

1 **Period prevalence and perceived side effects of hormonal contraceptive use**
2 **and the menstrual cycle in elite athletes**

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27 **Abstract**

28 **Purpose:** To identify the period prevalence of hormonal contraceptive (HC) use and
29 characterise the perceived side effects associated with the menstrual cycle and HC use.

30 **Methods:** 430 elite female athletes completed a questionnaire to assess; the period prevalence
31 of HC use, the reasons for initiation and discontinuation of HCs and the side effects experienced
32 by HC and non-HC users. Descriptive statistics, between-group comparisons and associations
33 between categorical variables were calculated. **Results:** 49.5% of athletes were currently using
34 HCs and 69.8% had used HCs at some point. Combined oral contraceptives were most
35 commonly used (68.1%), with 30.0% using progestin-only contraceptives (implant = 13.1%;
36 injection = 3.7%; intrauterine system = 2.8%). Perceived negative side effects were more
37 common with progestin-only HC use (39.1%) compared to combined HC use (17.8%; $P =$
38 0.001) and were most prevalent in implant users (53.6%; $P = 0.004$). HC users reported
39 perceived positive side effects relating to the ability to predict and/or manipulate the timing,
40 frequency and amount of menstrual bleeding. Non-HC users had a menstrual cycle length of
41 29 ± 5 d and 77.4% reported negative side effects during their menstrual cycle, primarily during
42 days 1-2 of menstruation (81.6%). **Conclusions:** Approximately half of elite athletes used HCs
43 and progestin-only contraceptive users reported greater incidences of negative side effects,
44 especially with the implant. Due to the high inter-individual variability in reported side effects,
45 athletes and practitioners should maintain an open dialogue to pursue the best interests of the
46 athlete.

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48 **Keywords:** menstrual cycle, hormonal contraceptives, side-effects, female athletes, prevalence

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52 **Introduction**

53 Alterations to the female reproductive-axis influence health and athletic performance.¹⁻³
54 Between menarche and the menopause, non-hormonal contraceptive users typically have a
55 monthly menstrual cycle, with a cyclical rise and fall in sex hormone concentrations.⁴ Primary
56 dysmenorrhea, which is characterised by painful menstruation, nausea, headaches, fatigue and
57 diarrhoea,⁵ is experienced by 60-91% of non-hormonal contraceptive users⁶ and may affect
58 athletic performance.⁷ In a recent study, 51% of athletes (n = 90) perceived that the menstrual
59 cycle affected their training and performance.⁸ Despite this, little is known about menstrual
60 cycle related side effects, when they occur and how training and performance may be
61 influenced.

62
63 Hormonal contraceptives (HCs) are exogenous steroid hormones that inhibit ovulation and
64 result in consistently low endogenous sex hormone concentrations, which can be used to treat
65 dysmenorrhea.^{9,10} There are different delivery methods for HCs including the oral
66 contraceptive (OC), implant, injection, transdermal patch, vaginal ring and intra-uterine system
67 (IUS). In the UK, a hormone releasing coil is typically referred to as an IUS, whereas a copper-
68 based, non-hormone releasing coil is referred to as an intra-uterine device (IUD) and, as such,
69 would not be considered a type of HC. Hormonal contraceptives can also be classified by type;
70 combined, with an oestrogenic and progestin component, or progestin-only. The type and
71 concentration of oestrogen and progestin varies between different preparations of contraceptive,
72 and may influence the physiological response.¹¹⁻¹³

73
74 In a large-scale epidemiological study of >194,000 women, Cea-Soirano et al.¹⁴ reported that
75 30% of 16-49 year olds in the UK used HCs: combined OCs (16.2%), progestin-only OCs
76 (5.6%), IUSs (4.2%), injections (2.4%), implants (1.5%), transdermal contraceptive patches

77 (0.1%), with 4.5% using non-hormonal copper-based coils (IUDs). The prevalence of HC use
78 in athletes has been poorly defined by previous research. In elite Norwegian athletes, OC use
79 was 40.2%, which was significantly higher than a control population (27%),¹⁵ while 46% of
80 Swedish football, volleyball and basketball athletes used OCs.¹⁶ Other studies have reported
81 low OC use in athletes (~14%),^{17,18} although this may be due to the inclusion of non-elite
82 athletes, who may be more analogous to the general population. Previous research in elite
83 athletes has only reported OC use and has not considered other delivery methods of HCs or
84 detailed the preparations used by participants, which influence endogenous hormone
85 concentrations and other physiological processes.¹¹⁻¹³ No study has identified the reasons why
86 elite athletes initiate or discontinue HC use, or the perceived side effects.

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88 Elite female athletes are required to train and compete whilst having to manage changes in sex
89 hormone concentration and their subsequent side effects. The current lack of understanding of
90 these side effects is a barrier to implementing strategies to support athletes and promote optimal
91 health and performance. The aim of this study was to identify (1) the period prevalence of HC
92 use, (2) the reasons for initiation and discontinuation of HCs and (3) the side effects
93 experienced by HC users and non-users in an elite athletic population.

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104 **Materials and methods**

105 *Participants*

106 Between 2015-2016, elite female athletes were recruited through National Governing Bodies,
107 coaching and support staff, or by approaching the athletes directly. Athletes had to be >18 y
108 and competing at a national, international or professional (full-time and salaried) level. A
109 paper-based questionnaire was used in order to minimise the possibility that the questionnaire
110 could be completed by the non-targeted population.¹⁹ A total of 476 athletes completed the
111 questionnaire, with 430 responses included in the final analysis (Figure 1). Athletes were
112 recruited from 24 sports with 361 competing at an international/professional level and 69
113 competing nationally. All participants provided written informed consent and the study was
114 approved by the Nottingham Trent University non-invasive ethics committee.

115

116 *Questionnaire*

117 Data were collected using a paper-based questionnaire that was specifically designed for the
118 purposes of the study. All data were provided by the athletes and reflect their perceptions and
119 experiences. Participants recorded demographic information including age, height, weight, age
120 of menarche, sport, competitive level, length of time competing at this level and weekly
121 training frequency and duration (Table 1 and Figure 1). Current HC users and non-HC users
122 were directed to complete different sections of the questionnaire. Non-HC users were asked
123 whether they used a IUD, their typical menstrual cycle duration and variability in length.
124 Participants were asked to state whether they experienced pain or other symptoms during the
125 menstrual cycle and whether they avoided exercise/training at any point of their cycle. Where
126 applicable, participants were asked, in an open-ended question, to state the symptoms/reasons
127 and time points when these occurred. Current HC-users were asked to provide the delivery
128 method, preparation and duration of use for their current HC. Participants were asked whether

129 they had discussed their HC with their coach/team doctor and whether the coach/team doctor
130 was involved in the decision to use this type of HC. Participants were asked why they had
131 chosen this method of HC, whether they considered possible side effects prior to commencing
132 HC use, and whether they have experienced any negative or positive side effects. Where
133 applicable, participants were asked to provide supporting information in an open-ended
134 question. Non-HC users and HC users were then asked to detail previous HC use, including
135 the delivery method, preparation, duration of use and reason for discontinuation for all previous
136 HCs used.

137

138 *Data analysis*

139 Data were analysed using Microsoft Excel and IBM SPSS (v. 23.0). To prevent duplicate data,
140 the database was searched for non-unique date of births and identical values were visually
141 checked to assess whether the respondents were different. Athletes were categorised by
142 competitive level (national or international/professional) to conduct a stratified analysis. For
143 open-ended questions, a content analysis was conducted independently by two researchers
144 (DM, KES) to categorise responses, whereby a frequency analysis was performed, which was
145 checked for consistency. Differences between the researchers were resolved by discussion until
146 a consensus was reached. Direct verbatim quotes were used to inform interpretation in some
147 instances. Assumptions of normality were checked using the Shapiro-Wilk test and between
148 group differences were examined using independent samples t-tests, Mann-Whitney U tests
149 and Kruskal Wallis H tests. Pearson's chi-squared analyses were used to examine the
150 relationships between categorical variables, with Fishers exact tests used where <80% of
151 expected cell counts were >5.²⁰ Data are represented as mean \pm 1SD, frequencies and
152 percentages and statistical significance was set at $p \leq 0.05$.

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155 **Results**

156 Three hundred (69.8%) athletes reported using HCs at some point, with 49.5% of athletes
157 currently using HCs and 50.5% not currently using any form of HC (Fig 1). Hormonal
158 contraceptive users had a lower age of menarche ($p = 0.010$) and length of time competing at
159 current level ($p = 0.048$) compared to non-HC users (participant characteristics in Table 1).
160 Competitive level did not influence the prevalence of HC use ($p > 0.05$).

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162 *Menstrual cycle (non-hormonal contraceptive users)*

163 Three athletes described themselves as amenorrheic, although the questionnaire did not
164 specifically ask this question. Thirty-four athletes did not report their menstrual cycle length or
165 did not provide enough information to interpret a response. Mean cycle length for the remaining
166 athletes was 29 ± 5 d. Eight athletes reported a mean menstrual cycle duration of greater than
167 35 days and three athletes reported a mean menstrual cycle duration of less than 21 days. One-
168 hundred and four (48.6%) athletes stated that their menstrual cycle was non-variable in length,
169 while 110 (51.4%) athletes reported their cycle length to be variable with a mean variation of
170 9 ± 9 d. Copper IUDs were used by 2 participants (0.9%); with a mean menstrual cycle length
171 of 28 ± 4 d. Menstrual cycle-related negative symptoms were reported by 168 athletes (77.4%)
172 and categorical frequencies are presented in Table 2. Symptoms were experienced in the week
173 prior to menstruation (25.0%), during days 1 and 2 of menstruation (81.6%) and between day
174 3 and the end of menstruation (28.9%). Nine athletes (4.1%) reported that they had to refrain
175 from exercise at certain points of their menstrual cycle. Reasons included pain ($n = 4$), sickness
176 ($n = 2$), or other reasons ($n = 3$), such as “Literally struggle to get out of bed so training is out
177 of the question” or “at the beginning of the menstrual cycle I avoid to do tough session [sic]”.
178 Four athletes reported that they didn’t refrain from exercise, although they provided additional
179 comments stating “No – but only because I can’t”, “but struggle with contact [rugby]”, “but I

180 get back cramps 1 week before when running” and “I don’t avoid it but I do sometimes have
181 to delay things until cramps calm down”. One athlete stated that “If anything I have to increase
182 it [exercise]. Helps to pass quicker by maybe a day and helps the pain”.

183

184 *Hormonal contraceptive use*

185 Combined HCs comprised 68.5% of HC use, with 30.0% using progestin-only and 1.9% using
186 an unspecified type of OC. There was no difference in length of current HC use between
187 combined (4.6 ± 3.7 y) and progestin-only HC users (3.9 ± 4.4 y; $p = 0.193$), or between
188 different delivery methods ($p = 0.649$). Oral contraceptives were the most widely used (78.4%),
189 followed by the implant (13.1%), injection (3.8%), IUS (2.8%) and vaginal ring (0.5%), with
190 one participant using a combination of the implant and OC. All combined OCs were
191 monophasic and contained ethinyl oestradiol (EO) as the oestrogenic component in varying
192 doses: 20 μg ($n = 4$, 2.8%), 30 μg ($n = 116$, 80.0%), 35 μg ($n = 19$, 13.1%). Six participants (n
193 $= 4.1\%$) used combined preparations but did not specify the oestrogenic dose. Twelve different
194 progestins were used in various doses, with Levonorgestrel accounting for 51.4% of progestin
195 use.

196

197 The most common reason athletes chose their specific type/delivery method was ease of use
198 (18.8%), and the most common side effects considered prior to HC use were weight gain (33%)
199 and mood changes/swings (12.7%). The side effects experienced by HC-users are shown in
200 Table 3. Negative side effects were significantly more common with progestin-only HCs
201 (39.1%) compared to combined HCs (17.8%; $p = 0.001$) and were significantly more common
202 in the implant (53.6%) compared to other delivery methods ($p = 0.004$; Table 4). Type and
203 delivery method of HC did not affect the prevalence of reported positive effects ($p > 0.05$). HC

204 users were significantly more likely to report positive effects of HCs than negative effects ($p <$
205 0.05).

206

207 International/professional athletes were significantly more likely to discuss HC use with their
208 coach/team doctor (25%) compared to national level athletes (0%; $p < 0.001$). Competitive
209 level did not influence coach/team doctor involvement in the decision to initiate HC use ($p =$
210 0.070), although this did occur for 7.6% of international/professional athletes and no national
211 level athletes. The coach/team doctor was involved in the decision to use HCs for 14 (6.6%)
212 athletes, of which 12 used OCs and 2 used an implant. Ultra-low dose EO (20 μ g) OCs
213 accounted for 25% of OC use in this group, in comparison to 2.7% of overall OC use, which
214 was a significant effect ($p = 0.010$). Where the coach/team doctor was involved in the decision,
215 athletes stated that they were prescribed these HCs for contrasting reasons including; ‘Higher
216 level of oestrogen’, ‘Apparently lowest oestrogen’, ‘Low hormones’ and ‘In attempt to reduce
217 monthly fluctuations in my performance and fatigue’.

218

219 In total, 87 (40.1%) non-HC users had previously used some form of HC, with 64 (30.0%)
220 current HC users previously using a different HC. There were 218 incidences of previous HC
221 use, as some athletes had used 2 ($n = 49$), 3 ($n = 13$), 4 ($n = 4$) and 5 ($n = 1$) previous types of
222 HC. Combined OCs accounted for 78.4% of previous use, with progestin-only OCs (7.8%),
223 implant (7.8%), injection (6.0%) and IUS (1.8%) also used. The reasons provided for
224 discontinuation of previous HCs are presented in Table 5. Mean duration of previous HC use
225 was 2.2 ± 2.3 y, with no difference between types ($p = 0.360$) or delivery methods ($p = 0.733$).

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228

229 **Discussion**

230 This novel study has shown that there is an approximately even prevalence of HC use and non-
231 HC use in elite female athletes. The majority of female athletes have used HCs at some point
232 in their sporting career. These results highlight the importance of understanding the effects of
233 the menstrual cycle and HC use in elite sportswomen. This is the first study to detail the
234 symptoms experienced by athletes during the menstrual cycle and with HC use, and these data
235 can be used to inform the decisions of athletes, practitioners and researchers.

236

237 The prevalence of HC use in elite athletes (49.5%) is higher than recent data for the general
238 population of reproductive age in the UK (30.0%)¹⁴ and USA (27.6%).²¹ Sixty-nine percent of
239 HCs used were combined OCs, which is also higher than in the general population where OCs
240 account for 54.0% of HC use.¹⁴ Schaumberg et al.²², showed that competitive (state, national
241 and international) athletes rated sport competition and sport training as more important factors
242 in menstrual manipulation with OCs, compared to sub-elite and recreationally active
243 individuals. Furthermore, 43.5% of OC-using competitive athletes planned to manipulate
244 menstruation often, which was greater than sub-elite (22.5%) and recreationally active women
245 (15.8%). In the current study, nearly a third of combined OC users perceived the ability to
246 predict or manipulate menstruation, thereby avoiding menstruation during training or
247 competition, as a positive effect, which may explain the differences in OC use between elite
248 athletes and the general population. Progestin-only HCs accounted for 30.0% of use, with the
249 implant (13.1%) and progestin-only OC (10.3%) being the most widely used. Almost 40% of
250 progestin-only HC users perceived the cessation of, or less frequent bleeding, as a positive
251 consequence of this type of HC. Previous research has documented the prevalence of OC use
252 in athletes.^{15,16} however the current study has provided a more comprehensive overview of HC
253 use by including all types and delivery methods of HCs, in addition to the preparations, which

254 enables the quantification of steroid hormone content and concentrations. Twelve different
255 progestins were used in varying concentrations, with EO being the oestrogenic component in
256 all combined preparations. Four HC users were prescribed ultra-low dose (20 µg EO) OCs;
257 with three cases involving the coach/team doctor in the decision to use this preparation, all of
258 which were from different sports. Ultra-low dose OCs are associated with reduced headaches,
259 nausea and breast tenderness compared to higher dose EO formulations²³ and can reduce the
260 symptoms of dysmenorrhea²⁴, so may have been prescribed to reduce these symptoms whilst
261 maintaining the benefits of improved cycle control. These data are representative of a UK based
262 population and further studies are required to expand this knowledge to other countries where
263 the use of other formulations, such as extended cycle OCs, are more prevalent.²⁵

264

265 Combined HCs were better tolerated than progestin-only HCs; with 17.8% of combined-type
266 users reporting negative side effects in comparison to 39.1% of progestin-only HC users. In
267 particular, the implant had a significantly higher incidence of reported negative symptoms
268 compared to other delivery methods of HCs (Table 4). One third of athletes considered weight
269 gain as potential side effect prior to HC initiation, although only 7.5% reported increased
270 weight which is lower than in the general population (34%).²⁶ Hormonal contraceptive users
271 were more likely to report positive than negative side effects, which may have implications for
272 athletes considering HC use in the future. Nineteen negative and 23 positive categories of side
273 effects were identified, emphasising the individuality of responses and that athletes should be
274 considered on a case by case basis. The most prevalent, positive side effects reported were the
275 ability to predict/change menstruation (n = 45), having regular periods (n = 27) and cessation
276 of/less frequent bleeding (n = 26), showing that changes to the timing, frequency and amount
277 of bleeding with HC use were well-received. It should be noted that athletes were asked to state

278 the non-contraceptive benefits of HC use, therefore the primary benefit and reason of HC use
279 may have been for contraception.

280

281 Sixty-four (30.0%) HC users previously used a different form of HC and 87 (40.1%) non-HC
282 users had previously used a form of HC. The most common reasons provided for
283 discontinuation of HCs were: they were no longer needed (19.9%), they altered mood (19.2%),
284 resulted in weight gain (18.5%) and caused headaches/migraines (11.9%). It is important to
285 note that 46 separate reasons were provided for discontinuation of HCs, emphasising the high
286 inter-individual response. This further emphasises that sport practitioners should openly
287 discuss HC use and side effects with athletes to monitor athletes' health, well-being and
288 performance.

289

290 Negative side effects associated with the menstrual cycle were reported by 77.4% of non-HC
291 users, which is similar to the general population.⁶ Exercise may reduce the occurrence and
292 severity of dysmenorrhea,²⁷ although dysmenorrhea is still widespread in elite athletes. The
293 most commonly reported side effects were stomach cramps (47.5%), unspecified cramps
294 (22.1%), back pain (17.1%) and headaches/migraines (9.7%). Despite having physically
295 demanding lifestyles, only 4.2% of athletes stated that they refrained from exercise at certain
296 points of their menstrual cycle, which is lower than the general population where dysmenorrhea
297 limits daily activities in 15-29% of women.⁶ This discrepancy may be caused by internal and
298 external pressures to perform,²⁸ meaning that athletes persevere with training whilst
299 experiencing severe symptoms, evidenced by responses such as "No, but only because I can't
300 [avoid exercise]". A recent study in HC users and non-users, showed 51.1% of athletes thought
301 their menstrual cycle affected training and performance,⁸ although the current data indicates
302 that this rarely translates into athletes modifying training schedules to accommodate symptoms.

303

304 Twenty-four distinct, negative symptoms were reported by non-HC users (Table 2) and
305 approximately half of the athletes reported menstrual cycle length variability with a relatively
306 high mean variation of (9 ± 9 d) in these athletes. Although the current questionnaire did not
307 ask specifically about amenorrhea, three athletes described themselves as amenorrheic, and we
308 recommend that future studies explicitly ask this question in order to not under-represent the
309 occurrence of amenorrhea in elite sport. Side effects were mostly experienced during the first
310 two days of menstruation (81.6%), however also occurred in the week prior to menstruation
311 (25.0%) and between day 3 and the end of menstruation (28.9%). These data emphasise the
312 individuality of responses and the importance of athletes monitoring their menstrual cycle and
313 associated symptoms. We suggest that athletes and coaches/support staff should maintain an
314 open dialogue about the menstrual cycle and encourage flexibility in training schedules, when
315 possible, to accommodate the most severe side effects.

316

317 With half of elite athletes using HCs, future research should include HC users and non-users
318 in order to represent the female athlete population. Progestin-only contraceptives constitute
319 ~30% of HC use in athletes, although we are unaware of any research available to identify the
320 effects of these contraceptives on athletic performance and health. Twenty-five different
321 preparations of HC were identified in this study, containing different doses of oestrogens and
322 progestins, which may have different physiological effects.¹¹⁻¹³ Therefore, future research
323 should focus on (1) examining differences in responses between HC users and non-users, (2)
324 progestin-only contraceptive users and (3) differences between preparations of HC.

325

326 **Practical Applications**

327 Progestin-only contraceptives had a greater incidence of negative side effects and physicians
328 may want to consider the increased prevalence of perceived negative side effects with these
329 contraceptives. There is a large degree of individuality in the type and severity of symptoms
330 experienced during the menstrual cycle and HC use, and in the reasons for initiating and
331 discontinuing HC use. It is recommended that athletes and practitioners discuss side effects
332 experienced with the menstrual cycle and HC use in order to suit the athletes' best interests.
333 This research also highlights that future research should include HC users and non-users in
334 order to represent the female athlete population.

335

336 **Conclusions**

337 Approximately half of elite athletes use some type of HC, with combined OCs most commonly
338 used, possibly due to the ability to predict and/or manipulate the timing, frequency and amount
339 of menstrual bleeding. A large proportion of sportswomen use progestin-only contraceptives
340 with a perceived benefit being that they induce amenorrhea. There is a larger inter-individual
341 variability in response to HC use and the menstrual cycle which should be considered by
342 athletes and practitioners.

343

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346

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426

427 **Figure captions**

428 **Fig 1.** The prevalence of type, delivery method and preparation of hormonal contraceptives
429 (HCs) used and the prevalence of non-HC use. IUD, Intrauterine device; IUS, Intrauterine
430 system; DNS, dose not specified; OC, oral contraceptive.

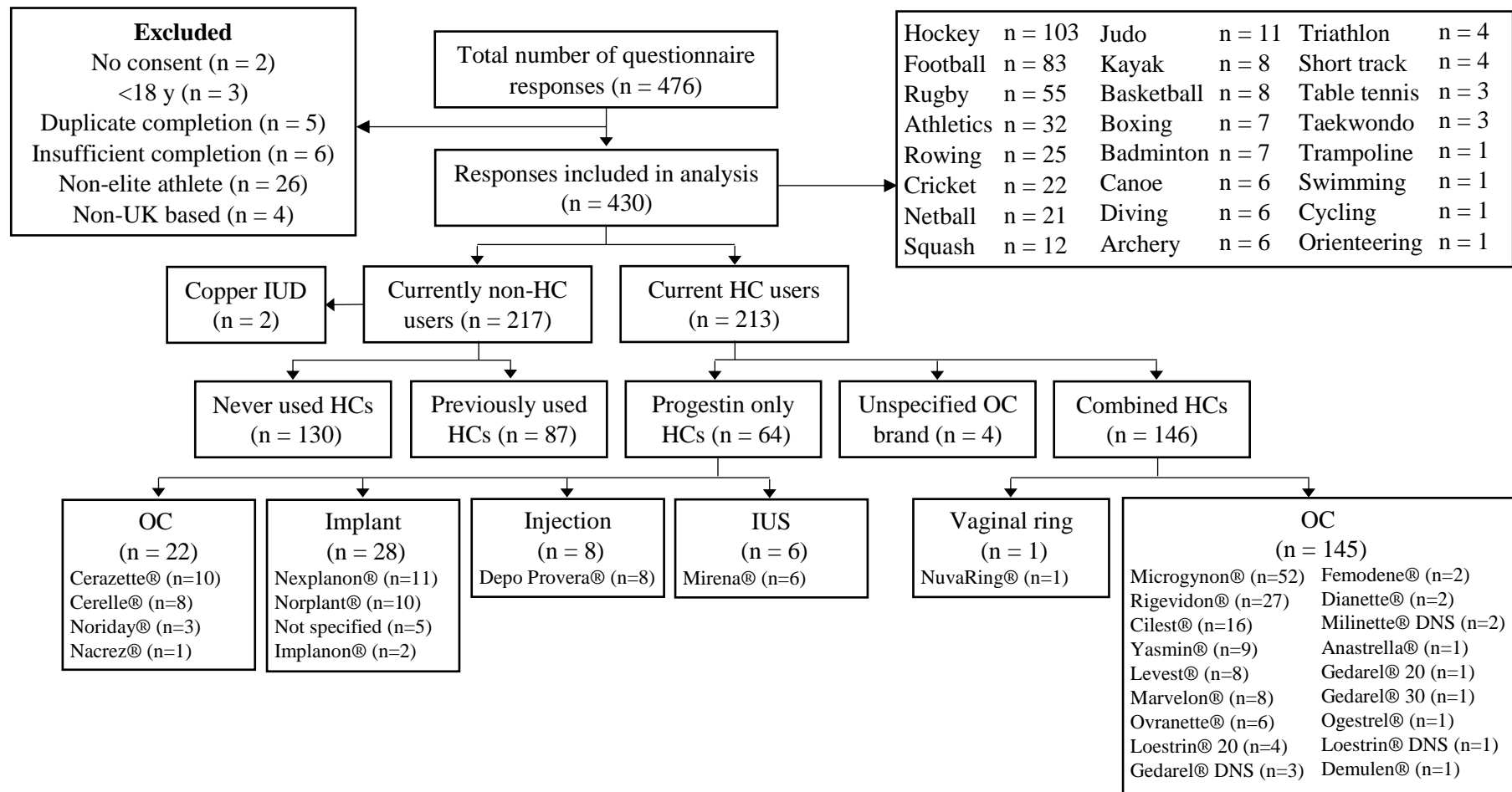
431 **Table 1.** Participant characteristics for hormonal contraceptive (HC) users and non-HC users.

432 **Table 2.** Frequency and prevalence of physical and emotional symptoms reported during the
433 menstrual cycle for non-hormonal contraceptive users.

434 **Table 3.** Prevalence of reported negative and positive side effects for current hormonal
435 contraceptive use.

436 **Table 4.** Prevalence of reported negative and positive effects of hormonal contraceptive use
437 in current users, separated by type and delivery method of hormonal contraceptive.

438 **Table 5.** Reasons, frequency and prevalence for discontinuation of previous hormonal
439 contraceptives.



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441 **Fig 1.** The prevalence of type, delivery method and preparation of hormonal contraceptives (HCs) used and the prevalence of non-HC use. IUD,

442 Intrauterine device; IUS, Intrauterine system; DNS, dose not specified; OC, oral contraceptive.

443 **Table 1.** Participant characteristics for hormonal contraceptive (HC) users and non-HC users.

Demographic information	HC users	Non HC users	Total
Age (y)	24.1 ± 4.5	24.3 ± 4.3	24.2 ± 4.4
Height (m)	1.7 ± 0.1	1.7 ± 0.1	1.7 ± 0.1
Weight (kg)	66.2 ± 9.8	66.0 ± 9.3	66.1 ± 9.6
Body mass index (kg·m ²)	23.1 ± 2.6	23.0 ± 2.5	23.1 ± 2.5
Age at menarche (y)	13.4 ± 1.5	13.8 ± 1.3	13.6 ± 1.4*
Gynaecological age (y)	10.7 ± 4.6	10.6 ± 4.6	10.6 ± 4.6
Duration competing at current level (y)	5.0 ± 3.6	5.7 ± 4.1	5.4 ± 3.9*
No. training session per week	8.5 ± 4.5	8.4 ± 4.0	8.5 ± 4.3
Average training session duration (mins)	92.8 ± 29.8	89.1 ± 27.8	90.9 ± 28.8
Total weekly training duration (mins)	769.7 ± 440.8	720.3 ± 385.6	744.6 ± 413.9

* Indicates a significant difference between HC users and non-HC users (p < 0.05)

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458 **Table 2.** Frequency and prevalence of physical and emotional symptoms reported during the
 459 menstrual cycle for non-hormonal contraceptive users.

	Symptom	Frequency	Prevalence (%)
Physical	Stomach cramps/abdominal pain	103	47.5
	Unspecified cramp	48	22.1
	Back pain	37	17.1
	Headache/migraine	21	9.7
	Bloating	12	5.5
	Nausea/sickness/vomiting	10	4.6
	Tiredness/fatigue/lethargy	9	4.1
	Dizzy/lightheaded/lack of coordination	5	2.3
	Leg discomfort	4	1.8
	Unspecified pain	3	1.4
	Hot flushes/sweating	2	0.9
	Hunger/increased appetite	2	0.9
	Sore breasts	2	0.9
	Bad skin	1	0.5
	Constipation	1	0.5
	Heavy bleeding	1	0.5
	Muscle ache	1	0.5
	Problems with exercise	1	0.5
	Sore throat	1	0.5
	Tight neck	1	0.5
Weakness	1	0.5	
Emotional	Mood changes/swings	9	4.1
	Irritability	1	0.5
	Flustered	1	0.5

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465 **Table 3.** Prevalence of reported negative and positive side effects for current hormonal contraceptive use.

	Negative effect	Frequency	Prevalence (%)	Positive effect	Frequency	Prevalence (%)
Physical	Weight gain	16	7.5	Regular period	27	12.7
	Irregular periods	9	4.2	Cessation of/less frequent periods	26	12.2
	Poor skin	6	2.8	Reduced bleeding/lighter periods	23	10.8
	Headaches/migraines	4	1.9	Improved skin	13	6.1
	Altered cycle length	3	1.4	Reduced period pain	10	4.7
	Breast issues (bigger/sore)	3	1.4	Reduced cramps (unspecified)	7	3.3
	Constant/irregular bleeding	3	1.4	Reduced pain (unspecified)	6	2.8
	Spotting	3	1.4	Reduced headaches/migraine	3	1.4
	Tiredness/fatigue/lethargy	3	1.4	Increased iron	3	1.4
	Effect on training/performance	2	0.9	Less ill/sick	3	1.4
	Nausea/sickness/vomiting	2	0.9	Resumption of cycle from amenorrhea	3	1.4
	Water retention	2	0.9	Reduced stomach cramps	3	1.4
	Abnormal liver function	1	0.5	Effect on training/performance	2	0.9
	Bloating	1	0.5	Reduced bloating	1	0.5
	Hormone imbalance	1	0.5	Improved bone density	1	0.5
	Increased appetite	1	0.5	Less faint	1	0.5
	Stomach pain	1	0.5	Reduced fluctuations in water retention	1	0.5
	Unspecified pain	1	0.5	Reduced fluctuations in weight	1	0.5
			Reduced PCOS side effects	1	0.5	
Emotional	Mood changes/swings	9	4.2	Improved mood	3	1.4
Both			Helps PMT	1	0.5	
Practical			Ability to predict/change cycle date	45	21.1	
			Couldn't forget to take	3	1.4	

PCOS, Polycystic ovarian syndrome; PMT, Pre-menstrual tension.

467 **Table 4.** Prevalence of reported negative and positive effects of hormonal contraceptive use in current users, separated by type and delivery
 468 method of hormonal contraceptive

	Type of hormonal contraceptive			Delivery method of hormonal contraceptive					
	Combined	Progestin -only	Total	OC	Implant	Injection	IUS	Vaginal ring	Total
Experienced negative symptoms	26	25	51	35	15	2	2	0	54
Didn't experience negative symptoms	120	39	159	136	13	6	4	1	214
Percentage with symptoms (%)	17.8	39.1	24.4*	20.5	53.6	25.0	33.3	0.0	25.2*
Experienced positive effects	99	42	141	117	18	3	5	1	144
Didn't experience positive effects	47	22	69	54	10	5	1	0	70
Percentage with symptoms (%)	67.8	65.3	67.1	68.4	64.3	37.5	83.3	100.0	67.3

* Indicates a significant effect of type or delivery method ($P < 0.05$). OC, oral contraceptive; IUS, intrauterine system.

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475 **Table 5.** Reasons, frequency and prevalence for discontinuation of previous hormonal
 476 contraceptives.

	Reason	Frequency	Prevalence (%)
Physical symptoms	Weight gain	28	12.8
	Headaches/migraine	18	8.3
	More frequent or heavier bleeding	13	6.0
	Irregular/no bleeding	10	4.6
	Poor skin	7	3.2
	Constant bleeding	6	2.8
	Fatigue/tiredness/lethargy	6	2.8
	Bone health	5	2.3
	Impaired training/performance/recovery	5	2.3
	Nausea/vomiting	4	1.8
	Resumption/regulation of menses	4	1.8
	Stomach cramps	3	1.4
	Stroke and cancer risk	3	1.4
	Water retention	3	1.4
	Cramps	2	0.9
	Hormone imbalance	2	0.9
	Impaired sleep	2	0.9
	Low libido	2	0.9
	Painful periods	2	0.9
	Bloating	1	0.5
	Blood pressure	1	0.5
	Blood side effects [sic]	1	0.5
	Breast pain	1	0.5
	Dizziness and blurred vision	1	0.5
	For oestrogen reasons [sic]	1	0.5
	Hot flushes	1	0.5
	Illness	1	0.5
Pain during intercourse	1	0.5	
PMS	1	0.5	
Removed to assess oestrogen level	1	0.5	
Emotional symptoms	Mood	29	13.3
	Wanting to be “normal” / “natural”	5	2.3
	Depression	4	1.8
	Needed a rest/break	3	1.4
Practical	Not sexually active/not needed	30	13.8
	Forgetting to take pill	16	7.3
	Doctor/nurse recommendation	11	5.0
	Didn't like it	10	4.6
	Pregnancy	6	2.8
	New preparation/type	4	1.8
	Ran out	4	1.8
	Went abroad/travelling	4	1.8
	Ineffective	3	1.4
	Wanted something different/permanent	2	0.9
	Word of mouth	2	0.9
	Loss of effect[sic]	1	0.5

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