioritise conversations about their menstrual cycle.

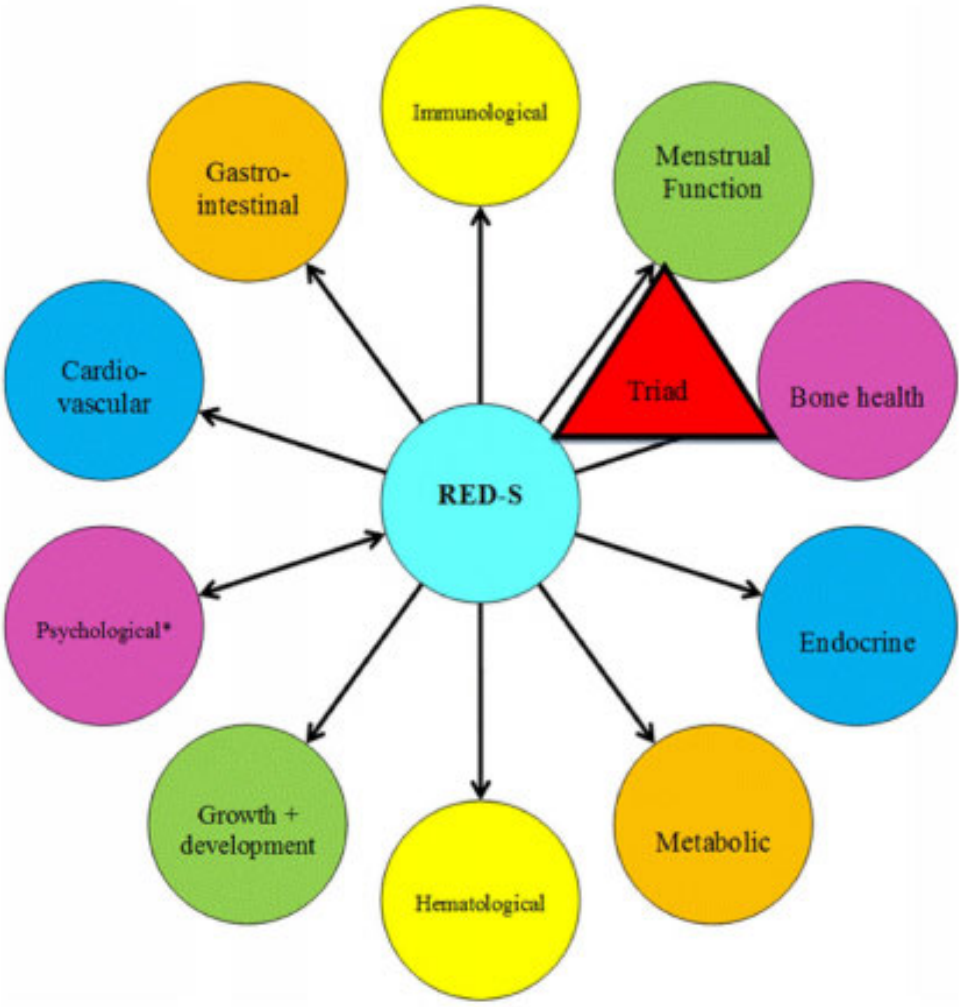


Figure 2. An expanded concept of the Female Athlete Triad and the health consequences of Relative Energy Deficiency in Sport. Sourced from Mountjoy et al. (2018)

2.5 Hormonal contraception and potential effects on athletic performance

Across the menstrual cycle, hormonal contraception (HC) inhibits ovulation and supress endogenous hormones (Larsen et al., 2020; Martin et al., 2018). The use of HC among the female athletic population is prevalent as HC provides the athlete with an opportunity to manage and manipulate their menstrual cycle to best suit their daily life,

training and performance. There are various delivery methods and types of HC that can be used containing various concentrations of synthetic oestrogen and/or progesterone (Martin et al., 2018; Rechichi et al., 2009). These include oral contraceptives (OC), implants, injections, transdermal patches, vaginal rings, and intrauterine device which is also referred to as an intrauterine system (Martin et al., 2018). The most commonly used HC among Australian athletes is the OC pill (Larsen et al., 2020). There are different types of OC pills that can be administered (e.g., monophasic, biphasic or triphasic hormone administration) as well as varying types and doses of oestrogen and progestogen (Burrows & Peters, 2007; Larsen et al., 2020). Various delivery methods and concentrations of exogenous hormones contained within HCs can affect the user in different ways and must be considered (Burrows & Peters, 2007; Rechichi et al., 2009).

A survey distributed by Martin et al. (2018) to 413 elite female athletes discovered that 49.5% of athletes were currently using HCs. Of the 413 elite female athletes surveyed, OC were the most commonly used HC (Martin et al., 2018). A recent survey of 15 international female rugby players, 27% were reported to use HC. Despite potentially experiencing worsened symptoms following courses of OC, these results highlight that many athletes have a strong desire to eradicate any complications that menses may cause to their performance (Findlay et al., 2020).

The impact of HC use on anaerobic performance remains inconclusive and inconsistent (Rechichi & Dawson, 2009; Rechichi et al., 2009; Redman & Weatherby, 2004). One study measuring anaerobic power and capacity among five well-trained rowers taking a triphasic OC pill reported an increase in peak power and 1000-metre time trial during days 26-28 of the pill cycle when concentrations of oestrogen and progestogen are low

(Redman & Weatherby, 2004). A similar study used a triphasic OC pill and found no significant differences in anaerobic performance in aerobically trained women (Lebrun et al., 2003). A study by Lebrun et al. (2003) measured time (seconds) to fatigue and an anaerobic speed test (AST) which was performed by OC users across two pill cycles during days 14-17 of the pill cycle (Lebrun et al., 2003). These two studies illustrate the ongoing difficulties of assessing the impact of HC on anaerobic performance, due to the notable variation in the type of participants, testing days and testing protocols implemented (Lebrun et al., 2003; Redman & Weatherby, 2004).

The influence of oral contraceptive use on peak physiological outcomes using sprint interval training in recreationally active women following a 4-wk program was also investigated (Schaumberg et al., 2017). This study identified a dampened aerobic (VO_2peak and Q_{peak}) response due to taking the monophasic OC pill (Schaumberg et al., 2017). Additionally, another study established a 2% lower $\dot{V}O_{2max}$ in the ML phase compared with the EF phase (Lebrun et al., 1995), which was supported by Casazza et al. who reported a 13% decrease in $\dot{V}O_{2max}$ following 4 months of oral contraceptive use (Casazza et al., 2002; Lebrun et al., 1995). From evidence from the aforementioned studies, it appears the OC use may lead to negative effects on endurance performance as reduced training adaptations appears to occur (Schaumberg et al., 2017). In contrast, there have been multiple studies utilising a monophasic pill that have discovered no significant differences when using HC on endurance performance across untrained and trained women (Burrows & Peters, 2007).

There have been few studies published which investigate the effects of HC use on strength performance. In one study, no significant difference was found in peak

isokinetic strength measures over two triphasic pill cycles among aerobically trained women (Lebrun et al., 2003). The use of a monophasic OC is more prolific within the research, however investigators are not in agreement as to the effects of a monophasic OC on muscular strength of female athletes (Burrows & Peters, 2007). In line with the majority of HC research, the monophasic OC pill has been investigated in studies in which the type of participants, testing days and testing protocols are greatly varied. Nonetheless, select studies concluded that there were no significant differences on the muscular strength of females when taking a monophasic OC pill compared to eumenorrheic women across the menstrual cycle (Elliott et al., 2005; Petrofsky et al., 1976; Wirth & Lohman, 1982).

The variations between study methodology creates challenges when trying to come to a consensus on the role HC plays on athletic performance. A recently published meta-analysis in which the study quality of included articles was also evaluated, has suggested that HC use has only a trivial to small effect on exercise performance. It is difficult to draw conclusions from this study regarding elite female athletes as only one study included in this meta-analysis involved elite athletes (Elliott-Sale et al., 2021). In the absence of robust athlete data, a personalised approach is required to ensure athletes are choosing HC which is best suited to their health, wellbeing and their sports performance. Thus, conversations between Support Staff and athletes to determine whether athletes are using HC, as well as any symptoms that the athletes are experiencing and possible detriments to performance as a result of HC use, should be prioritised. The influence HC can have on the management and manipulation of the menstrual cycle highlights the importance of HC and would be expected that athletes and Support Staff should be having conversations about their HC choices. Through

effective conversation, Support Staff are able to provide appropriate education and guidance to ensure the impact of HC use promotes an athletes health, wellbeing and performance (Findlay et al., 2020).

2.6 Communication and the coach-athlete relationship

The athletes training processes and performance outcomes are directly impacted by the athlete-coach relationship (Poczwardowski et al., 2002). A positive coach-athlete relationship is characterised by the coach and athlete intentionally interacting with each other; communication occurs during practice, competition and during other situations that are not directly related to their sport (Poczwardowski et al., 2002). There are two common elements in every communication exchange, the sender and the receiver (Lunenburg, 2010). Communication is initiated by the sender, a message is then developed by the sender (this can take form of verbal, non-verbal, or written language), and is sent to the receiver (Lunenburg, 2010). Communication allows the transmitting of information and common understanding from one person to another (Lunenburg, 2010). For an athlete-coach relationship to be beneficial, engagement in conversation needs to occur on both sides**.** In-person conversation is recognised as the most effective method of communication due to the direct feedback and engagement between athlete and coach (Denison, 2007; Thelwell et al., 2017).

2.7 Effective conversation

Conversation allows for the transference of information (message) between the coach (sender or receiver) and athlete (sender or receiver) (d'Arripe-Longueville et al., 2001;

Denison, 2007; Lunenburg, 2010). Based on the terminology used by Thelwell et al. (2017) to describe effective communication, it is reasonable to suggest effective conversation refers to verbal interactions between coaches and athletes resulting in a transference of information leading to outcomes to promote general health, wellbeing, sport skill development, increased motivation, and enhanced levels of performance (Thelwell et al., 2017). There are multiple variables that influence the intended message being delivered during conversation from the sender to the receiver, which can act as either a barrier or facilitator to effective conversation (Thelwell et al., 2017).

2.8 Barriers to effective conversation

Due to the dynamic nature and various elements that influence conversation, it is difficult to determine the barriers to effective conversation within female sport. Halson and Lastella (2017) observed the message transferred alone does not result in change nor is the message guaranteed to reach the receiver. The medium (e.g. verbal conversation) and noise (e.g. contextual factors such as the environment), can greatly influence success of the message transferring from the sender to receiver (Cheney, 2004). Stigma has been identified as a major barrier to initiating conversation with professionals within mental health (Gulliver et al., 2012), which may translate to conversations surrounding the menstrual cycle. Despite professionals in mental health having an expansive knowledge base and intention to use this knowledge positively, the stigma surrounding mental health hindered the message from the professionals transferring to the patient. This is similar within elite female sport in which stigma and taboo is associated with menstruation, which may impede an athlete seeking help or the Support Staff from approaching this topic with a female athlete (Slade et al., 2009). This

highlights the importance of professionals to eliminate contextual factors (noise) that may act as a barrier to effective conversation.

Following the review of the literature surrounding athletes, Support Staff and the menstrual cycle, as well as the literature pertaining to effective conversation, four themes were identified that could influenced the effectiveness of conversation in an elite or sub-elite sport environment. These four themes, opportunity, environment, responsibility and knowledge, were used to explore the barriers and facilitators to effective conversations between elite female athletes and Support Staff.

2.9 Opportunity

The occurrence of conversations between the Support Staff and athlete is a key component in developing the coach-athlete relationship. It has been identified as the responsibility of the coach to initially establish open-dialogue to provide the athlete with opportunities to have conversations when necessary (Findlay et al., 2020). Encouraging an open dialogue between the coach and athlete is key to building ownership and trust with the player to initiate conversations instead of relying solely on the coach (Hines et al., 2019). This is likely to facilitate earlier identification and interventions for maladaptive behaviours among at risk athletes (Hines et al., 2019).

For effective conversations to occur, coaches and athletes must have one-on-one opportunities in a private and quiet place without disruption (Duda & Marks, 2014; Jowett & Shanmugam, 2016). Within the team-sports setting, it has been found that coaches typically address athletes as a team or group, limiting the quantity of one-on-one conversations between coaches and athletes (Jowett & Shanmugam, 2016;

Poczwardowski et al., 2002; Rhind et al., 2012; Sandström et al., 2016). This is likely due to the number of athletes within one team and the team-sport setting being more formal, hierarchical and distant (Poczwardowski et al., 2002; Sandström et al., 2016). Encouragingly, the total length of each conversation does not appear to be vital, and for time-stressed Support Staff, conversations that occur briefly before, during or after training sessions are suitable (Jowett & Shanmugam, 2016). Thus, privacy may be more of an opportunity barrier to effective conversation in team sport environment, particularly when considering a sensitive and often stigmatised topic such as menstruation.

2.10 Environment

The opportunity for Performance Staff to initiate or even maintain a conversation with a female athlete is heavily dependent on the cultural norms within the specific sport (Sandström et al., 2016). The socio-cultural environment can impact the quality and quantity of conversation between the Support Staff and the female athlete (Sandström et al., 2016); athletes require a comfortable environment to give them confidence to express their symptoms (Slade et al., 2009). The results from a recent qualitative study by Findlay et al. (2020), using semi-structured interviews, suggest athletes feel more at ease if personal health-related conversations are initiated by Support Staff (Findlay et al., 2020).

The research surrounding Sport Coaches behaviours and attitudes toward eating disorders among female athletes raises issues (Findlay et al., 2020; Pantano, 2006; Trattner Sherman et al., 2005) that may be of consequence, when considering the menstrual cycle. Sporting cultures which focus on aesthetics, endurance, or weight can

normalise extreme dietary and training practices, potentially resulting in body dissatisfaction, disordered eating practices, low bone mineral density and stress fractures, and menstrual dysfunction, (Heather et al., 2021; Krane et al., 2004). For example, perceived pressure from the coach surrounding weight could place an athlete at an increased risk of disorder eating (Mukherjee et al., 2016). This highlights the influence the socio-cultural environment can have on the athlete (Mukherjee et al., 2016; Pantano, 2006).

In a study assessing the knowledge, attitudes and behaviours of college coaches with respect to eating disorders and menstrual dysfunction, it was noted that coaches are well placed to assist in the identification and referral of at risk female athletes (Trattner Sherman et al., 2005). However, it was also found that 37% of coaches within this study viewed amenorrhea as 'normal'(Thompson & Trattner Sherman, 1999; Trattner Sherman et al., 2005). Some coaches erroneously believe the presence of amenorrhea as a sign of a dedicated, hard-working athlete who trains intensively rather than a risk factor (Pantano, 2006). So while coaches and Support Staff may be well placed to identify and refer at risk female athletes, it is possible that outdated 'knowledge' or ideas may influence who they perceive to be at risk.

The attitudes and behaviours of Support Staff towards the presence of menstrual dysfunction has also been associated with gender of the Support Staff, (Mukherjee et al., 2016; Pantano, 2006; Pantano, 2017). In one study, it was identified that female coaches are more likely to respond to issues related to amenorrhea than their male counterparts (Trattner Sherman et al., 2005). Furthermore, a study concluded that female coaches were more comfortable and more likely to initiate conversations with

their athletes surrounding amenorrhea than male coaches (Kroshus et al., 2014; Trattner Sherman et al., 2005). It has been established that some athletes behaviours when dealing with Support Staff is influenced by the gender of the staff member (Findlay et al., 2020; Heather et al., 2021); despite experiencing a negative influence on training and performance due to their menstrual cycle, athletes have admitted to not discussing their menstrual cycle with their coach due to their gender (Armour et al., 2020). One respondent in the interviews conducted by Findlay et al. (2020) reported that they did not feel comfortable speaking to staff surrounding their menstrual cycle as the athlete reported "all the coaches I've had in rugby are male" (Findlay et al., 2020, P14). In a recent study surveying 219 respondents, similar responses were found with female athletes reporting gender as their most frequently cited barrier to conversations between the athlete and Support Staff (Heather et al., 2021). This poses a serious issue, as the current state of gender amongst coaches indicates ~85% of coaches are male in Australia (Armour et al., 2020). Thus, the typical sporting environment may not be conducive to effective conversation around sensitive topics such as the menstrual cycle.

2.11 Responsibility

It is vital for Support Staff to understand their professional responsibility when monitoring and managing the menstrual cycle of female athletes in order to effectively implement a multi-disciplinary approach (Armour et al., 2020; Pantano, 2006). An integrated performance system has been proposed that promotes the integration between health and coaching staff in which everyone is responsible for the output of the system at various levels (Dijkstra et al., 2014; Mooney et al., 2017). Put simply, both departments of performance coaching and health management need to operate toward one goal. For this to occur, coaches must have an understanding of major injuries and

illnesses and Health Staff must be aware of the physiological and mechanical demands of the specific sport. (Dijkstra et al., 2014). As discussed previously, the menstrual cycle, menstrual dysfunction and HC use among athletes have been shown to influence an athlete's health and wellbeing and may negatively or positively influence the athletes ability to meet the physiological demands of a specific sport (Bruinvels et al., 2016; Burrows & Peters, 2007; Mountjoy et al., 2014; Nazem & Ackerman, 2012). Given the established relationship between menstrual dysfunction, low energy availability and bone stress fractures, it is reasonable to suggest that the treatment of these health issues is the responsibility of dietitians and medical doctors (Mountjoy et al., 2014; Pantano, 2006). However, these practitioners may not be positioned to communicate frequently with the athletes. Thus, a systems model that incorporates the menstrual cycle within the health management of the athlete is imperative (Dijkstra et al., 2014; Mooney et al., 2017). In this proposed model, issues with the menstrual cycle are the responsibility of the Health Staff, in addition to, coaching and Performance Staff who are required to maintain a working knowledge of the impact of the menstrual cycle and HC use on athletic performance to best support the Health Staff and the athlete (Dijkstra et al., 2014). The integrated performance model relies on the interdependent responsibilities of both health and performance coaching staff to ensure decisions are based on an informed process, taking into account the relevant health aspects, demands of the sport and the specific individual performance goals (Dijkstra et al., 2014; Mooney et al., 2017).

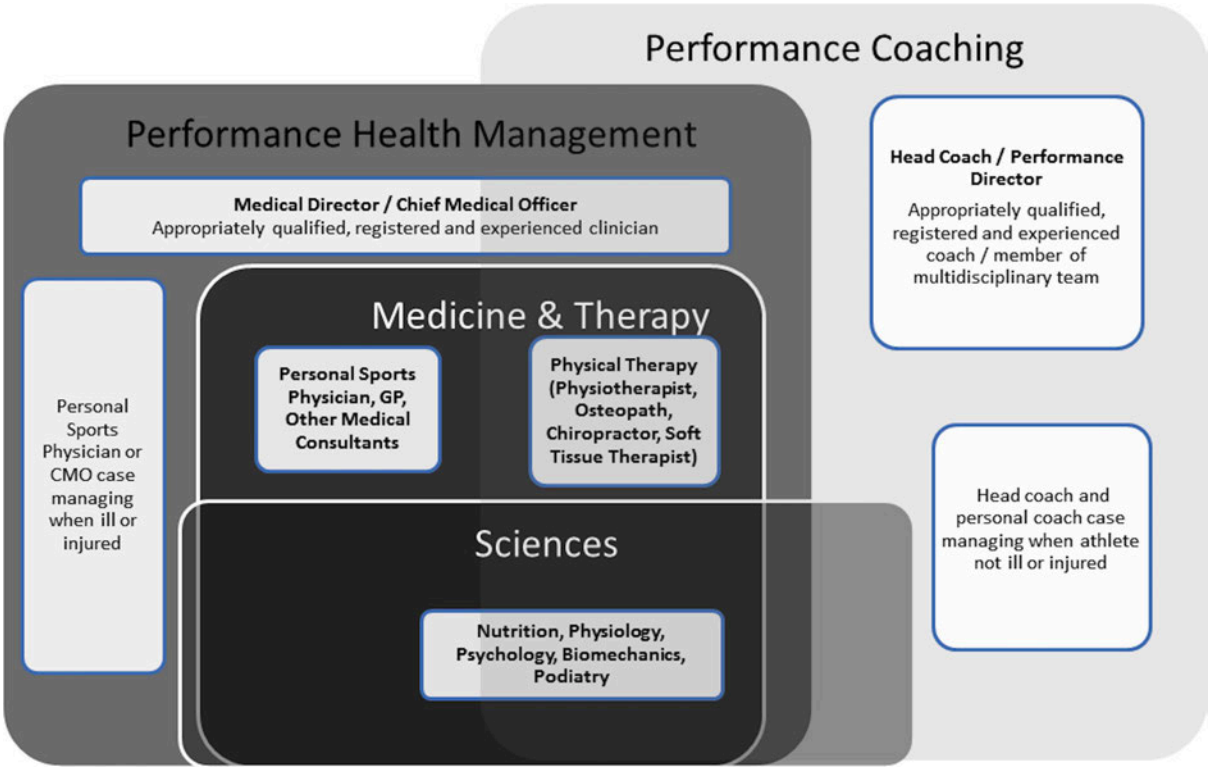


Figure 3. The Integrated Performance Model. Sourced from Dijkstra et al. (2014)

2.12 Knowledge

The knowledge of Performance Staff has been established as a contributing factor influencing the quantity and quality of conversation surrounding the menstrual cycle with female athletes (Armour et al.; Mukherjee et al., 2016). It was previously established to successfully implement an integrated performance model, coaches must have an understanding of major injuries and illnesses and Health Staff are aware of the physiological and mechanical demands of the specific sport. (Dijkstra et al., 2014). Within the sport science research, there is a lack of evidence outlining the how lack of knowledge impacts supports staff ability to successfully fulfill their role. In lieu of studies investigating the influence of knowledge on conversation between Support Staff and athletes, a similar communication dynamic involving GP's may offer some insight. A study by Jochemsen-van der Leeuw et al (2011) investigated the attitudes towards

obesity treatment in GP training practices, where the GP's interviewed were unaware whose responsibility it was to provide prevention and advice on obesity (Jochemsen-van der Leeuw et al., 2011). Jochemsen-van der Leeuw et al. (2011) suggested that increased knowledge of weight management and interventions would improve the GP's ability to treat and manage a patient with obesity. It is possible a similar dynamic is occurring surrounding menstrual cycle conversations between athletes and Support Staff, whereby Support Staff are unaware of their responsibility to 'manage' the menstrual cycle of the athlete and may lack the knowledge to effectively communicate on the topic. Evidence suggests that increased knowledge and awareness of the menstrual cycle and menstrual dysfunction is lacking amongst Performance Staff as only 38% are aware of the negative health consequences of menstrual dysfunction (Larsen et al., 2020; Mukherjee et al., 2016). Furthermore, Mukherjee et al. (2016) identified that 89% of Singaporean coaches, both male and female, were unable to identify the components of the Female Athlete Triad (now known as RED-S). This lack of knowledge among coaches could also explain the normalisation of menstrual dysfunction that can occur in athlete populations, reducing the perceived importance of the menstrual cycle and its impact on athletic performance of female athletes (Armour et al., 2020). Based on these two studies (Jochemsen-van der Leeuw et al., 2011; Mukherjee et al., 2016), a lack of knowledge appears to act as a barrier to effective conversation surrounding the menstrual cycle, with low knowledge resulting in a reluctance of Sport Coaches, Performance and Health Staff to initiate conversations surrounding the menstrual cycle and specifically, a hesitance of Medical Doctors to treat and manage athletes presenting with signs and symptoms of the Female Athlete Triad (Curry et al., 2015). Select studies have already indicated poor knowledge of the menstrual cycle and OCs among elite female athletes (Laresen et al., 2021), which

means it is likely that neither the Support Staff nor the athlete is willing to initiate conversation about the menstrual cycle. Without adequate knowledge, Support Staff are less likely to implement a multi-disciplinary approach to assist athletes suffering from menstrual dysfunction (Pantano, 2006). Indeed, a prior study found that Sport Coaches with greater knowledge were more likely to employ a multi-disciplinary approach when dealing with the Female Athlete Triad, ensuring female athletes return to training and ultimately performance was optimised (Pantano, 2006). When coaches have knowledge surrounding the menstrual cycle, more effective conversation is likely to occur.

2.13 Significance

The participation of women in elite-level sport continues to grow (Costello et al., 2014; Hackney, Kallman, & Eser, 2019). Nonetheless, women remain largely under-represented in the exercise and sport scientific literature, despite well-established research that highlights how men and women respond and adapt differently to exercise stimuli (Bruinvels et al., 2017; Costello et al., 2014; Hackney, Kallman, & Eser, 2019; Oosthuyse & Bosch, 2010). This bias towards male participants results in current coaching and sports science practices applied to female athletes being informed by evidence based on male participants (Burrows & Peters, 2007; Martin et al., 2018). Recently, there has been increased interest in the effect of the menstrual cycle on training optimisation and athletic performance (McNulty et al., 2020). We now know that the menstrual cycle and the administration of hormonal contraceptives can affect the wellbeing and subsequent training of elite female athletes (Bruinvels et al., 2016; Martin et al., 2018). If the menstrual cycle is not monitored among elite female athletes, menstrual dysfunction is likely to be disregarded or remain undiagnosed (Nazem & Ackerman, 2012). This is of importance, as menstrual dysfunction can be associated with reduced health and performance outcomes (Keen & Drinkwater, 1997; Mountjoy et al., 2014; Nazem & Ackerman, 2012). Furthermore, psychological stress can occur due to menstrual dysfunction (Findlay et al., 2020; Mountjoy et al., 2014). Despite Support Staff being well placed to discuss the menstrual cycle with elite female athletes, these conversations do not appear to be occurring frequently, it at all.

It is clear that knowledge is lacking surrounding the menstrual cycle of female athletes and this appears to be a result of lack of education delivery as well as limited research investigating the menstrual cycle in athletes (Kroshus et al., 2014). Menstrual cycle

related symptoms can alter training or result in training absences (use Armour study), which may subsequently hinder performance. More importantly, without suitable treatment, menstrual dysfunction can lead to long term health consequences to the female athlete (psychological (Drinkwater et al., 2005; Mountjoy et al., 2014), bone health (De Souza et al., 2008; Mountjoy et al., 2018; Papageorgiou et al., 2018), and physiological functions (Mountjoy et al., 2014). To avoid this scenario, Performance Staff need to understand how to encourage effective conversations with their athletes surrounding the menstrual cycle. This will ensure optimised training and performance and most importantly, will help avoid the long-term health risks that can occur due to menstrual dysfunction (Bruinvels et al., 2016; Findlay et al., 2020)

3 Aims and Objectives

The aim of this study was to determine the barriers to effective conversations surrounding the menstrual cycle between elite female athletes and Support Staff. This study deconstructed the barriers that currently impact effective conversation surrounding the menstrual cycle, specifically relating to the themes of opportunity, environment and responsibility. To achieve this, the objective of this study was to develop a survey to determine the current perceptions of Performance Staff regarding the barriers to effective conversation surrounding the menstrual cycle.

3.1 Aims

The specific aims of the present study were to:

1. Determine the quality and quantity of conversations between Support Staff and elite female athletes regarding the menstrual cycle using three contextual factors (opportunity, environment and responsibility).

2. Identify what Support Staff perceive to be the key barriers to effective conversations about the menstrual cycle with their athletes

3.2 Objectives

The objectives of the present study are as follows:

1. Administer an online questionnaire to Sport Coaches, Performance and Health Staff (Support Staff) currently working with elite female athletes

2. Determine the quantity of conversations that occur through exploring the opportunity Support Staff have to initiate conversations with female athletes.

3. Understand the environment in which effective conversations about the menstrual cycle occur between Support Staff and female athletes.

4. Evaluate who is responsible among Support Staff to initiate conversations with female athletes to discuss their menstrual cycle.

3.3 Hypotheses

1. A key barrier to effective conversation about the menstrual cycle is (1) Support Staff have a lack of opportunities to have conversations with female athletes, (2) the environment within professional female sport is not conducive for Support Staff to have conversations with their female athletes, (3) Support Staff's not taking responsibility for having these conversations with athletes

4 Research Methods

4.1 Study Design

This study was a cross-sectional design using an online questionnaire. The questionnaire aimed to collect and analyse descriptive data using a primarily quantitative approach. Qualitative data was collected through open ended questions and was used to complement the key findings. This was the first phase of a two-phase mixed methods study where respondents in the questionnaire were invited to participate in a series of focus groups, data for which will be investigated separately. The questionnaire was distributed to Support Staff via the high performance manager of the sporting team. The Support Staff were to complete the questionnaire individually at any point until the close date of the questionnaire on the online platform (1st February 11:59PM, 2021). All data was initially deidentified. A 36-item questionnaire was developed and reviewed by the research group in conjunction with the Female Athlete Health Project led by the Australian Institute of Sport. The review of the questionnaire considered the type of questions used and question and response bias. The survey took respondents approximately 10 minutes to complete. Participants consented to providing data in a deidentified format and participants were informed that submission of the questionnaire

constituted their consent to participation. A copy of the survey tool can be found in Appendix A. All study procedures conducted were reviewed and approved by Griffith University Human Research Ethics Committee prior to data collection (GU Ref No 2020/648).

4.2 Participants

A non-probability sampling method was used to recruit participants for this study. A statistical analysis of the required participants to determine effect size of the study was not conducted due to a lack in previous studies using Sport Coaches, Health Staff or Performance Staff and the small field of professional female sport. One previous study (Pantano, 2017) in Ohio, USA investigating high school coaches recruited 200 participants. However, given the larger population of USA and the drastically greater number of high school athletes in comparison to professional Australian female athletes, it was determined that this study was not appropriate to be used as a guide to determine effect size for this current study. To ensure an expert sample was captured, a purposive sampling strategy was used to target relevant sporting organisations and a convenience sample was then used to recruit Sport Coaches, Performance Staff and Health Staff that were willing and available to participate. To meet the study inclusion criteria, participants were required to be currently employed in a position within women's professional team sports. For this study, Sport Coaches included Head Coaches and Assistant Coaches, Performance Staff included Strength and Conditioning Coaches, Sport Scientists and High-Performance Managers, and Health Staff included Physiotherapists, Dietitians and Medical Doctors. Following assessment of participant eligibility, 26 expert Support Staff were included in the study. Support Staff were aged between 27 – 64 and were recruited through women's Australian Football, Cricket,

Rugby League, and Netball at the professional level. Despite the relatively small size of the sample group, the methods used to recruit participants ensured an expert and representative sample of Support Staff across various professions and sporting codes leading the way in professional female sport.

Table 1: Participant Characteristics

Variable	n	%
Sport		
National Rugby League Women's (NRLW)	5	19
Australian Football League Women's (AFLW)	3	12
Women's Big Bash League (WBBL)	15	58
Suncorp Super Netball	3	12
Gender		
Man	11	42
Woman	15	58
Age◊		
20-29	3	12
30-39	13	48
40-49	4	15
50-59	3	11
60-69	1	4
Highest completed level of education		
Secondary School	1	4
Certificate III	1	4
Diploma	1	4
Bachelor's Degree	6	23

Graduate Diploma	1	4
Graduate Certificate	1	4
Bachelor Honour's Degree	2	8
Master's Degree (coursework)	8	31
Master's Degree (research)	1	4
Medical-Specialist Fellowship	3	12

◊ indicated n = 24, missing data from two participants

4.3 Questionnaire Design

A questionnaire was developed by the research group during a series of meetings and was designed specifically for the purposes of this study. An initial list of draft questions were developed that included questions items surrounding the themes of responsibility, opportunity, environment and knowledge that may act as barriers and facilitators to effective conversation surrounding the menstrual cycle between Support Staff and elite female athletes. All questions included were closed questions and the questionnaire was distributed in the same format to all participants to ensure results were comparable (Anderson et al., 2013; Martin, 2006). Closed questions were used as they reduce the opportunity for clerical and judgmental errors when analysing the data (Anderson et al., 2013). Likert scales and multiple choice questions were primarily used. A variety of 5-point scales using Never-Always, Not at all-Completely, Not at all-Absolutely and Not at all-Extremely were used within the questionnaire to maximise the validity and reliability of these questions The questionnaire was tailored to the Health Staff and Performance and Coaching Staff separately. This was applicable to questions 17c and 17d, in which the participant was asked whether athletes can express their ideas and contribute to their decisions regarding training (Performance and Coaching Staff) or

treatment (Health Staff). Initial questionnaire items related to the primary role in the squad/team of the participant, secondary role(s), initial role within the squad/team, age, gender (of the participant and the squad/team), nationality, ethnicity, state of residence, highest completed level of education and any further education surrounding female physiology.

For instance, Questions 15 included Likert scales to represent the Support Staff perceptions relating to their opportunities to have conversations with female athletes they work with. The environment was explored in Questions 16 and 17. These questions provided an insight into the Support Staff's perceptions of the environment of the squad or team to determine whether female athletes feel comfortable having conversations with Support Staff on various topics. Perceptions of environment relating to knowledge was examined in Questions 19 and 22 using a multiple choice question and a 5-point Likert scale. Questions 18 and 21 investigated the influence of perceived responsibility on conversation surrounding the menstrual cycle between Support Staff and elite female athletes. An 'unsure' response option was added as this is relevant to the research question.

The quantity of conversations was investigated by asking participants whether there is opportunity for Support Staff to ask athletes questions about the menstrual cycle. The quality of conversation was investigated by asking Support Staff how comfortable they are to have conversations around the menstrual cycle with athletes and their perception of athletes comfort to ask personal health-related topics. These questions determined the environment in which Support Staff work in with female athletes and the influence this has on having conversations with the female athlete about the menstrual cycle. Based on

previous research as outline above, a lack of knowledge was assumed amongst Support Staff about the menstrual cycle. The quantity and quality of conversations was investigated by determining the responsibilities of each Support Staff within their role surrounding the menstrual cycle of a female athlete. Responsibility was explored within this questionnaire by including questions that assessed the participants perception of ownership of initiating discussions with athletes, education resources and referral to specialist practitioners.

Following ethical approval, the 36-item questionnaire was developed by the research group. The survey was collected and managed using REDCap electronic data capture tools hosted at Griffith University. REDCap Research Electronic Data Capture (REDCap) is a secure, web-based software platform designed to support data capture for research studies (Clarke et al., 2021; Harris et al., 2019; Harris et al., 2009).

4.4 Data Analysis

All survey data was analysed using Excel and SPSS 27.0. Survey data was initially screened for missing data and outliers. Each section of the survey was then analysed sequentially. Descriptive statistics (frequencies and percentages) were used to describe participant characteristics and participant responses to questions pertaining to the barriers to conversation between Support Staff and elite female athletes. Data was presented as n (%).

5 Results

5.1 Participant Characteristics

A total of 27 Performance Staff completed the questionnaire. One participant did not complete the questionnaire in full and their responses were excluded from the results. The participant demographic data are presented in **Table 1**. All participants were recruited from professional team sports. Participants included in this study stated their primary role within their squad or team. There were four (15%) participants that held a Sport Coach role, six (23%) participants in a Performance Staff role and 16 (61%) participants in a Health Staff role. These results are displayed in **Table 2**. Two participants held both the Strength and Conditioning Coach and Sport Scientist role.

Table 2: Primary role within the squad or team

Variable	n	Percentage (%)
Sport Coach		
Head Coach	4	15
Performance Staff		
Strength & Conditioning	3	12
Sport Scientist	1	4
High Performance Manager	2	8
Health Staff		
Physiotherapist	6	23
Dietitian	6	23
Medical Doctor	4	15

5.3 Opportunity

The majority of the participants reported having 1-5h/wk (23%), 5-9h/wk (23%) and 9-13h/wk (15.4%) contact with each athlete. **Table 3** outlines the variation across participants regarding the contact hours with each athlete.

Table 3. Participant Contact Hours with each Athlete

Contact Hours	n (%)	Sport Coaches	Performance Staff	Health Staff
<1h/month	3 (12)	0	0	3 (12)
<1h/wk	2 (8)	0	0	2 (8)
1-5h/wk	6 (23)	0	2 (8)	4 (15)
5-9h/wk	6 (23)	1 (4)	1 (4)	4 (15)
9-13h/wk	4 (15)	1 (4)	2 (8)	1 (4)
13-17h/wk	2 (8)	2 (8)	0	0
>17h/wk	3 (12)	0	1 (4)	2 (8)

When participants were asked to consider their meetings, conversations and communication with athletes, only one participant (Health Staff, Medical Doctor), reported there was rarely any opportunity to ask athletes questions. The majority (89%) of participants reported “Often” or “Always” when considering their opportunity to ask each athlete questions. The results to Question 15b explored which Support Staff actioned Question 15a. There was a decrease of 8% of Support Staff that reported having the opportunity however did not ask athletes questions.

In response to Question 15c, the majority of participants reported “Often” (39%) or “Always” (34.6%) when asked whether they had the opportunity to raise topics other

than the ones athletes raise. Furthermore 4% of Support Staff were rarely able to raise topics other than the ones athletes raise. Less than a quarter of participants reporting "Always" (23%) and an increase in participants responding "Sometimes" (38.5%). These results can be found in **Table 4**.

Table 4. Participant responses to Question 15

Thinking about all the meetings, conversations, communication you have with the athletes…

Variable	Never	Rarely	Sometimes	Often	Always
Is there an opportunity for you to ask questions?	0	1 (4)	2 (8)	12 (46)	11 (42)
Do you ask the athletes questions?	0	1 (4)	2 (8)	14 (54)	9 (35)
Is there an opportunity for you to talk about topics other than the ones the athletes raise?	0	1 (4)	6 (23)	10 (39)	9 (35)
Do you raise topics other than the ones the athletes raise?	0	1 (4)	10 (39)	9 (35)	6 (23)

5.4 Environment

Reponses from Question 17a are presented in **Table 5**. The majority of participants reported feeling "Completely" comfortable raising topics about their personal health-related issues including gut health (65%) and period pain/menstrual cramping (62%). 85% of participants answered either "Mostly" (50%) or "Completely" (35%) when

asked whether athletes feel comfortable telling a staff member if they felt unwell. These results were similar when participants were asked whether they would ask athletes how they're feeling. Only one Health Staff reported that athletes do not feel comfortable expressing when they're feeling unwell. 80% of Coaching Staff and Performance Staff answered "Mostly" (40%) or "Completely" (40%) when asked if their athletes express their ideas about how they train. This was reflected with 80% of participants reporting "Sometimes" (60%) or Often (20%) when asked whether athletes contribute to decisions made about drills or exercises, intensity and volume.

Table 5: Participant Responses to Question 17a

Do you think athletes would feel comfortable telling you they are feeling unwell?

Variable	n	Percentage (%)
Not at all	1	4
Somewhat	2	8
Neutral	1	4
Mostly	13	50
Completely	9	35

To further investigate the environment within these sporting teams, Questions 19 were developed to determine the Support Staff perceptions of the negative or positive effect of the menstrual cycle on general health, wellbeing and performance. Responses to Question 19 are displayed in **Table 6.** A majority of both the male (91%) and female (93%) participants agreed that the menstrual cycle/period has a negative effect on the general health and wellbeing, and athletic performance, of female athletes. Slightly less female participants (87%) and a minority of male (18%) participants reported that the menstrual cycle/period has a positive effect on the general health and wellbeing. This

was similar to Support Staff perceptions of the effect of the menstrual cycle on an athlete's athletic performance. These results are similar to those reported in Question 22 (see. **Fig 4**). There was a larger majority (60%) of women that reported "Extremely" to Question 22 compared to 27% of male participants.

Table 6. Question 19
Do you feel like the athlete's menstrual cycle/period can have…

Variable	Female Support Staff (%)	Male Support Staff (%)
A negative effect on their general health and wellbeing?		
Yes	14 (93)	10 (91)
No	0	0
Unsure	1 (7)	1 (9)
A positive effect on their general health and wellbeing?		
Yes	13 (87)	2 (18)
No	0	2 (18)
Unsure	2 (13)	7 (64)
A negative effect on their athletic performance?		
Yes	13 (87)	8 (73)
No	0	2 (18)
Unsure	2 (13)	1 (9)
A positive effect on their athletic performance?		
Yes	10 (67)	2 (18)
No	1 (7)	3 (27)
Unsure	4 (27)	6 (55)

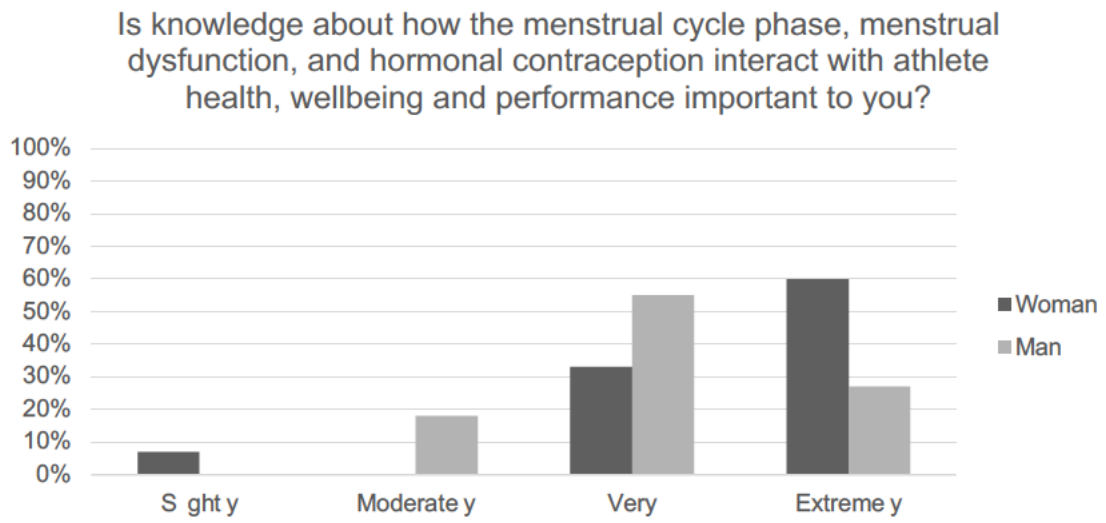


Figure 4. Participant Attitudes towards Knowledge surrounding the Menstrual Cycle, Menstrual Dysfunction and Hormonal Contraception

5.2 Responsibility

There was a clear consensus among participants when describing their responsibilities with female athletes. As illustrated in **Figure 5**, all participants believed they were responsible for directing athletes to educational resources regarding sleep quality, mood, menstrual cycle, diet, and gut health. 80% of participants believed it was their responsibility to have discussions regarding sleep quality, mood, menstrual cycle, diet and gut health with female athletes. However, a minority of participants did not believe it was their responsibility to have discussions with female athletes regarding these topics. The majority (73%) of participants also believed it was their responsibility to refer athletes to a specialist practitioner (e.g., orthopaedic surgeon, endocrinologist), whereas less than a quarter (23%) of participants did not recognise referral to specialist practitioners as their responsibility and 4% of participants were unsure. Similarly, when asked whether it was their responsibility to refer athletes to a specialist if female athletes were suspected of menstrual cycle disturbance despite no affect to their performance, a larger majority (80%) of participants answered 'yes' with only 4% of

participants reporting that it wasn't their responsibility with a remaining 15% unsure whose responsibility this was.

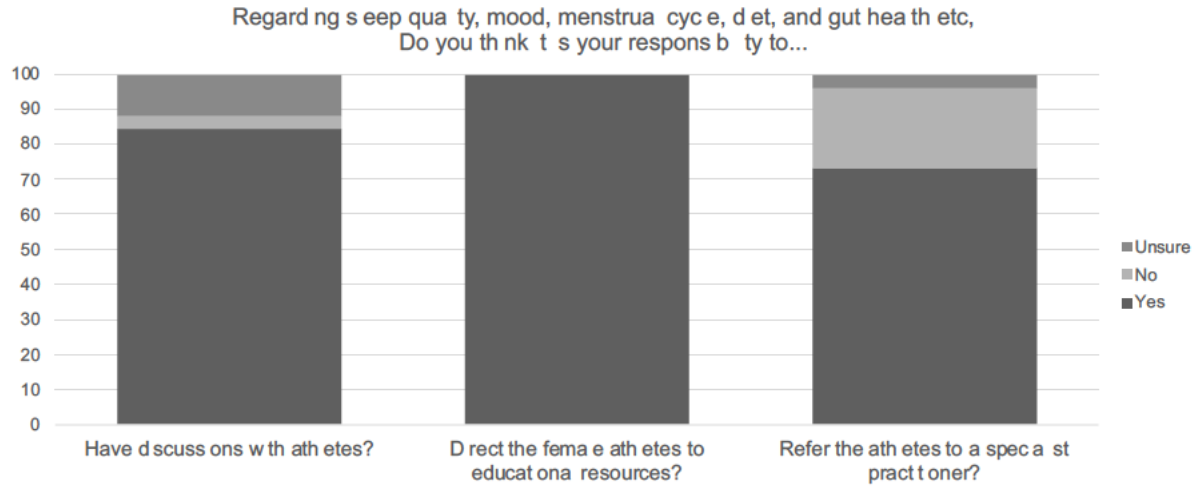


Figure 5. The Distribution of responses to Question 18 relating to Responsibility

6 Discussion

6.1 Primary Findings

The present study aimed to identify the barriers to effective conversation surrounding the menstrual cycle between female athletes and Support Staff. This was explored by determining the quantity and quality of conversations that occur. Furthermore, three contextual themes (responsibility, environment, opportunity) were used to determine the quantity and quality of conversations that occur and to gain an understanding of the barriers to effective conversation surrounding the menstrual cycle. Knowledge amongst Support Staff about the menstrual cycle was not within the scope of this investigation however it was assumed within this study that a lack of knowledge about the menstrual cycle is present amongst Support Staff and contributes as a barrier to effective conversations between Support Staff and female athletes.

A questionnaire was administered using the online platform REDCap, to investigate the perceptions of coaches and how these contextual themes influence the research question. To the authors knowledge, this is the first study to detail the perceptions of coaches across these three contextual themes to describe the barriers and facilitators to effective conversation within professional female sport in Australia. The findings of this study suggest that Support Staff lack a clear understanding of their responsibilities when working with female athletes and as a result effective conversation surrounding the menstrual cycle between Support Staff and athletes is less likely to occur.

6.2 Opportunity

Each of the sporting organisations included in this study, offered their female athletes a maximum part-time contract; nonetheless, a majority of Support Staff reported having weekly interactions with athletes (Cleary, 2021; Houston, 2020; Keoghan, 2020; Lawson, 2019). Thus, opportunity does not appear to be a barrier to effective conversation between Support Staff and female athletes. The majority of Support Staff have >5 hours per week with their athletes. As expected, a number of Health Staff (Medical Doctor, Physiotherapist and Dietitian) were less likely to interact with athletes on a daily basis due to the nature of their profession. However, it was interesting to note that two out of three staff who reported to have >17hours per week contact with athletes were Physiotherapists from AFLW and WBBL. The only other staff member that had more than 17 hours per week contact with athletes was an S&C Coach from Netball. Participants reported having the opportunity to ask questions of the athletes and to ask questions on topics other than what the athletes themselves raise. Despite these results, the number of participants that choose to follow up with asking athletes questions appears to decrease. These results highlight a barrier to effective conversation. Despite

Support Staff having the opportunity to ask athletes issues that may be uncomfortable for them to raise (e.g. the menstrual cycle), these conversations about the menstrual cycle may not be occurring between Support Staff and female athletes.

6.3 Environment

It is vital to create a conducive environment in which female athletes are more likely to share personal health-related issues with Support Staff as this assists with shared education to promote prevention strategies, early identification of at risk athletes and successful management of athletes that develop menstrual disturbances (Slade et al., 2009). As discussed in the literature, it is necessary for Support Staff to initiate conversations with athletes to create a conducive environment to develop an open dialogue with female athletes (Findlay et al., 2020; Slade et al., 2009). Question 19 and 22 were developed to explore the influence of knowledge. These questions also provide insightful results when exploring the role environment has on perceived level of importance surrounding knowledge of the menstrual cycle amongst Support Staff and how this acts as a barrier to effective conversation. Within the current results, Question 17b provides an insight into whether Support Staff initiate conversations to allow for an open-dialogue with athletes (Findlay et al., 2020). Three of the 26 participants reported they do not attend most training sessions; these participants were all Health Staff, and is expected of Support Staff that typically have external roles or practices. The majority of remaining Support Staff reported ‘Often’ regarding whether they ask athletes questions. Unfortunately, within the scope of this questionnaire, we are unable to determine the factors stopping Support Staff from ‘Always’ being able to check in with athletes.

The results from the questionnaire found that more than half of the Support Staff were comfortable in asking personal health-related questions. Perhaps unsurprisingly due to the nature of their roles, 86% of Support Staff were comfortable with raising topics surrounding muscle injury or soreness. There is a 24% decrease among Support Staff that feel comfortable raising the topic of period pain or menstrual cramping. There was 62% of Support Staff that were 'Completely' comfortable raising this topic of period pain or menstrual cramping. One female participant that reported they would not feel comfortable raising this topic with athletes. A survey conducted by Pantano (2017) discovered similar results in which male coaches were more likely to ask athletes about their menstrual cycle. Previous findings (Mukherjee et al., 2016; Pantano, 2006; Pantano, 2017; Trattner Sherman et al., 2005) and the results from this study provide contrasting results, which further highlight the discrepancies between the attitudes and behaviours between male and female Sport Coaches, Performance Staff and Health Staff. This raises an interesting point, as although more than half of the Support Staff reported feeling completely comfortable raising the menstrual cycle among conversationa with female athletes there is 38% that for unknown reasons aren't completely comfortable with doing this. Furthermore, it brings the responses to Question 20, "Have you ever had a discussion about menstrual cycle with athletes" into question. Only 8% of Support Staff reported not having conversations about the menstrual cycle with athletes however 38% of Support Staff don't feel comfortable raising this topic. One respondent who anserwed no to Question 20 went on to explain that the reason they had never had a conversation with athletes was due to the female athletes not raising the menstrual cycle during conversations. Thus, further knowledge to understand the pshychology of the coach-athlete relationship and the benefits and

importance of Support Staff initating personal health-related issues such as the menstrual cycle.

The landscape of sport is shifting, with the upcoming Women's State of Origin in which both teams for the first time will be coached by women (NRL page), and yet there remains a large portion of Support Staff that are male (Armour et al., 2020). It is promising to see that these results suggest that gender alone does not act as a barrier to effective conversation between female athletes and Support Staff surrounding the menstrual cycle. The results from this questionnaire highlight Support Staff are essential in creating an environment that allows female athletes to feel comfortable discussing their menstrual cycle to prioritise their health, wellbeing and subsequent athletic performance.

6.4 Responsibility

The majority of Support Staff reported it was their responsibility to have discussions with athletes, direct athletes to educational resources and refer athletes to specialist practitioners. However there remains 15% of participants, two Sports Coaches and two Health Staff (Physiotherapists) who were unsure, or who reported that having discussions with female athletes surrounding personal health-related issues is not their responsibility. This is problematic as Support Staff, specifically Sports Coaches, have been identified as being in an important role in the prevention of the Female Athlete Triad (Pantano, 2006; Pantano, 2017). This suggests that 15% of Support Staff are unlikely to have conversations with their female athletes on these topics and consequently knowledge transfer and education surrounding these important health-related issues is not occurring (Cheney, 2004; d'Arripe-Longueville et al., 2001). The

literature (Kroshus et al., 2014; Pantano, 2017) has identified that Sport Coaches have the responsibility to refer athletes to an appropriate health care professional when needed within the High School setting. It is likely that this responsibility is largely on Sport Coaches within the High School setting due to their contact with athletes and the likelihood of less Support Staff involved at this level (Pantano, 2006; Trattner Sherman et al., 2005). Within professional sport, athletes have contact with various Support Staff that could fill this role (Pantano, 2017). An interesting finding of this study is when comparing the survey responses to Question 18c and Question 21. The only difference in the wording of the question is that in Question 18 participants are asked whether it is their responsibility to refer female athletes to a specialist practitioner when considering sleep quality, mood, menstrual cycle, diet, and gut health. In comparison to Question 21, participants are asked whether they would refer an athlete to a specialist practitioner if an athlete was suspected of experiencing menstrual cycle disturbances even if it is not affecting their performance. The language used for Question 21 may explain the increased response rate of 'Unsure' amongst participants, as knowledge (or lack thereof) surrounding the menstrual cycle may influence whether Support Staff value the importance of menstrual disturbances when it's not affecting performance (Trattner Sherman et al., 2005).

Based on the integrated performance model, the treatment and management of any menstrual discrepancies that may arise is the responsibility of Health Staff, it remains the responsibility of Sport Coaches and Performance Staff to have sufficient knowledge of the menstrual cycle and female athletes to assist in the identification of at risk female athletes (Dijkstra et al., 2014; Mooney et al., 2017). The results from this study are concerning as although largely positive, there remains Support Staff hesitant or

unknowing surrounding their responsibility and the menstrual cycle of female athletes. As a result, Support Staff are unaware of their responsibilities and subsequently unlikely to have conversations surrounding the menstrual cycle or to refer to specialist practitioners when needed. It is established that is is essential for Support Staff and female athletes to have conversations regarding the menstrual cycle due to its impact on the female athletes health, wellbeing and subsequent performance. Furthermore, this has highlighted the importance for Support Staff to have conversations about their female athletes within the Support Staff team to effectively implement a integraged performance model. Consequently, it is to the athletes benefit for conversations to also take place within the Support Staff team to assist in early identification of menstrual disturbances, referral of athletes to specialist practitioners and ensure each member of the Support Staff team clearly understands their responsibilities surrounding this topic.

6.5 Knowledge

The main purpose of this study was not to investigate the current knowledge of Support Staff surrounding the menstrual cycle as a lack of knowledge surrounding the menstrual cycle has been established (Mukherjee et al., 2016). While knowledge wasn't assessed in detail, the conflicting responses to Question 19 may suggest a gap in knowledge among Support Staff surrounding this topic (**Table 6**). Previous research has identified Support Staff with greater knowledge surrounding the menstrual cycle are more likely to implement a multidisciplinary approach (Mukherjee et al., 2016; Pantano, 2006). Although this survey did not directly ask participants if they would implement a multi-disciplinary approach, Question 18c and Question 21 investigates the coaches perception of responsibility regarding the menstrual cycle and referral to specialist practitioners. These results were interesting as both questions were very similar

however there was a change in responses from Question 18c to Question 21. An increase of 8% of participants answered “Yes” they would refer athletes to a specialist practitioner, however it is concerning that an increase of 12% of participants were unsure if they would refer an athlete to a specialist practitioner if the athlete was experiencing menstrual cycle disturbances. Future research needs to investigate the benefit of explicitly outlining the roles and responsibilities about the menstrual cycle of female athletes among Support Staff. Although it is not possible to draw conclusions regarding Support Staff knowledge of the menstrual cycle from these results, it remains that this hesitancy to have conversations with athletes may reflect the lack of knowledge pertaining to 15% of the sample group (Curry et al., 2015). These results are consistent with previous findings, that Support Staff lack knowledge surrounding the menstrual cycle and continue to emphasise the need for continuing education to ensure conversations surrounding the menstrual cycle, menstrual dysfunction and hormonal contraception are occurring (Kroshus et al., 2014; Mukherjee et al., 2016; Pantano, 2017).

6.6 Limitations

Similar to previous reported limitations using survey or self-report research, it is not possible to confirm whether Support Staff responded honestly (Trattner Sherman et al., 2005). Furthermore, without a true response rate it is difficult to determine exactly how accurately 26 participants represent Support Staff within professional female sport. Nevertheless, these participants recruited for this present study are a representation across multiple disciplines and four of some of the most professionalised sporting female codes in Australia. There is an overrepresentation of females recruited in this study. This is similar to previous studies that included a slight overrepresentation of

females (54.9% female in (Pantano, 2006), 61% female in Kroshus et al. (2014), 70% female in Brown et al. (2002)) when surveying coaches on topics that involved the Female Athlete Triad. It is interesting to note that there are multiple studies implementing a questionnaire tool that have had a larger response rate from female participants. This is in line with findings that suggest that female coaches place a higher importance than male coaches on the occurrence of menstrual irregularities with athletes they work with (Kroshus et al., 2014). In addition, there was a large majority (61%) of Health Staff among the sample group. This again suggests that Health Staff value this area of exploration more greatly in comparison to other professions working within female sport. Furthermore, due to this larger representation of Health Staff the results may be more favourable as these professions are more likely to treat and manage female athletes with symptoms of the Female Athlete Triad more regularly. Furthermore, between sports, the most respondents were received from Cricket, in the Women's Big Bash League.

6.7 Future research

This research has again put light on the need for the delivery of education surrounding the menstrual cycle for both Support Staff and athletes to improve their knowledge of this topic. The scope of this study focused on team sports, thus initial research across individual sport investigating Support Staff knowledge, attitudes and behaviours and how they are influenced by the contextual factors subsequently impacting the quantity and quality of conversations between Support Staff and female athletes is warranted. Future research would greatly benefit from qualitative research to determine why these conversations take place and develop recommendations that can assist Support Staff and the sporting team or organisation to implement an integrated performance model in

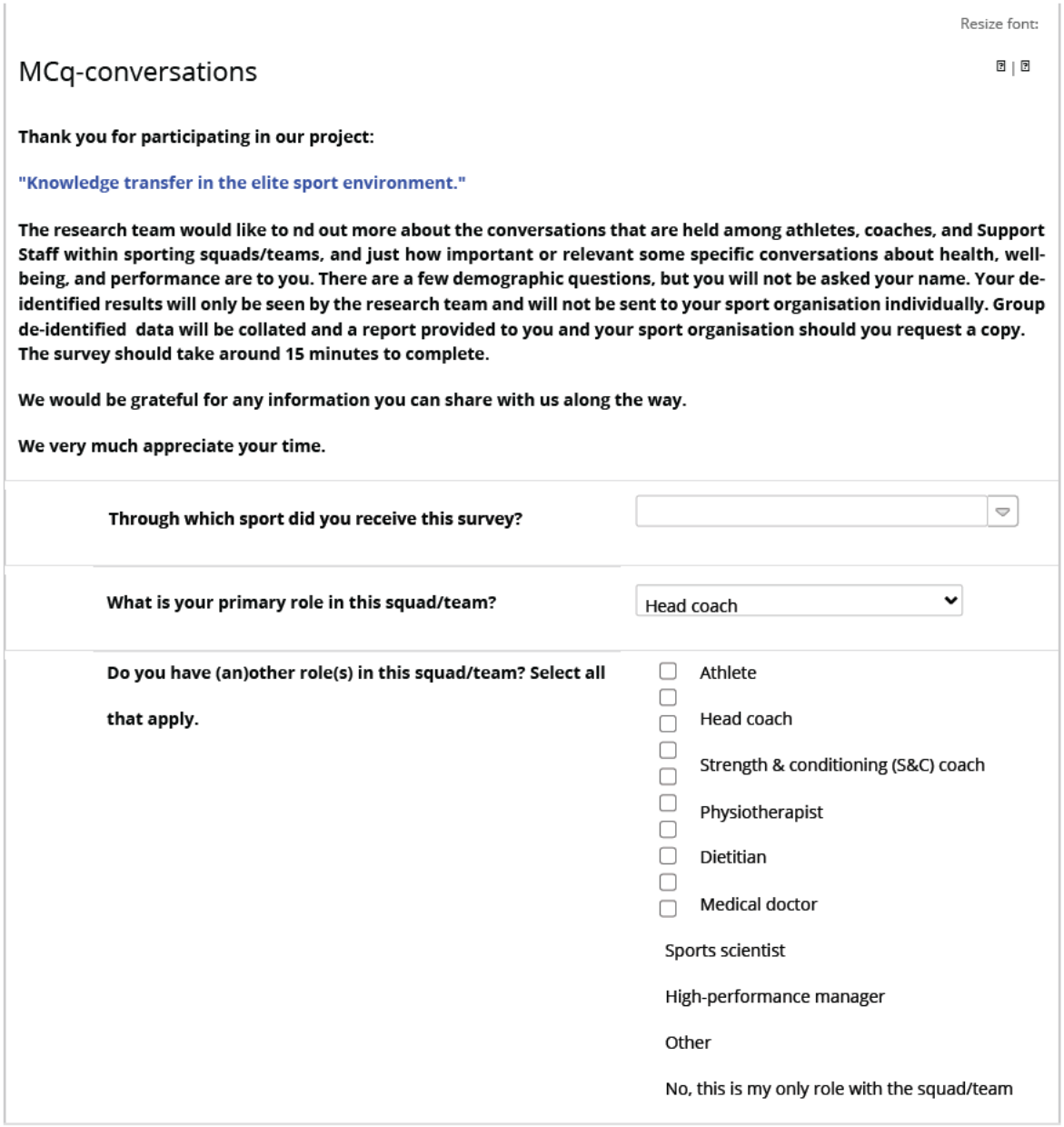
which female athletes health and wellbeing is holistically managed to subsequently promote their athletic performance.

6.8 Conclusions

It is important for Support Staff to recognise the value of effective conversation surrounding the menstrual cycle between Support Staff and female athletes. The menstrual cycle is a vital biological rhythm for health females, and the presence of menstrual dysfunction and hormonal contraception among the elite female athlete cohort needs to be monitored and managed to ensure an athlete's health and wellbeing are always prioritised and as a result the athletes athletic performance is not jeopardised. The results highlight the need for sporting teams to implement an integrated performance model to ensure all Support Staff have a clear understanding of their roles and responsibilities when have a working with female athletes. Furthermore, continued education of the menstrual cycle, menstrual dysfunction and hormonal contraception and how to implement effective conversation with female athletes is vital when working in sport and specifically female sport.

Appendix A

Questionnaire distributed to Sport Coaches and Performance Staff.



Resize font:

MCq-conversations

Thank you for participating in our project:

"Knowledge transfer in the elite sport environment."

The research team would like to nd out more about the conversations that are held among athletes, coaches, and Support Staff within sporting squads/teams, and just how important or relevant some specific conversations about health, well-being, and performance are to you. There are a few demographic questions, but you will not be asked your name. Your de-identified results will only be seen by the research team and will not be sent to your sport organisation individually. Group de-identified data will be collated and a report provided to you and your sport organisation should you request a copy. The survey should take around 15 minutes to complete.

We would be grateful for any information you can share with us along the way.

We very much appreciate your time.

Through which sport did you receive this survey?

What is your primary role in this squad/team? Head coach

Do you have (an)other role(s) in this squad/team? Select all that apply.

- Athlete
- Head coach
- Strength & conditioning (S&C) coach
- Physiotherapist
- Dietitian
- Medical doctor
- Sports scientist
- High-performance manager
- Other
- No, this is my only role with the squad/team

Did you begin in another role in this squad/team? Select all that apply.	☐ Athlete ☐ Head coach ☐ Strength & conditioning (S&C) coach ☐ Physiotherapist ☐ Dietitian ☐ Medical doctor Sports scientist High-performance manager Other No, I began in this role with the squad/team
Please answer all further questions from the perspective of your current/combined role	
Date of birth	Today D-M-Y
Gender	
Nationality	
Ethnicity. Select all that apply.	☐ Hispanic, Latino, or Spanish Origin of any race ☐ American Indian or Alaskan Native ☐ Asian ☐ Maori, Native Hawaiian, or Other Pacific Islander ☐ African (incl. Sub-Saharan and North-African) Caucasian Aboriginal/Torres Strait Islander Ethnicity unknown Mixed ethnicity Other I do not identify

State of residence	

Highest completed level of education

Have you completed a course/workshop (outside of secondary education) that included female physiology?

Yes No Unsure reset

What is the gender of the athletes in the squad/team?

How long have you worked with athletes at a state-representative or professional level?

< 1 yr 1-5 yr 5-10 yr ◯10-15 yr ◯>15 yr

reset

How many contact hours do you have with each athlete in this squad (on average)?

◯<1 h/month ◯<1 h/wk ◯1-5 h/wk ◯5-9 h/wk ◯9-13 h/wk ◯13-17 h/wk ◯>17 h/wk

reset

Thinking about all the meetings/conversations/communication you have with the athletes...

Is there an opportunity for you to ask questions?

Never Rarely ◯Sometimes Often Always

reset

Do you ask the athletes questions?

Never Rarely ◯Sometimes Often Always

reset

Is there an opportunity for you to talk about topics other than the ones the athletes raise?

Never Rarely ◯Sometimes Often Always

reset

Do you raise topics other than the ones the athletes raise?

Never Rarely ◯Sometimes Often Always

reset

Do you feel comfortable asking the athletes questions about their personal health-related issues such as...

Gut health?

◯Not at all ◯Somewhat ◯Neutral ◯Mostly ◯Completely

reset

Period pain/menstrual cramping?

◯Not at all ◯Somewhat ◯Neutral ◯Mostly ◯Completely

reset

Muscle injury/soreness?

○Not at all ○Somewhat ○Neutral ○Mostly ○Completely

reset

During the sessions you have with the athletes...

Do you think the athletes would feel comfortable telling you they are feeling unwell?

○Not at all ○Somewhat ○Neutral ○Mostly ○Absolutely

reset

Do you ask how the athletes are feeling?

Never Rarely ○Sometimes Often Always ○I don't attend most training sessions

reset

Can the athletes express their ideas about how they train?

○Not at all ○Somewhat ○Neutral ○Mostly ○Absolutely

reset

Do the athletes contribute to the decisions made about drills/exercises, intensity, volume, etc?

Never Rarely ○Sometimes Often Always

reset

Regarding sleep quality, mood, menstrual cycle, diet, and gut health etc., *Do you think it is your responsibility to...*

Have discussions with the athletes?

Yes No Unsure reset

Direct the athletes to education resources?

Yes No Unsure reset

Refer the athletes to a specialist practitioner (e.g., orthopaedic surgeon, endocrinologist)?

Yes No Unsure reset

Do you feel like the athlete's menstrual cycle/period can have...

A negative effect on their general health and wellbeing?

Yes No Unsure reset

A positive effect on their general health and wellbeing?

Yes No Unsure reset

A negative effect on their athletic performance?

Yes No Unsure reset

A positive effect on their athletic performance?

Yes No Unsure reset

Have you ever had a discussion about menstrual cycle with the athletes?

Yes No Unsure reset

Would you refer the athlete to a specialist if you suspected that they were experiencing menstrual-cycle disturbances, even if it was not a effecting their performance?

Yes No Unsure reset

Is knowledge about how the menstrual cycle phase, menstrual dysfunction, and hormonal contraception interact with athlete health, wellbeing, and performance important to you?

◯Not at all ◯Slightly ◯Moderately Very Extremely

reset

Do you have any comments about what might help or hinder conversations specific to the menstrual cycle among you, the athletes, and the support sta ?

Expand

The research team would like to nd out more about the 'conversations' that are held among athletes, coaches, and support sta within sporting squads/teams, and just how important or relevant some specific conversations about health, wellbeing, and performance are to you.
If you are interested in continuing your involvement with this important research please add your email below to register your interest in participating in a discussion/interview via zoom.
These discussions/interviews will be conducted in conjunction with the Australian Institute of Sport's Female Performance & Health Initiative. Only the Chief Investigator, A/Prof Clare Minahan, Gri th University, will receive your email address.

Expand

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Appendix B

Questionnaire distributed to Health Staff.

Resize font:

MCq-conversations

Thank you for participating in our project:

"Knowledge transfer in the elite sport environment."

The research team would like to nd out more about the conversations that are held among athletes, coaches, and support sta within sporting squads/teams, and just how important or relevant some specific conversations about health, well-being, and performance are to you. There are a few demographic questions, but you will not be asked your name. Your de-identified results will only be seen by the research team and will not be sent to your sport organisation individually. Group de-identified data will be collated and a report provided to you and your sport organisation should you request a copy. The survey should take around 15 minutes to complete.

We would be grateful for any information you can share with us along the way.

We very much appreciate your time.

Through which sport did you receive this survey?

What is your primary role in this squad/team? Physiotherapist

Do you have (an)other role(s) in this squad/team? Select all that apply.

- ☐ Athlete
- ☐ Head coach
- ☐ Strength & conditioning (S&C) coach
- ☐ Physiotherapist
- ☐ Dietitian
- ☐ Medical doctor
- Sports scientist
- High-performance manager
- Other
- No, this is my only role with the squad/team

Did you begin in another role in this squad/team? Select all that apply.

- ☐ Athlete
- ☐ Head coach
- ☐ Strength & conditioning (S&C) coach
- ☐ Physiotherapist
- ☐ Dietitian
- ☐ Medical doctor
- Sports scientist
- High-performance manager

Other

No, I began in this role with the squad/team

Please answer all further questions from the perspective of your current/combined role

Date of birth Today D-M-Y

Gender

Nationality

Ethnicity. Select all that apply.

- Hispanic, Latino, or Spanish Origin of any race
- American Indian or Alaskan Native
- Asian
- Maori, Native Hawaiian, or Other Pacific Islander
- African (incl. Sub-Saharan and North-African)
- Caucasian
- Aboriginal/Torres Strait Islander
- Ethnicity unknown
- Mixed ethnicity
- Other
- I do not identify

State of residence

Highest completed level of education

Have you completed a course/workshop (outside of secondary education) that included female physiology?

Yes No Unsure reset

What is the gender of the athletes in the squad/team?

How long have you worked with athletes at a state-representative or professional level?

< 1 yr 1-5 yr 5-10 yr ◯10-15 yr ◯>15 yr

reset

How many contact hours do you have with each athlete in this squad (on average)?

◯<1 h/month ◯<1 h/wk ◯1-5 h/wk ◯5-9 h/wk ◯9-13 h/wk ◯13-17 h/wk ◯>17 h/wk

reset

Thinking about all the meetings/conversations/communication you have with the athletes...

Is there an opportunity for you to ask questions?

Never Rarely ◯Sometimes Often Always

reset

Do you ask the athletes questions?

Never Rarely ◯Sometimes Often Always

reset

Is there an opportunity for you to talk about topics other than the ones the athletes raise?

Never Rarely ◯Sometimes Often Always

reset

Do you raise topics other than the ones the athletes raise?

Never Rarely ◯Sometimes Often Always

reset

Do you feel comfortable asking the athletes questions about their personal health-related issues such as...

Gut health?

◯Not at all ◯Somewhat ◯Neutral ◯Mostly ◯Completely

reset

Period pain/menstrual cramping?

◯Not at all ◯Somewhat ◯Neutral ◯Mostly ◯Completely

reset

Muscle injury/soreness?

◯Not at all ◯Somewhat ◯Neutral ◯Mostly ◯Completely

reset

During the sessions you have with the athletes...

Do you think the athletes would feel comfortable telling you they are feeling unwell?

◯Not at all ◯Somewhat ◯Neutral ◯Mostly ◯Absolutely

reset

Do you ask how the athletes are feeling?

Never Rarely ◯Sometimes Often Always ◯I don't attend most training sessions

reset

Can the athletes express their ideas about their treatment?

◯Not at all ◯Somewhat ◯Neutral ◯Mostly ◯Absolutely

reset

Do the athletes contribute to the decisions made about their treatment?

Never Rarely ◯Sometimes Often Always

reset

Regarding sleep quality, mood, menstrual cycle, diet, and gut health etc., *Do you think it is your responsibility to...*

Have discussions with the athletes?

Yes No Unsure reset

Direct the athletes to education resources?

Yes No Unsure reset

Refer the athletes to a specialist practitioner (e.g., orthopaedic surgeon, endocrinologist)?

Yes No Unsure reset

Do you feel like the athlete's menstrual cycle/period can have...

A negative effect on their general health and wellbeing?

Yes No Unsure reset

A positive effect on their general health and wellbeing?

Yes No Unsure reset

A negative effect on their athletic performance?

Yes No Unsure reset

A positive effect on their athletic performance?

Yes No Unsure reset

Have you ever had a discussion about menstrual cycle with the athletes?

Yes No Unsure reset

Would you refer the athlete to a specialist if you suspected that they were experiencing menstrual-cycle disturbances, even if it was not a effecting their performance?

Yes No Unsure reset

Is knowledge about how the menstrual cycle phase, menstrual dysfunction, and hormonal contraception interact with athlete health, wellbeing, and performance important to you?

◯Not at all ◯Slightly ◯Moderately Very Extremely

reset

Do you have any comments about what might help or hinder conversations specific to the menstrual cycle among you, the athletes, and the support sta ?

Expand

The research team would like to nd out more about the 'conversations' that are held among athletes, coaches, and support sta within sporting squads/teams, and just how important or relevant some specific conversations about health, wellbeing, and performance are to you.
If you are interested in continuing your involvement with this important research please add your email below to register your interest in participating in a discussion/interview via zoom.
These discussions/interviews will be conducted in conjunction with the Australian Institute of Sport's Female Performance & Health Initiative. Only the Chief Investigator, A/Prof Clare Minahan, Gri th University, will receive your email address.

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