

---

Citation:

Heyward, O and Elliott-Sale, KJ and Roe, G and Emmonds, S and Hornby, K and Stokes, KA and Jones, B (2022) Oral contraceptive use in Premiership and Championship women's rugby union: perceived symptomology, management strategies, and performance and wellness effects. *Science and Medicine in Football*. pp. 1-8. ISSN 2473-3938 DOI: <https://doi.org/10.1080/24733938.2022.2156588>

Link to Leeds Beckett Repository record:

<https://eprints.leedsbeckett.ac.uk/id/eprint/9261/>

Document Version:

Article (Published Version)

---

Creative Commons: Attribution-Noncommercial-No Derivative Works 4.0

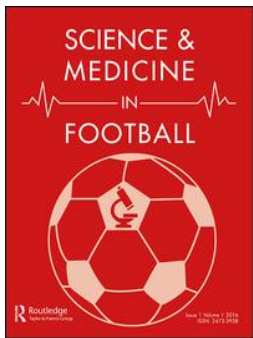
© 2022 The Author(s).

The aim of the Leeds Beckett Repository is to provide open access to our research, as required by funder policies and permitted by publishers and copyright law.

The Leeds Beckett repository holds a wide range of publications, each of which has been checked for copyright and the relevant embargo period has been applied by the Research Services team.

We operate on a standard take-down policy. If you are the author or publisher of an output and you would like it removed from the repository, please [contact us](#) and we will investigate on a case-by-case basis.

Each thesis in the repository has been cleared where necessary by the author for third party copyright. If you would like a thesis to be removed from the repository or believe there is an issue with copyright, please contact us on [openaccess@leedsbeckett.ac.uk](mailto:openaccess@leedsbeckett.ac.uk) and we will investigate on a case-by-case basis.



## Oral contraceptive use in Premiership and Championship women's rugby union: perceived symptomology, management strategies, and performance and wellness effects

Omar Heyward, Kirsty J Elliott-Sale, Gregory Roe, Stacey Emmonds, Katy Hornby, Keith A Stokes & Ben Jones

To cite this article: Omar Heyward, Kirsty J Elliott-Sale, Gregory Roe, Stacey Emmonds, Katy Hornby, Keith A Stokes & Ben Jones (2022): Oral contraceptive use in Premiership and Championship women's rugby union: perceived symptomology, management strategies, and performance and wellness effects, Science and Medicine in Football, DOI: [10.1080/24733938.2022.2156588](https://doi.org/10.1080/24733938.2022.2156588)

To link to this article: <https://doi.org/10.1080/24733938.2022.2156588>



© 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 22 Dec 2022.



[Submit your article to this journal](#)



Article views: 445



[View related articles](#)



[View Crossmark data](#)

# Oral contraceptive use in Premiership and Championship women's rugby union: perceived symptomology, management strategies, and performance and wellness effects

Omar Heyward<sup>a,b,c</sup>, Kirsty J Elliott-Sale<sup>d</sup>, Gregory Roe<sup>a,e</sup>, Stacey Emmonds<sup>a,f</sup>, Katy Hornby<sup>b</sup>, Keith A Stokes<sup>b,g</sup> and Ben Jones<sup>a,c,f,h,i</sup>

<sup>a</sup>Carnegie Applied Rugby Research (CARR) centre, Carnegie School of Sport, Leeds Beckett University, Leeds, UK; <sup>b</sup>Rugby Football Union, Twickenham, London, UK; <sup>c</sup>Leeds Rhinos Rugby League club, Leeds, UK; <sup>d</sup>Institute of Sport, Manchester Metropolitan University, Manchester, UK; <sup>e</sup>Bath Rugby, Bath, UK; <sup>f</sup>England Performance Unit, The Rugby Football League, Leeds, UK; <sup>g</sup>Department for Health, University of Bath, Bath, UK; <sup>h</sup>School of Science and Technology, University of New England, Armidale, New South Wales, Australia; <sup>i</sup>Division of Exercise Science and Sports Medicine, Department of Human Biology, Faculty of Health Sciences, the University of Cape Town and the Sports Science Institute of South Africa, Cape Town, South Africa

## ABSTRACT

The aim of this study was to investigate the prevalence of oral contraceptive use in domestic rugby union, to compare symptomology by contraceptive use, and to determine symptom management strategies. Additionally, to characterise the perceived influence of oral contraceptive use and non-use on wellness and performance. A total of 238 Premiership and Championship women's rugby union players completed an online questionnaire. The survey was comprised of questions relating to player characteristics, hormonal or non-hormonal contraceptive characteristics, perceived symptomology, symptom management strategies, and performance and wellness characteristics. The prevalence of oral contraceptive users was 26%. Non-hormonal contraceptive users reported greater perceived negative symptomology (i.e., back pain, nausea, sore breasts) and performance and wellness effects (i.e., fatigue, stress, mood, concentration, power, match-play) than oral contraceptive users. The most common symptom management strategies were medication (33%), nutritional interventions (20%), and training modulation (20%). Twelve percent of players had previously spoken to staff about their menstrual cycle (i.e., regular and irregular) or contraceptive use. The most common barriers to speaking to staff were 'male staff' (29%) and 'club culture' (24%). The importance of assisting non-hormonal contraceptive users in managing symptoms is evident. Emphasis on overcoming barriers to staff-player dialogue regarding menstrual/contraceptive cycle is required.

## ARTICLE HISTORY

Accepted 15 November 2022

## KEYWORDS

Female; sportswomen; menstrual cycle

## Introduction

Women's rugby union has seen rapid growth in financial investment and media exposure world-wide. Women's rugby union participation levels are at an all-time high of 2.7 million players internationally, with a 28% increase in registered players since 2017 (World Rugby 2022). With the growth in participation and investment in women's rugby union internationally, it is important for players, practitioners, and researchers to consider female specific factors on performances such as the menstrual and contraceptive cycles. A recent scoping review and Delphi study on future research priorities in women's rugby identified 'female health' as a high priority theme (Heyward et al. 2022). Furthermore, this study also identified 'relationship between menstrual cycle and performance/well-being' and 'menstrual-related symptom management' as high priority subthemes. Consideration of such factors may be vital to ensure that sports-women can achieve peak performance (Parker et al. 2022).

Recent meta-analyses investigating the effects of the menstrual cycle and oral contraceptives on exercise performance indicated that performance may be reduced by a trivial amount

during the early follicular phase of the menstrual cycle and that oral contraceptive users may experience slightly inferior performances when compared to naturally menstruating women (Elliott-Sale et al. 2020; McNulty et al. 2020). However, the results were highly variable between the studies, which were also predominantly classified as very low, low, and moderate quality. Contrary to these laboratory-based findings, 70–76% of mixed-sport athletes competing at international to sub-elite standards perceive their menstrual or contraceptive cycle to negatively affect their performance (Martin et al. 2018; Ekenros et al. 2022). It is therefore important to quantify the perceived effects of the menstrual cycle and oral contraceptive pill use on performance and wellness in women's rugby.

In Australian football codes (i.e., rugby league, rugby union, rugby sevens, Australian football) 32.7% of athletes use a hormonal contraceptive (Clarke, Bruinvels et al. 2021). In elite women's rugby, four out of 15 players (27%) reported currently using hormonal contraceptive (Findlay et al. 2020). The oral contraceptive pill is a frequently used hormonal contraceptive by female athletes (Martin et al. 2018; Bruinvels et al. 2021); however, the prevalence of hormonal contraceptive use

is not currently known in women's rugby union in England. It is therefore necessary to establish the prevalence of hormonal contraceptive use, and the most frequently used type of hormonal contraceptive, in women's rugby to ensure athletes are appropriately supported from a performance and health perspective.

A high percentage (81%) of exercising women report experiencing at least one negative menstrual cycle symptom often (Bruinvels et al., 2021). In rugby, negative perceived symptoms related to the menstrual cycle have been reported with high prevalence (84–93%) in both elite international players and in a mixed sample of powerlifters and rugby players (Findlay et al. 2020; Nolan et al. 2022). These studies have explored perceptions of the menstrual cycle in relation to performance in a small sample of elite international players ( $n = 15$ ) (Findlay et al. 2020) and investigated the prevalence of hormonal contraceptive use and reported side effects of menstrual/contraceptive cycle (e.g., cramp, headache, mood change) in rugby (Nolan et al. 2022). These studies provide useful descriptive data that can be used by applied practitioners to benchmark players' symptomology. Further development of the evidence base related to menstrual and contraceptive cycle characteristics and symptomology in rugby, as well as and their management and perceived impact on performance and wellness may be important information to assist practitioners support players. Additionally, as sport science and medical support are reduced at lower standards of play, lower standard players receive less education and assistance on management of self-reported symptomology and perceived effects on performance and wellness (Emmonds et al. 2019; Scantlebury et al. 2022). It is therefore important to understand differences in perceived symptomology and effects on performance and wellness, by age and playing standard. This will assist specific management of players to support peak performance throughout the menstrual/contraceptive cycle.

Therefore, the aims of this study were to describe the: i) prevalence of oral contraceptive use, and type and delivery method of oral contraceptive use in women's rugby union players; ii) perceived symptomology and differences by oral contraceptive and non-hormonal contraceptive users, age, and playing standard; iii) symptom management strategies; and iv) perceived negative performance and wellness effects experienced by oral contraceptive and non-hormonal contraceptive users, age and standard.

## Methods

### Questionnaire

A questionnaire, based on previous studies, (Martin et al. 2018; Armour et al. 2020; Findlay et al. 2020) was developed by the research team. The CHERRIES Checklist for Reporting Results of Internet E-Surveys was followed (Eysenbach 2004). The questionnaire was split into sections and comprised questions related to: i) player characteristics (e.g., age, body mass, typical playing position); ii) hormonal or non-hormonal contraceptive characteristics (e.g., contraceptive use and delivery method); iii) perceived symptomology (e.g., stomach cramps, negative mood state); iv) symptom management strategies; and v)

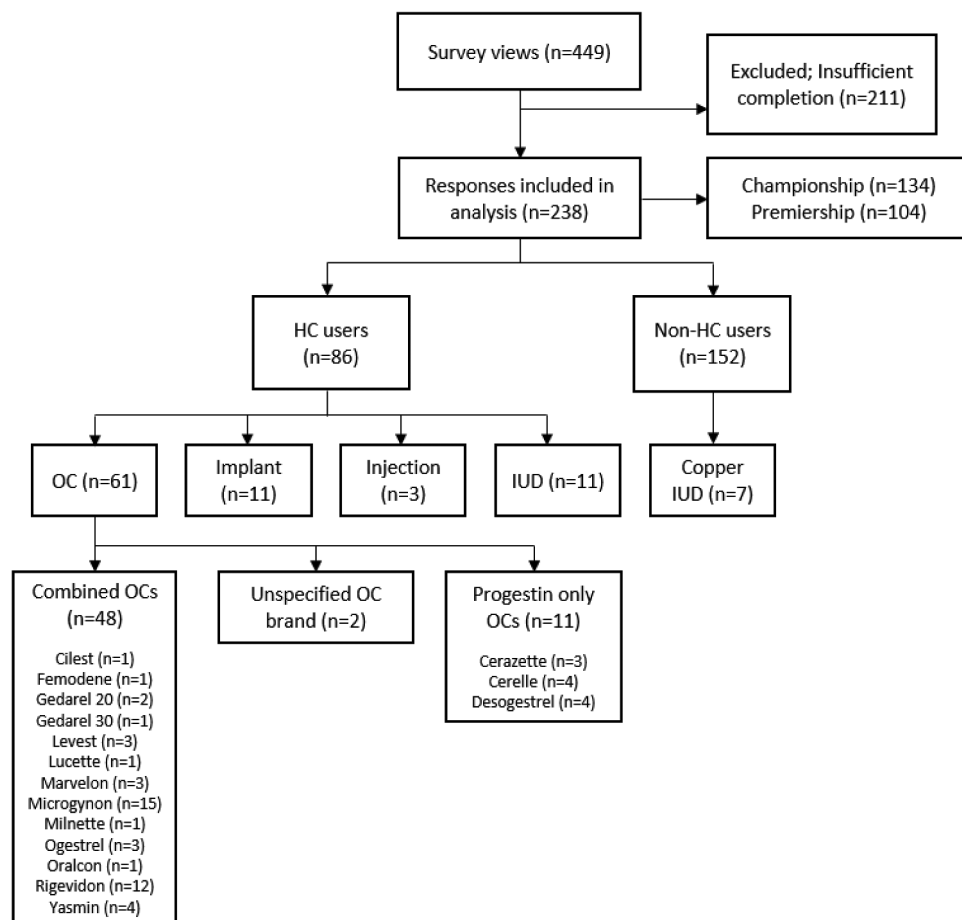
performance and wellness characteristics (e.g., sleep, soreness, speed). Participants were required to complete different sub-sections of the questionnaire depending on contraceptive use (e.g., non-hormonal contraceptive users completed questions on menstruation length and flow). As the aim of this study was to compare between oral contraceptive users and non-hormonal contraceptive users, non-oral hormonal contraceptive users (e.g., hormonal intrauterine device) were not asked questions on symptomology, management strategies and performance and wellness characteristics. Although the questionnaire included primarily closed questions, participants were asked open-ended questions to provide further information about symptom management strategies and barriers to speaking with club staff about their menstrual cycle (i.e., regular and irregular) or hormonal contraceptive use. Prior to the questionnaire being distributed, it was pilot tested in a sub-group of five women's rugby players to ensure clarity of questions. No questionnaire adaptations were required following this exercise. This study was approved by the institutions Research Ethics Committee prior to data collection (#72477).

### Participants

In January 2021, the voluntary, self-administered online questionnaire was distributed by the Rugby Football Union to all women's domestic rugby union players (Premiership and Championship) in their database ( $n = 616$ ). A follow-up email sent after four weeks to encourage non-responders to participate. The participants provided their written informed consent to take part in this study.

### Data analysis

The questionnaires were collected with Qualtrics (Qualtrics, Provo, USA) and analysed with Microsoft Office 365 ProPlus Excel (v1902; Microsoft, USA) and SPSS (v27.0). Qualitative data (i.e., open-ended question responses) were analysed using the inductive content analysis method (Elo and Kyngäs 2008; Crowe et al. 2015). This is a means of identifying and reporting common patterns (main categories) in the data. The process involves identifying the main categories by raw data familiarisation and categorisation. The analysis was performed by one author (OH) and reviewed by a second author (BJ). Any discrepancies were resolved via discussion between OH and BJ. All authors agreed on the final main categories. Quantitative data were presented as mean  $\pm$  standard deviation (SD), median (interquartile range) or frequencies and prevalence, as appropriate. To prevent multiple questionnaire entries from the same individual, IP address checks were performed. Where duplicate IP addresses were identified, questionnaire data were visually checked for unique responses. No duplicate responses were identified. Incomplete responses were not included in the analysis (Figure 1). Players were categorised based on contraceptive use (i.e., non-hormonal contraceptive vs. oral contraceptive). Players were also categorised by age (i.e., younger [ $\leq 24$  years] vs. older [ $> 24$  years]), based on a median split, and standard of play (Premiership vs. Championship). A Shapiro–Wilks test was used to assess normality. As data were not normally distributed, a Mann Whitney



**Figure 1.** The prevalence of type and delivery method of hormonal contraceptives used and the prevalence of non-hormonal contraceptive use. HC, hormonal contraceptive; IUD, intrauterine device; OC, oral contraceptive.

U-test was used to determine if differences existed between contraceptive use, age group, and standard of play. Statistical significance was set a priori at  $p < 0.05$ .

## Results

### Player, hormonal, and non-hormonal contraceptive characteristics

The completion rate (determined by ratio of users who finished the survey/users that received the survey) for this study was 38.6%, with 238 players from both the women's rugby Premiership ( $n = 104$ ) and Championship 1 ( $n = 134$ ) competitions in England participating in this study. Player characteristics by oral contraceptive and non-hormonal contraceptive users are presented in Table 1. The prevalence of hormonal contraceptive users in this cohort was 36%. Of the hormonal contraceptive users, 71% were oral contraceptive pill users. A significant difference was shown between oral contraceptive and non-hormonal contraceptive users for menstrual cycle monitoring (Participants were asked 'Do you track your menstrual cycle? [e.g., via mobile app]?') ( $U = 4040.0$ ,  $p < 0.001$ ,  $r = -0.37$ ). The non-hormonal contraceptive user cohort included 6 participants who were currently experiencing secondary amenorrhea and 11 participants who were non-eumenorrheic (i.e., menstrual cycle length  $< 21$  days or  $> 35$  days). Figure 1 presents the prevalence of type and

delivery method of hormonal contraceptive use and the prevalence of non-hormonal contraceptive use.

### Perceived symptomology

Frequency and prevalence of perceived symptomology experienced by oral contraceptive and non-hormonal contraceptive users are presented in Table 2. Significant differences between oral contraceptive users and non-hormonal contraceptive users were observed for back pain ( $U = 3333.5$ ,  $p = 0.037$ ,  $r = -0.15$ ), nausea ( $U = 3198.0$ ,  $p = 0.012$ ,  $r = -0.18$ ), sore breasts ( $U = 3262.0$ ,  $p = 0.023$ ,  $r = -0.16$ ), with non-hormonal contraceptive users experiencing a greater frequency of symptoms. For oral contraceptive users, median severity of symptoms ranged from 1 (constipation, energy level increase, sore throat) to 4 (light-headedness) on a 1–5 point Likert scale (minor factor to major factor) and the median symptom severity of all symptoms was 3. For non-hormonal contraceptive users, the median severity of symptoms ranged from 2 (appetite decrease, back pain, constipation, energy level increase, food preference change, headache, hot flush, leg discomfort, nausea, sore throat) to 4 (stomach cramps) and the median symptom severity of all symptoms was 2.3.

When symptomology comparisons were made between standard of play and contraceptive use, significant differences between Premiership and Championship players for food preference change and hot flush severity were found. Food

**Table 1.** Player characteristics by oral contraceptive users and non-hormonal contraceptive users.

	OC Users (n = 61)	Non-HC Users (n = 152)	Total (n = 213)
Age (yrs) <sup>1</sup>	23.0 (6.0)	24.0 (8)	24.0 (8)
Age group			
Younger ( $\leq 24$ yrs)	31 (50.8)	68 (44.7)	99 (46.5)
Older ( $> 24$ yrs)	30 (49.2)	84 (55.3)	114 (53.5)
Height (cm)	167.7 $\pm$ 6.1	169.0 $\pm$ 6.9	168.6 $\pm$ 6.7
Body Mass (kg)	75.4 $\pm$ 10.7	78.8 $\pm$ 14.9	77.8 $\pm$ 13.9
Level	27 (44.3)	67 (44.1)	94 (44.1)
Premiership	34 (55.7)	85 (55.9)	119 (55.9)
Championship			
Position	12 (19.7)	34 (22.4)	46 (21.6)
Front row	7 (11.5)	16 (10.5)	23 (10.8)
Second row	9 (14.8)	38 (25)	47 (22.1)
Back row	8 (13.1)	13 (8.6)	21 (9.9)
Scrum-half	14 (23.0)	23 (15.1)	37 (17.4)
Inside back	11 (18.0)	28 (18.4)	39 (18.3)
Outside back			
Rugby experience (yrs)	8.62 $\pm$ 5.96	9.14 $\pm$ 5.54	8.99 $\pm$ 5.71
S&C experience (yrs)	4.67 $\pm$ 3.39	5.28 $\pm$ 4.61	5.10 $\pm$ 4.29
Age at menarche (yrs)	12.56 $\pm$ 1.20	12.70 $\pm$ 1.37	12.66 $\pm$ 1.33
Monitor MC (% yes)	17 (27.9)	104 (68.4)*	121 (56.8)
MC length (days)	-	29.23 $\pm$ 4.18	-
Menstruation length (days)	-	5.04 $\pm$ 1.47	-
Flow Severity	-	3.40 $\pm$ 0.85	-

Note: Data reported as mean  $\pm$  SD, or n(%) unless otherwise stated. <sup>1</sup>Data reported as median (interquartile range).

\*p<0.05. MC, Menstrual cycle; S&C, Strength and conditioning; OC, Oral contraceptive; HC, Hormonal contraceptive.

**Table 2.** Frequency and prevalence of perceived symptoms experienced by oral contraceptive users and non-hormonal contraceptive users.

Symptom	OC Users		Non-HC Users	
	Frequency (n)	Prevalence(%)	Frequency (n)	Prevalence(%)
Appetite increase	43	70.5	113	74.3
Appetite decrease	17	27.9	41	27.0
Back pain	31	50.8	100*	65.8
Bloating	48	78.7	116	76.3
Constipation	21	34.4	59	38.8
Energy level increase	11	18.0	32	21.1
Energy level decrease	45	73.8	114	75.0
Food preference change	25	41.0	72	47.4
Headaches	30	49.2	74	48.7
Hot flushes	19	31.1	49	32.2
Leg discomfort	15	24.6	49	32.2
Light headedness	18	29.5	52	34.2
Negative mood state	48	78.7	121	79.6
Nausea	12	19.7	57*	37.5
Poor skin	35	57.4	97	63.8
Sore breasts	28	45.9	95*	62.5
Sore throat	6	9.8	15	9.9
Stomach cramps	42	68.9	118	77.6
Weight increase	30	49.2	79	52.0
Weight decrease	2	3.3	4	2.6

Note: \*p<0.05. OC, Oral contraceptive; HC, Hormonal contraceptive.

preference change was less frequently reported in Premiership than Championship oral contraceptive users ( $U = 239.0$ ,  $p = 0.009$ ,  $r = -0.35$ ). Hot flushes were more frequently reported in Premiership than Championship non-hormonal contraceptive users ( $U = 1960.5$ ,  $p = 0.016$ ,  $r = -0.20$ ).

### Symptom management strategies

Symptom management strategies resulted in seven main categories, which are presented in Table 3. Forty-five percent of players reported they felt they could speak to staff (i.e., coaches,

medical, or performance) about their menstrual cycle (i.e., regular and irregular) or contraceptive use and 12% of players had previously spoken to staff about their menstrual cycle or contraceptive use. Barriers to speaking to staff were thematically analyzed and the main categories identified and selected data are presented in Table 3.

### Performance and wellness characteristics

The frequency and prevalence of perceived negative performance and wellness effects experienced by oral contraceptive

**Table 3.** Symptom management strategies and barriers to speaking to staff about menstrual or oral contraceptive cycle.

Main Category	Frequency (n)	Prevalence (%)	Select data from responses
<i>Symptom management strategies</i>			
Medication	44	33	Pain killers. Take lots of medication. Paracetamol. Ibuprofen.
Nutritional Intervention	27	20	Avoid spicy foods. Try to manage cravings. Avoid sugar and bread. Eat chocolate. Iron rich foods. Supplements (e.g., iron, herbal, magnesium). Drink lots of water. Smaller meals. Frequent snacking.
Training Modulation	27	20	Reduce training load. Less intense training.
Heat Application	15	11	Hot water bottle. Heat Pack.
Sleep/Rest	9	7	Sleep more. Plenty of sleep. Rest days.
General Movement	7	5	Light jogging. Brisk walk. Stretching. Yoga/Pilates. Cycling.
Other	3	2	Allow myself to cry for no reason. Curling up in a ball and rubbing belly. Wear loose clothing
<i>Barriers to speaking to staff about menstrual or oral contraceptive cycle</i>			
Male staff	30	29	A lot of the coaches are men and I'm unsure if all would fully understand some of the difficulties that are faced.
Club culture	25	24	It's a bit of a taboo subject and it's not really spoken about within rugby or at our club.
Support staff limitation	16	15	Not their skillset, it's a specialised area with a lot of misinformation.
Uncomfortable topic	13	13	It is awkward to discuss.
Not relevant or appropriate	11	11	I don't think it is relevant to the sport.
Private information	6	6	It is a personal issue that all females have. [Coaches] don't need to know.
Lack of supporting evidence	3	3	No research into it. Not much knowledge about it.

**Table 4.** Frequency and prevalence of perceived negative performance and wellness effects experienced by oral contraceptive and non-hormonal contraceptive users.

Performance and wellness variable	OC Users		Non-HC Users	
	Frequency (n)	Prevalence(%)	Frequency (n)	Prevalence(%)
Fatigue	30	49.2	101*	66.4
Sleep quality	24	39.3	75	49.3
Sleep duration	19	31.1	53	34.9
Upper body soreness	16	26.2	42	27.6
Lower body soreness	15	24.6	58	38.2
Stress	28	45.9	92*	60.5
Mood	34	55.7	105*	69.1
Concentration	20	32.8	74*	48.7
Enjoyment of exercise	28	45.9	84	55.3
Confidence	26	42.6	74	48.7
Speed	19	31.1	64	42.1
Power	19	31.1	71*	46.7
Strength	23	37.7	79	52.0
Fitness	21	34.4	68	44.7
Balance	13	21.3	43	28.3
Decision-making	20	32.8	60	39.5
Fine-motor skills	12	19.7	51	33.6
Gross-motor skills	15	24.6	52	34.2
Rugby match-play	21	34.4	78*	51.3

Note: \* $p < 0.05$ . OC, Oral contraceptive; HC, Hormonal contraceptive.

and non-hormonal contraceptive users, at any phase in their menstrual/contraceptive cycle, are presented in Table 4. There was a significant difference between oral contraceptive users and non-hormonal contraceptive users for fatigue ( $U = 2152.5$ ,  $p = 0.007$ ,  $r = -0.21$ ), stress ( $U = 2237.0$ ,  $p = 0.042$ ,  $r = -0.16$ ), mood ( $2298.5$ ,  $p = 0.031$ ,  $r = -0.17$ ), concentration ( $U = 2170.0$ ,  $p = 0.035$ ,  $r = -0.16$ ), power ( $U = 2178.5$ ,  $p = 0.04$ ,  $r = -0.16$ ), rugby match play ( $U = 2139.0$ ,  $p = 0.024$ ,  $r = -0.18$ ), with non-hormonal contraceptive users reporting a greater frequency of negative effects.

When performance and wellness comparisons were made between levels of play and contraceptive use, significant differences between Premiership and Championship players for sleep and lower body soreness were observed. Sleep duration

was negatively affected less frequently for Premiership than Championship oral contraceptive users ( $U = 147.5$ ,  $p = 0.019$ ,  $r = -0.35$ ). Lower body soreness was negatively affected less frequently in Premiership than Championship oral contraceptive users ( $U = 157.0$ ,  $p = 0.029$ ,  $r = -0.32$ ).

When performance and wellness comparisons were made for age group and contraceptive use, significant differences between older and younger players for fatigue, lower body soreness, concentration, power, and fine motor skills were observed. Fatigue was reported more frequently in younger than older oral contraceptive users ( $U = 152.5$ ,  $p = 0.006$ ,  $r = -0.41$ ). Lower body soreness was reported more frequently in younger than older oral contraceptive users ( $U = 167.5$ ,  $p = 0.021$ ,  $r = -0.34$ ). Concentration was negatively affected more

frequently in younger than older non-hormonal contraceptive users ( $U = 1307.0$ ,  $p = 0.007$ ,  $r = -0.25$ ). Power was negatively affected more frequently in younger than older oral contraceptive users ( $U = 172.5$ ,  $p = 0.039$ ,  $r = -0.31$ ). Fine motor skills were negatively affected more frequently in older than younger non-hormonal contraceptive users ( $U = 1413.0$ ,  $p = 0.047$ ,  $r = -0.18$ ).

## Discussion

The aim of the present study was to describe oral contraceptive and non-hormonal contraceptive characteristics, symptomology, negative performance and wellness effects, and symptom management strategies in women's rugby union players. This represents the largest study to date in women's rugby, investigating oral contraceptive and non-hormonal contraceptive symptomology and negative performance and wellness effects. It is the first study in women's rugby to investigate differences between standard of play and age. The prevalence of hormonal contraceptive users was 36%, and of the hormonal contraceptive users, 71% were oral contraceptive pill users. Non-hormonal contraceptive users perceived greater negative symptomology (i.e., back pain, nausea, sore breasts) and negative performance and wellness effects (i.e., fatigue, stress, mood, concentration, power, match-play) when compared to oral contraceptive users. Championship oral contraceptive users perceived greater negative performance and wellness effects (i.e., sleep duration and lower body soreness) compared to Premiership oral contraceptive users. Overall, younger players perceived greater negative performance and wellness effects (i.e., fatigue, lower body soreness, concentration, power) compared to older players. Medication, nutritional interventions, and training modulation were the most prevalent symptom management strategies identified in this cohort. This study expands on previous women's rugby research (Findlay et al. 2020; Nolan et al. 2022) and offers novel data that may be vital to player management to allow peak performance. The findings can be used to support negative symptom management and assist with highlighting barriers to staff-player dialogue regarding menstrual related health.

## Symptomology

Overall, both oral contraceptive and non-hormonal contraceptive users experienced a high proportion of negative symptomologies, which they perceived were related to their ovarian hormone status (i.e., oral contraceptive use or non-use). Negative mood state (79.6%) in non-hormonal contraceptive users, and bloating and negative mood state (both 78.7%) in oral contraceptive users were the most prevalent symptoms identified. This is higher than findings from a mixed cohort of strength sports (rugby and powerlifting) where negative symptom prevalence in non-hormonal contraceptive and hormonal contraceptive users were 42.4% and 17.9% for unspecified cramp and mood changes, respectively (Nolan et al. 2022). These differences may be due to symptom prevalence being an individual specific factor (McNulty et al. 2020). The findings from the present study are aligned to symptoms self-reported by Australian Olympic/Paralympic athletes where pain (83%)

and bloating (78%) were the most common (McNamara et al. 2022).

The present study showed that non-hormonal contraceptive users experienced a higher prevalence of negative symptomologies (i.e., back pain [65.8% vs. 50.8%], nausea [37.5% vs. 19.7%], sore breasts [62.5% vs. 45.9%]) compared to oral contraceptive users. Oral contraceptive users experiencing a lower frequency of symptoms is consistent with reports in elite mixed-sport athletes, where up to 47.5% of non-hormonal contraceptive users and up to 7.5% of hormonal contraceptive users experienced negative physical symptoms (i.e., stomach cramps and weight gain, respectively) (Martin et al. 2018). The literature suggests that hormonal contraceptive users experience a lower prevalence of negative symptoms compared to non-hormonal contraceptive users. There are several reasons for female athletes opting to use hormonal contraceptives. Reasons for hormonal contraceptive use in Australian football codes (i.e., rugby league, rugby union, rugby sevens, Australian football) have been reported as avoiding pregnancy (71%), regulating cycle (38%) and reducing menstrual pain (36%) (Clarke, Bruinvels et al. 2021). Additionally, in competitive athletes using oral contraceptives, 73% have deliberately manipulated menstruation and 54% of the time this was due to sports competition (Schaumberg et al. 2018). It appears that understanding female athletes' reasons for hormonal contraceptive use is an important consideration for sporting performance. This may present an opportunity for practitioners to discuss periodization of oral contraceptive use around specific competitive windows.

## Management strategies

This study identified how players manage their menstrual cycle symptoms. The strategies with the greatest prevalence were analgesic medication (33%), nutritional intervention (e.g., frequent snacks, manage cravings) (20%) and training modulation (e.g., reduce training load) (20%). The use of analgesics as a management strategy has been reported in Australian athletes from club to Olympic and Paralympic standard (Armour et al. 2020; McNamara et al. 2022). A recent study has suggested investigating nutrition strategies for symptom management (McNamara et al. 2022). The present investigation highlighted a diversity in the use of nutritional interventions to manage symptoms (Table 3). While some players '*tried to manage cravings*' and '*avoid(ed) sugar and bread*', others were '*frequent(ly) snacking*' and '*eat(ing) chocolate*'. These findings suggest there are various nutritional strategies employed by players to assist with symptom management. Additionally, this result highlights an opportunity to support female players through positive discussions about performance nutrition. Practitioners should discuss these nutritional strategies with individual players and consider the appropriateness of each approach whilst also considering performance nutrition principles (e.g., carbohydrate periodization).

A significant challenge highlighted in the present study is that over 55% of the players felt they could not speak to staff about their menstrual/contraceptive cycle and only 12% of the players had spoken to staff. The top two barriers to speaking to staff were male staff (29%) and club culture (24%). Male

staff has previously been reported as a barrier to players speaking openly about their menstrual/contraceptive cycle (Armour et al. 2020; Findlay et al. 2020). Findings from Findlay and colleagues (Findlay et al. 2020) highlighted that female staff have approached players to discuss menstrual cycle management, whereas male staff might not do this. Despite this, recent research has highlighted that female coaches' and sport science practitioners have variable knowledge and awareness of the menstrual cycle in relation to sport (Brown and Knight 2022). As female athletes have low menstrual cycle and oral contraceptives knowledge (Larsen et al. 2020), it is important for both male and female practitioners and coaches to educate themselves and initiate educational conversations with players. An educational framework has been developed for (male) practitioners to improve menstrual cycle-related practices (Clarke et al. 2021). The educational framework suggested i) facilitating better recognition and referral of menstrual cycle dysfunction, ii) encouraging multi-disciplinary team (including the athlete) collaborations, and iii) promoting effective coach-athlete communication about the menstrual cycle. If this approach is adopted by a cohesive multi-disciplinary team, it may positively impact the perception of club culture where menstrual cycle-related topics are '*a bit of a taboo subject and ... not really spoken about within rugby or at our club*' (Table 4).

### Performance and wellness

Previous research has highlighted that 67% of elite women's rugby players perceive menstrual cycle symptoms to negatively impact performance (Findlay et al. 2020). The present study expands on these previous findings by discriminating between types of performance, oral contraceptive users and non-users, age and playing standard. Overall, the present study found non-hormonal contraceptive users perceived a higher prevalence of negative performance and wellness effects (i.e., fatigue, stress, mood, concentration, power, match-play) compared to oral contraceptive users. This is congruent with the findings of other studies where 33% of oral contraceptive pill users perceive their menstrual cycle to affect performance (McNamara et al. 2022). The present study found that players who were younger (<24 years) or played at a lower standard (i.e., Championship) suffered a higher prevalence of negative performance and wellness effects (i.e., sleep, lower body soreness, fatigue, concentration, power). As sport science and medicine support is under-resourced at lower standards of play, players at these standards may not have access to practitioners with sufficient expertise to support appropriate management of reductions in performance and wellness. Additionally, older players may have more experience with managing negative symptoms and therefore have an improved understanding of the management strategies that help them to perform. This is supported by a quote from an Olympic athlete; '*At the Rio Olympics I raced with my period and because I knew I'd done 1000 good sessions with it before, it didn't bother me one bit*' (McNamara et al. 2022). Therefore, less lived experiences as a female athlete and a lower level of sport science and medicine support may explain the perceptual reductions in

performance and wellness by younger and lower standard players (Emmonds et al. 2019; Scantlebury et al. 2022).

### Strengths and limitations

This study provides data from a large and representative sample of players competing in the women's rugby union Premiership and Championship in England. The present study represents the largest sample size of women's rugby players to date, and investigates identified high priority research themes in women's rugby (Heyward et al. 2022). Despite this, due to the nature of online self-administered questionnaires, results of this study may be affected by participant self-selection bias. Additionally, as oral contraceptive brand usage were diverse, so too were the associated exogenous hormonal profiles (e.g., monophasic vs. biphasic). The non-hormonal contraceptive users cohort included players who were non-eumenorrheic and experiencing secondary amenorrhea. Different hormonal profiles and menstrual dysfunction may influence perceptual symptomology, performance, and wellness. Furthermore, this is the first study investigating oral contraceptive use and non-use on performance by age and standard of play. The data presented in this study can be used to assist with player management and to support the education of practitioners.

### Conclusion and practical implications

Oral contraceptive users comprise 26% of Premiership and Championship rugby union players. Non-hormonal contraceptive users perceived greater negative symptomology (i.e., back pain, nausea, sore breasts) and negative performance and wellness effects (i.e., fatigue, stress, mood, concentration, power, match-play) compared to oral contraceptive users. Both Championship and younger players suffer a greater frequency of perceived negative performance and wellness effects. Medication, nutritional interventions, and training modulation were the most prevalent symptom management strategies identified. These results highlight the importance of supporting non-hormonal contraceptive users in symptom management, particularly those who are younger (i.e., ≤24 years) or playing at a lower standard (i.e., Championship). This study may also assist practitioners with highlighting barriers to staff-player dialogue regarding menstrual-related health (e.g., male staff, club culture).

### Disclosure statement

No potential conflict of interest was reported by the author(s).

### Funding

The author(s) reported there is no funding associated with the work featured in this article.

### References

Armour M, Parry KA, Steel K, Smith CA. 2020. Australian female athlete perceptions of the challenges associated with training and competing

- when menstrual symptoms are present. *Int J Sports Sci Coach*. April 15 (3):316–323. [10.1177/1747954120916073](https://doi.org/10.1177/1747954120916073)
- Brown N, Knight CJ. 2022. Understanding female coaches' and practitioners' experience and support provision in relation to the menstrual cycle. *Int J of Sports Sci & Coaching*. 17(2):235–243. doi:[10.1177/17479541211058579](https://doi.org/10.1177/17479541211058579).
- Bruinvels G, Goldsmith E, Blagrove R, Simpkin A, Lewis N, Morton K, Suppiah A, Rogers JP, Ackerman KE, Newell J, et al. 2021. Prevalence and frequency of menstrual cycle symptoms are associated with availability to train and compete: a study of 6812 exercising women recruited using the Strava exercise app. *Br J Sports Med*. 55(8):438–443. doi:[10.1136/bjsports-2020-102792](https://doi.org/10.1136/bjsports-2020-102792).
- Clarke A, Bruinvels G, Julian R, Inge P, Pedlar CR, Govus AD. 2021. Hormonal Contraceptive Use in Football Codes in Australia. *Front Sports Act Living* [Online], 3 February, 3. p. 634866. [Accessed 26 February 2021] Online: [10.3389/fspor.2021.634866](https://doi.org/10.3389/fspor.2021.634866)
- Clarke A, Govus A, Donaldson A. 2021. What male coaches want to know about the menstrual cycle in women's team sports: performance, health, and communication. *Int J Sports Sci Coach*. June 16(3):544–553. [10.1177/17479541211989237](https://doi.org/10.1177/17479541211989237)
- Crowe M, Inder M, Porter R. 2015. Conducting qualitative research in mental health: thematic and content analyses. *Australian & New Zealand Journal of Psychiatry*. 49(7):616–623. doi:[10.1177/0004867415582053](https://doi.org/10.1177/0004867415582053).
- Ekenros L, von Rosen P, Solli GS, Sandbakk Ø, Holmberg HC, Hirschberg AL, Fridén C. 2022. Perceived impact of the menstrual cycle and hormonal contraceptives on physical exercise and performance in 1,086 athletes from 57 sports. *Front Physiol*. 13:1763. doi:[10.3389/fphys.2022.954760](https://doi.org/10.3389/fphys.2022.954760).
- Elliott-Sale KJ, McNulty KL, Ansdell P, Goodall S, Hicks KM, Thomas K, Swinton PA, Dolan E. 2020. The effects of oral contraceptives on exercise performance in women: asystematic review and meta-analysis. *Sports Medicine*. 50(10):1785–1812. doi:[10.1007/s40279-020-01317-5](https://doi.org/10.1007/s40279-020-01317-5).
- Elo S, Kyngäs H. 2008. The qualitative content analysis process. *J Adv Nurs*. April 62(1):107–115. [10.1111/j.1365-2648.2007.04569.x](https://doi.org/10.1111/j.1365-2648.2007.04569.x)
- Emmonds S, Heyward O, Jones B. 2019. The challenge of applying and undertaking research in female sport. *Sports Med - Open*. 5(1):51. doi:[10.1186/s40798-019-0224-x](https://doi.org/10.1186/s40798-019-0224-x).
- Eysenbach G. 2004. Improving the quality of web surveys: the checklist for reporting results of internet E-Surveys (CHERRIES). *J Med Internet Res*. 6 (3):e132. doi:[10.2196/jmir.6.3.e34](https://doi.org/10.2196/jmir.6.3.e34).
- Findlay RJ, Macrae EHR, Whyte IY, Easton C, Forrest (Néewhyte) LJ. 2020. How the menstrual cycle and menstruation affect sporting performance: experiences and perceptions of elite female rugby players. *Br J Sports Med*. 54(18):1108–1113. doi:[10.1136/bjsports-2019-101486](https://doi.org/10.1136/bjsports-2019-101486).
- Heyward O, Emmonds S, Roe G, Scantlebury S, Stokes K, Jones B. 2022. Applied sports science and sports medicine in women's rugby: systematic scoping review and Delphi study to establish future research priorities. *BMJ Open Sports & Exercise Med*. 8(3):e001287. doi:[10.1136/bmjsem-2021-001287](https://doi.org/10.1136/bmjsem-2021-001287).
- Larsen B, Morris K, Quinn K, Osborne M, Minahan C. 2020. Practice does not make perfect: a brief view of athletes' knowledge on the menstrual cycle and oral contraceptives. *J of Sci and Med in Sports*. February 23 (8):690–694. [10.1016/j.jsams.2020.02.003](https://doi.org/10.1016/j.jsams.2020.02.003)
- Martin D, Sale C, Cooper SB, Elliott-Sale KJ. 2018. Period prevalence and perceived side effects of hormonal contraceptive use and the menstrual cycle in elite athletes. *Int J Sports Physiol Perform*. August 13(7):926–932. [10.1123/ijsp.2017-0330](https://doi.org/10.1123/ijsp.2017-0330)
- McNamara A, Harris R, Minahan C. 2022. 'That time of the month' ... for the biggest event of your career! Perception of menstrual cycle on performance of Australian athletes training for the 2020 Olympic and Paralympic Games. *BMJ Open Sports & Exercise Med*. April 8(2):e001300. [10.1136/bmjsem-2021-001300](https://doi.org/10.1136/bmjsem-2021-001300)
- McNulty KL, Elliott-Sale KJ, Dolan E, Swinton PA, Ansdell P, Goodall S, Thomas K, Hicks KM. 2020. The effects of menstrual cycle phase on exercise performance in eumenorrheic women: a systematic review and meta-analysis. *Sports Med*. Online Available from, July, 50 (10):1813–1827. Accessed 19 August 2020 [10.1007/s40279-020-01319-3](https://doi.org/10.1007/s40279-020-01319-3)
- Nolan D, Elliott-Sale KJ, Egan B. 2022. Prevalence of hormonal contraceptive use and reported side effects of the menstrual cycle and hormonal contraceptive use in powerlifting and rugby. *Phys Sportsmed*. January:1–6. [10.1080/00913847.2021.2024774](https://doi.org/10.1080/00913847.2021.2024774)
- Parker LJ, Elliott-Sale KJ, Hannon MP, Morton JP, Close GL. 2022. An audit of hormonal contraceptive use in women's super league soccer players; implications on symptomology. *Sci Med Footb*. 6(2):153–158. doi:[10.1080/24733938.2021.1921248](https://doi.org/10.1080/24733938.2021.1921248).
- Scantlebury S, Ramirez C, Cummins C, Stokes K, Tee J, Minahan C, Emmonds S, McCormack S, Phillips G, Jones B. 2022. Injury risk factors and barriers to their mitigation for women playing rugby league: a delphi study. *J Sports Sci*. Online, Available from, June:1–14. Accessed 4 July 2022. <https://www.tandfonline.com/doi/abs/10.1080/02640414.2022.2085433>
- Schaumberg MA, Emmerton LM, Jenkins DG, Burton NW, Janse de Jonge XAK, Skinner TL. 2018. Use of Oral Contraceptives to manipulate menstruation in young, physically active women. *Int J Sports Physiol Perform*. January 13(1):82–87. [10.1123/ijsp.2016-0689](https://doi.org/10.1123/ijsp.2016-0689)
- World Rugby (2022) *Women's Rugby* [Online]. Available from: <https://www.world.rugby/organisation/about-us/womens>.