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Investigating the Impact of the Menstrual Cycle Phases on Agility Performance in Female Football Players

Bachelor of Sports and Leisure Management

Thesis

Spring 2025

KAMK • University
of Applied Sciences

Abstract

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Title of the Publication: Investigating the Impact of the Menstrual Cycle Phases on Agility Performance in Female Football Players

Degree Title: Bachelor of Sport Studies, Sports and Leisure Management

Keywords: agility, menstrual cycle, female, football athletes

This study investigated the possible connection between the phases of the menstrual cycle and agility performance in female football players in collaboration with Kajaanin HAKA women's team as the commissioning party. The contraceptive pill users were also included in this study to serve as a control group. The research involved monitoring participants' menstrual cycles and the timing of oral contraceptive pill use through self-reports, along with performing agility and reactive agility tests at different stages of their cycles.

A total of seven female football athletes were recruited and categorized into two groups: the naturally menstruating group and the oral contraceptive group. Members of the naturally menstruating group reported their menstrual cycle status and associated symptoms weekly via a pseudonymous online questionnaire. The Illinois Agility Test and the Reactive Agility Test (Y-shaped test) were conducted according to the menstrual cycle phase for the naturally menstruating group and the pill cycle for the oral contraceptive group. In total, six participants (three from each group) completed the study and were included in the analysis. Self-reported symptoms suggested that phase 2 (strong estrogen peak) had fewer physical and emotional symptoms, indicating a sense of stability and a generally positive mental state. In contrast, phase 1 (5 days from the onset of bleeding) posed significant physical and emotional challenges that could negatively affect performance and training ability.

The Illinois Agility Test demonstrated a moderate positive linear correlation ($r = 0.413$) in the naturally menstruating group, while the oral contraceptive group exhibited a notably weak correlation ($r = –0.22$, $\rho = –0.12$). The Reactive Agility Test showed weak correlations for both groups, with the naturally menstruating group showing ($r = –0.19$, $p = 0.08$) and the oral contraceptive group ($r = 0.35$, $p = 0.25$). This study indicates that the menstrual cycle might impact agility performance; however, the correlation is deemed weak according to the results, and the overall trend remains unclear. Future research that involves larger sample sizes and enhanced methods for accurately identifying menstrual cycle phases is encouraged.

Forward

This thesis would not have been possible without the support, guidance, and encouragement of many wonderful individuals.

First and foremost, I would like to express my deepest gratitude to my thesis supervisor, Kirsi Huotari, for her invaluable guidance, support, and encouragement throughout this research process. Her expertise and feedback have been essential in helping me complete this work.

I would also like to sincerely thank my friends Hilla Heikkinen and Sage Kemiläinen, who generously helped me translate the questionnaires from English to Finnish. Their support made it easier for my subjects to participate in this study and contributed greatly to the success of this study.

Finally, I want to thank my cat Sukat, whose comforting presence and quiet companionship have been a constant source of motivation and joy throughout this journey.

Thank you all for being part of this process.

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1 Introduction

The influence of the menstrual cycle on athletic performance is a highly debated topic in sports science (Juillard et al., 2024). However, existing high-quality studies on this subject are insufficient (Elliott Sale et al., 2023). With an increasing number of women participating in sports and exercise, there is a growing need for research specifically focused on the female menstrual cycle. Given the significant impact of agility on athletic performance in nearly all sports, it is crucial to understand how agility varies throughout the menstrual cycle (Karim, 2016). When compared to other aspects of sports performance and training adaptation, there is a notably limited number of studies focused on the relationship between the menstrual cycle and agility performance. Therefore, it is essential to pursue further research to better understand the connections between the menstrual cycle and agility performance.

This study aims to explore the potential relationship between menstrual cycle phases and agility performance in female football athletes. The participants utilizing the contraceptive pill were also incorporated into this study to function as a control group. The research involves tracking participants' menstrual cycles/oral contraceptive pill-taking time through self-reporting and conducting agility and reactive agility tests at different phases of their cycles. In this study, a quantitative research methodology is employed to systematically collect and analyze data regarding the menstrual cycles of athletes and the agility test results.

The study is carried out in collaboration with the Kajaanin Haka Football Club’s female team as the commissioning party. The benefit of the study for the commissioning party is to enhance the team's overall performance and achieve better results, thereby enhancing the club’s reputation. Coaches will be provided with a tool to monitor players’ menstrual cycles, enabling them to develop more effective training programs. Furthermore, athletes gain a deeper understanding of their bodies and can leverage the insights from this research to enhance their future performance.

The author has served as the physical trainer for the female team for two seasons. This collaboration deepens the author’s understanding of the factors that influence human growth, development, and social behavior. It also enhances the author’s ability to integrate these factors into physical activity and utilize physical education to support and educate on human growth and development. Additionally, this experience refines the author’s skills in communicative and

interactive professional environments, decision-making in unforeseen circumstances, and adherence to ethical principles in the field.

This study presents both advantages and limitations. Its focus on female football players makes the findings particularly relevant for female football teams. However, this specificity also suggests that the insights derived may not be applicable to other sports or the broader population.

2 The Menstrual Cycle

According to Thiyagarajan et al. (2022), the menstrual cycle is a regular, cyclic process that can be seen as a periodic preparation for pregnancy and fertilization. In primates and humans, this cycle is referred to as the menstrual cycle, and its most prominent feature is the recurring vaginal bleeding that occurs when the uterine mucosa is shed (menstruation). While the cycle length can vary significantly, the average duration is 28 days from the onset of one menstrual period to the onset of the next (from the first bleeding day of the current cycle to the first bleeding day of the next cycle). In the conventional delineation of the menstrual cycle, days are enumerated commencing with the onset of menstruation. This cyclical process initiates at puberty, typically manifesting between the ages of 10 and 16, and culminates at menopause, which, on average, occurs at the age of 51.

Throughout the menstrual cycle, hormones are secreted in a feedback manner to regulate the cycle, with variations occurring across its duration. Between puberty and menopause, circulating concentrations of estrogen fluctuate fivefold and progesterone greater than 50-fold over a 21- to 35-day cycle. The ovary produces a variety of substances, including steroid hormones (such as androgens, estrogens, and progesterone, which are considered among the most influential), prostaglandins, inhibin, activin, growth factors, proteoglycans, and proteolytic enzymes. Ovarian steroids, beyond their role in reproduction, are known to affect various types of tissues, including epithelial, connective, muscle, and nervous tissues, and play a significant role in numerous biological functions such as metabolism, breathing, immune response, mental processes, functions of the gastrointestinal and cardiovascular systems, autonomic regulation, and the operation of the genitourinary system. Considering the broad impact of ovarian hormones on these diverse biological systems, it is understandable that research involving female participants, especially studies focused on physiological reactions to physical activity and the body's adjustments to exercise training, often yields varied results. This variability can likely be attributed to the range of hormonal profiles a woman may experience over her lifetime. (Evans & Bennett, n.d.; Henry & Norman, 2003; Thiyagarajan et al., 2022)

A recommendation for defining menstrual cycle phases based on hormonal profiles was provided by Elliott-Sale et al. to enhance the reliability of studies and the validity of findings. According to Elliott-Sale et al. (2021, as cited in McGovern et al., 2004; Tsampoukos et al., 2010; Janse de Jonge et al., 2019; Elliott-Sale et al., 2020), the menstrual cycle can be divided into four phases as shown

in Table 1. Meanwhile, Figure 1 presents a visual representation of the fluctuations in hormone levels throughout a standard menstrual cycle.

Phases	Time	Hormone Status and Definitions
Phase 1	Begins with the onset of bleeding and lasts until day 5.	Low estrogen and progesterone levels.
Phase 2	Occurs 14–26 hours prior to ovulation and the LH surge.	Estrogen levels are higher than in phases 1, 3, and 4, and progesterone levels are higher than in phase 1 but lower than 6.36 nmol·L^{-1}.
Phase 3	Begin with a positive result on a urinary ovulation kit and last 24–36 hours.	Estrogen levels are higher than in phase 1 but lower than in phases 2 and 4, and progesterone levels are higher than in phase 1 but lower than 6.4 nmol·L^{-1}.
Phase 4	Start 7 days after ovulation has been confirmed.	Estrogen levels are higher than in phases 1 and 3 but lower than in phase 2, and progesterone levels are greater than 16 nmol·L^{-1}.

Table 1. Overview of the menstrual cycle phasing. (Elliott-Sale et al., 2021)

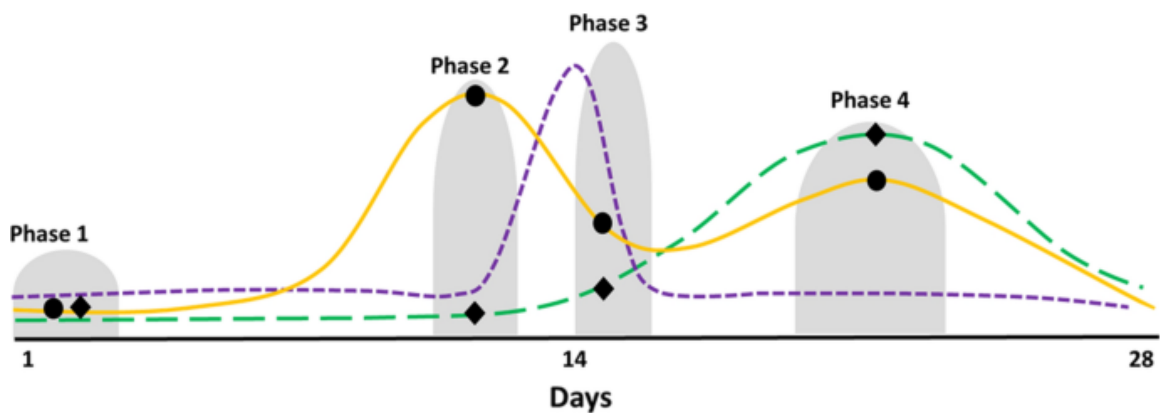

Figure 1. Visual overlay of the hormonal changes across an idealized 28-day menstrual cycle: the solid gold line represents estrogen, the short-dash purple line represents luteinizing hormone, and the long-dash green line represents progesterone. (Elliott-Sale et al., 2021)

2.1 Effect of oral contraceptives on the hormone level

Rechichi et al. (2009) highlighted that the prevalence of oral contraceptive use is increasing among athletes. As a result, it is crucial to include users of oral contraceptives in studies that examine exercise performance and variations in female hormonal levels. Oral contraceptive pills (OCPs) have a dual role: they reduce the natural levels of estradiol and progesterone in the body while providing synthetic estrogen and progestin, and this hormonal shift contrasts with that of women who have regular menstrual cycles and may influence exercise performance by altering the physiological processes regulated by ovarian hormones (Elliott-Sale et al., 2020).

Currently, three types of oral contraceptive pills are broadly prescribed: combined estrogen-progesterone, progesterone-only, and continuous or extended-use pills. The comparison of hormone profiles between the natural menstrual cycle and the use of combined oral contraceptive pills, as well as progesterone-only pills, is presented in Figure 2. Most combined monophasic oral contraceptive pills are second-generation formulations that contain low to standard doses of ethinyl estradiol alongside one of the following progestins: levonorgestrel, norethisterone, desogestrel, or gestodene. Typically, these pills are taken daily for 21 to 24 OCP days during the active phase, followed by 7 to 4 OCP days of a withdrawal phase with inactive pills. Progesterone-only pills (POPs), frequently referred to as mini-pills, are taken daily and do not include any inactive pills, eliminating scheduled withdrawal bleeding. In an extended-use regimen, active hormone pills are taken daily for three months, followed by a week of placebo pills. Alternatively, a continuous-use regimen can be implemented by exclusively using the active pills from monthly packs for up to one year, which can effectively halt all menstrual bleeding. (Barton et al., 2023; Cooper & Patel, 2024)

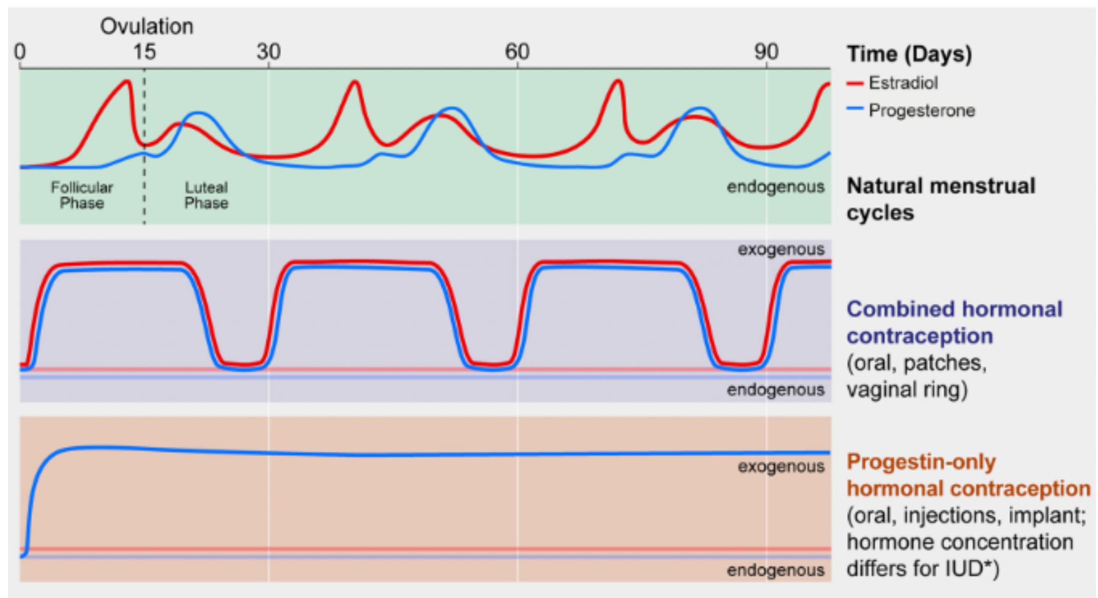

Figure 2. Comparison of ovarian hormone profiles in the natural menstrual cycle (top row) versus the most common hormonal contraceptives: combined hormonal contraception (middle row) and progesterone-only contraception (bottom row). (Lewis et al., 2019)

2.2 Effect of the menstrual cycle on exercise physiology

Steroid hormones, including estrogen and progesterone, play a crucial role in regulating gene expression and controlling a wide range of physiological processes, such as immune function, metabolism, and reproduction. The hormones produced by the ovaries have an impact on several physiological processes in the female body. These processes include maximal strength, substrate metabolism, basal body temperature, inflammation status, and protein breakdown. Studies suggest that these effects are influenced by the phase of the menstrual cycle and the levels of hormones. The concentrations of female sex hormones can influence muscle strength and power. Estrogen has a stimulating effect, while progesterone has an inhibitory effect on force production. Estrogen has been shown to enhance muscle mass and strength, as well as increase the collagen content of connective tissues. However, in tendons and ligaments, estrogen reduces stiffness, directly impacting performance and the risk of injury. Elevated estrogen levels may lead to reduced power and performance and can make females more susceptible to serious ligament injuries. It is hypothesized that higher strength and power outcomes occur when progesterone is low during the follicular phase and estrogen peaks. Conversely, lower strength outcomes are expected when progesterone is high during the luteal phase. The menstrual cycle phase may also

impact rapid force production, with muscle activation playing a key role in explosive movements. Given the predictable variations in hormone levels across the different phases of the menstrual cycle, it is reasonable to hypothesize that these fluctuations, beyond their reproductive roles, may have implications on the athletic performance of females, particularly in aspects such as agility. (Carmichael et al., 2021; Chidi-Ogbolu & Baar, 2019; Henry & Norman, 2003; Mikkonen et al., 2023)

3 Defining Agility

Defining agility has always been a complex and elusive task throughout history, and there is no consensus on a precise definition within the sports science community (Usher, 2019, as cited in Chelladurai, 1976; Gambetta, 1996; Sheppard & Young, 2006), and the concept has been developed from different perspectives over the years. Agility has traditionally been defined as a skill-related component of physical fitness that pertains to the capacity to change the body's direction or position in space with celerity and precision while maintaining balance (American College of Sports Medicine, 2014; Nieman, 2006; Turner, 2011). Consequently, a significant portion of the research on agility has predominantly concentrated on the evaluation of pre-established, change-of-direction speed tests. These methodologies, which include the Illinois Agility Run, Shuttle Run Test, T-Test, the 10-meter shuttle, and so on, have been advanced as instruments for quantifying an individual's velocity and agility capabilities (Zemková & Hamar, 2014).

However, questions have been raised about whether traditional definitions of agility in sports accurately capture its nature. The agility drills are pre-planned and primarily evaluate an athlete's capacity to change direction rather than their ability to react to sport-specific stimuli. In most sports, changes in direction are prompted by stimuli such as an opponent's actions and are influenced by perceptual and decision-making skills. As a result, new definitions of agility include not only predefined movements but also reactive elements (Turner, 2011). Therefore, agility has been defined by Sheppard & Young (2006) as a rapid whole-body movement with the ability to change direction in response to a sport-specific stimulus, incorporating physical, technical, perceptual, and decision-making skills. Additionally, Sheppard and Young (2006, as cited in Young, James, and Montgomery 2002) defined agility in the context of running sports, particularly football codes, highlighting the various factors that influence performance. The two principal components of agility are change of direction speed and perceptual decision-making factors were identified. These elements encompass several sub-components, as illustrated in Figure 3.

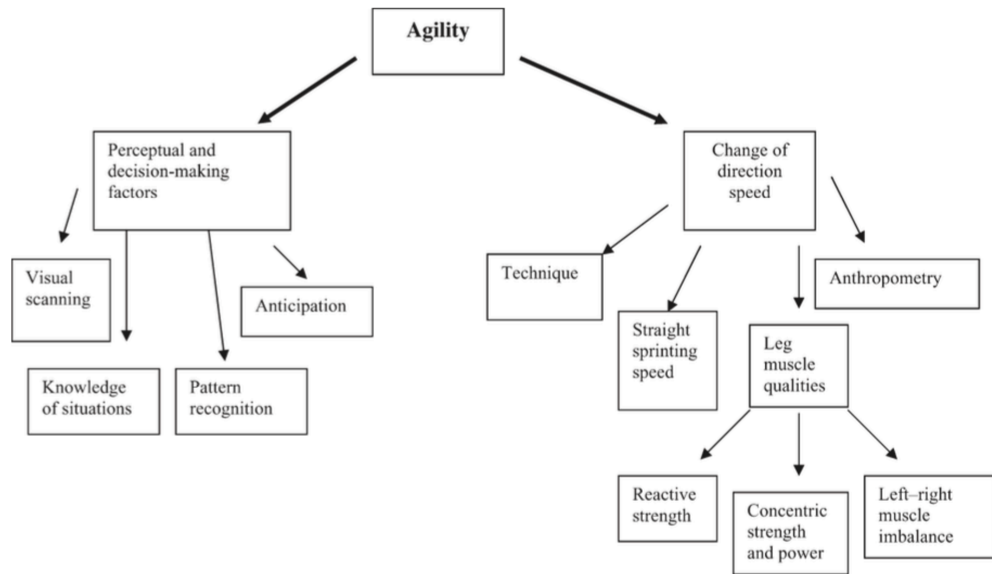

Figure 3. Universal agility components (Sheppard & Young, 2006)

4 “Female” and The Development Stages of The Reproductive Hormones

The term "female" includes a diverse group. When examining the potential impact of the menstrual cycle on exercise performance, it is crucial to specify that "female" refers specifically to cisgender females identified by ovarian steroid concentrations (Schmalenberger & Eisenlohr-Moul, 2019). Additionally, due to the inherent variability in female reproductive endocrinology, defining female identity solely based on reproductive hormonal profiles is challenging (Elliott-Sale et al., 2021). Consequently, it is imperative to precisely delineate the inclusion and exclusion criteria for the recruitment of participants in the related study. According to Elliott-Sale et al. (2021), eumenorrhea is characterized by menstrual cycle lengths of 21 to 35 days, at least 9 periods per year, evidence of LH surge, a correct hormonal profile, and no use of hormonal contraceptives for the three months preceding recruitment. Moreover, naturally menstruating women are those who have menstrual cycles lasting 21 to 35 days but without confirmed ovulation, meaning ovulation was not assessed by urinary luteinizing hormone surge or verified by hormone concentrations via blood sample analysis (Elliott-Sale et al., 2021).

Menarche represents a significant milestone in the process of puberty, indicating the onset of reproductive capability. Following menarche, a girl’s body begins to adapt, with gonadotrophs becoming responsive to the effects of estradiol on luteinizing hormone and follicle-stimulating hormone. While regular ovulation typically does not occur until after she has experienced approximately six menstrual cycles, this gradual development is a natural aspect of maturation. On average, girls will experience menarche around the age of 12, with full sexual maturity and fertility usually being reached between the ages of 11 and 16. Throughout the reproductive years, various key factors affect the levels of estrogen and progesterone. These include the natural fluctuations that occur within a regular menstrual cycle, disruptions caused by illnesses or health conditions, alterations resulting from the use of external hormones—both synthetic and natural—as well as the effects of pregnancy and menopause. (Remien & Pillarisetty, 2023; Elliott-Sale et al., 2021)

Menopause is defined as the permanent cessation of menstruation resulting from the decline in ovarian follicular function. Typically, natural menopause occurs between the ages of 45 and 55 in women globally; however, some individuals may experience early menopause (before the age of 40). (World Health Organization: WHO, 2024)

Applying inclusive and exclusive criteria according to the definition of “female” and the development stage of hormones improves the precision and reliability of defining the population and

ensures a more uniform hormonal profile. Nonetheless, this method also limits the number of available participants and prolongs the duration of the study, especially if verifying the condition is necessary before initiating data collection (Elliott-Sale et al., 2021).

5 Purpose and Objectives

The main purpose of this study was to examine the potential relationship between the menstrual cycle and agility performance in female football athletes. In addition, this research aimed to enhance athletes' understanding of their menstrual cycles by incorporating a self-report questionnaire that tracks symptoms associated with the menstrual cycle. Furthermore, from the author's perspective as a student, the purpose of this study is to deepen the author's understanding of this specific topic (menstrual cycle-related studies) and to learn from the process of conducting research.

This study sought to explore the following research questions: (1) In what ways do hormonal fluctuations throughout the menstrual cycle impact agility performance in female footballers, in comparison to oral contraceptive users? (2) What patterns of change can be observed in agility performance in relation to the menstrual cycle and hormonal fluctuations?

6 Research Method

It is believed that the menstrual cycle influences the physical state of female athletes due to hormonal variations throughout the cycle (Juillard et al., 2024). This study was designed to explore the potential correlation between the menstrual cycle phases and agility performance metrics, specifically within the group of female football athletes. The study was carried out by using a quantitative research method, which emphasizes objective measurement and statistical analysis of data obtained through polls, surveys, and the manipulation of pre-existing statistical datasets using computational techniques (Labaree, 2024). This study utilized a correlational research design to investigate the relationship between agility performance and the phases of the menstrual cycle or oral contraceptive use. The correlational design examines the links between variables without any intervention or manipulation by the researcher (Bhandari, 2021a). This approach is particularly valuable for examining non-causal relationships, such as the interplay between the menstrual cycle and agility performance in this study, as it yields significant insights into complex interactions present in real-world scenarios.

The research was conducted with cisgender women affiliated with the Kajaanin Haka club. It involved the implementation of two agility assessments, which were administered in alignment with the participants' menstrual cycle phases/oral contraceptive phase. These phases were tracked through the use of a self-reported questionnaire. Given the precise definition of the menstrual cycle and the delineation of its various phases, it facilitates more effective research into menstrual cycle tracking. By selecting different phases of the menstrual cycle, it is possible to estimate the highest and lowest levels of estrogen and progesterone. This allows for an investigation into the correlation between agility performance and these hormone levels.

Furthermore, the use of oral contraceptive pills is associated with the stabilization of hormone profiles (Rechichi et al., 2009). Consequently, women who utilize oral contraceptives were recruited to serve as the control group in this study. Data regarding the subjects' menstrual cycle status/ oral contraceptive pill phase and the timings of the two agility tests were collected. Subsequently, a correlation analysis was conducted to examine the relationship between these variables.

The research complied with the ethical principles for conducting studies with human participants in Finland, as specified in the TENK guidelines (2019). This study placed a high value on the dignity and autonomy of all participants, ensuring their right to be informed. Furthermore, it guaranteed

that no undue risks or harm would be inflicted upon participants, communities, or other subjects involved. The data management plan can be found in Appendix 1. The ethical committee was informed about the research through the thesis plan.

6.1 Participants

The participants were recruited from the commissioning party, the Kajaanin Haka female football team. The inclusion criteria are: (1) age 16-35, non-smoker, (2) healthy by own report, (3) a regular menstrual cycle of 28 days (acceptable 21-35 days) or oral contraceptive user, and (4) cisgender female football athletes. All subjects were given an informed consent form (see Appendix 2) and a health questionnaire (see Appendix 3) for safety and ethical concerns. No tests were conducted on the individual before the consent form was signed. The participants were selected according to the previously outlined criteria, and a scanning reproductive status questionnaire (see Appendix 4) was employed as part of the selection process. The study information was presented to all players during the team meeting to ensure participants received sufficient and clear information about the research, including content, procedures, and data handling methods. The consent form, scanning questionnaire, and health questionnaire were sent to the subjects via email.

A total of seven participants were recruited in the study: 3 with oral contraceptives and 4 with regular menstrual cycles (naturally menstruating). Six women completed the study, consisting of 3 with oral contraceptives (1 progesterone-only contraception user - Desirett, 2 combined hormonal contraception users - Dizminelle and Gestinyl) and 3 with natural menstruation, with one participant withdrawing due to personal reasons. There were no noteworthy differences among the participants in terms of age, age at menarche, or health conditions (Table 2).

	Naturally menstruating group (N = 3)	Oral contraceptive group (N = 3)
Age (yr)	27.3 ± 6.4	26.3 ± 2.3
Age at menarche (yr)	13 ± 1	12.3 ± 1.5

Length of the menstrual cycle (days)	28.6±1.7	N/A*

Table 2. Subject characteristics in the naturally menstruating group and oral contraceptive group. Data are presented as mean ± standard deviation (SD). *Contraceptive users frequently exhibit irregular menstrual cycles, which complicates the acquisition of reliable data.

Given the constraints associated with a limited sample size, subjective menstrual symptoms were systematically collected and analyzed to provide contextual insights into the potential individual variability in performance outcomes.

6.2 Menstrual cycle determination and testing phases

In order to determine the different phases of the menstrual cycle for the testing schedule, subjects were asked to track their menstrual cycle with a questionnaire (see Appendix 5, modified from Schmalenberger & Eisenlohr-Moul, 2019) designed by the author from the first day of the menstrual cycle (the first bleeding day). The menstrual cycle tracking questionnaire inquired about the start date of the current cycle, along with the feelings and symptoms experienced throughout the week. The questionnaire was completed weekly (for an idealized 28-day cycle). The author notified the participants when it was time to complete the questionnaire. Due to the budget of this study, the urinary ovulation kit and blood test were not available to identify the hormonal level. The menstrual cycle tracking was recorded in a logbook from 1 month before the first test until the last test completion. The phases were confirmed by counting the days of the menstrual cycle. The tests were conducted during phases 1, 2, and 4 for each individual, in accordance with the recommendations from Elliott-Sale et al. (2021) and Schmalenberger & Eisenlohr-Moul (2019). Due to the variability in menstrual cycle lengths, the duration of each phase may vary as well. Table 2 outlines the number of days associated with each phase for different cycle lengths.

Cycle length / Phase	21	22	23	24	25	26	27	28
Phase 1	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5

Phase 2	3-6	3-6	4-7	5-8	6-9	7-10	8-11	9-12
Phase 4	12-16	13-17	14-18	15-19	16-20	17-21	18-22	19-23
Cycle length / Phase	29	30	31	32	33	34	35	
Phase 1	1-5	1-5	1-5	1-5	1-5	1-5	1-5	
Phase 2	10-13	11-14	12-15	13-16	14-17	15-18	16-19	
Phase 4	20-24	21-25	22-26	23-27	24-28	25-29	26-30	

Table 3. Phase determination by counting method (The onset of bleeding counts as day 1)

The oral contraceptive users were tested at three evenly spaced times, with the inactive pill-taking phase excluded to keep the hormone level stable. The first test was conducted two days after the end of the inactive pill phase, followed by the second and third tests occurring seven and fourteen days after the initial evaluation, respectively.

6.3 Test

The test was scheduled based on the menstrual cycle phase and the contraceptive pill phase. Participants were instructed to conduct the test in the afternoon, ensuring that they refrained from engaging in vigorous physical activity and consuming substantial meals prior to the assessment. This helped minimize the potential impact of diet and hydration status on the results. Participants wore the same shoes during each testing session and avoided consuming alcohol and caffeine 24 and 12 hours before the test, respectively, to ensure objectivity. During each test session, a basic warm-up routine, similar to the subjects' normal training session, was carried out, followed by verbal and visual explanations of the testing protocols. Afterward, the Illinois agility test and reactive agility test were completed accordingly. All the tests were conducted in an indoor field to minimize the effect of an outdoor open environment.

6.3.1 Illinois Agility Test

The Illinois Agility Test (Cureton, 1951) was previously considered a standard test of agility. In a 2017 study by Kutlu et al., an intraclass correlation coefficient of 0.98 was reported for multiple trials of the Illinois Agility Run test conducted with amateur female soccer players. The initial objective was to utilize an electronic timing gate system for the assessment to ensure precise measurement of performance. However, the Chronojump system provided by KAMK experienced connectivity issues. Consequently, the study employed a stopwatch along with manual timekeeping methods for data collection. The timekeeping was conducted with the same individual throughout all the tests; consequently, any manual errors that might affect the results would likely be consistent across each trial. The setup featured four cones to mark the start and two turning points, along with an additional four cones placed 3.3 meters apart near the start line. The test required participants to sprint 10 meters, make a turn, return to the start line, weave through four markers, and complete two 10-meter sprints in the opposite direction. Participants needed to avoid cutting across the markers and were instructed to run around them. If a participant did not comply, the trial was halted and would be repeated after the standard recovery period. The total time, measured in seconds, was recorded, and the best score out of three attempts was used, with a 3-minute rest period permitted between trials.

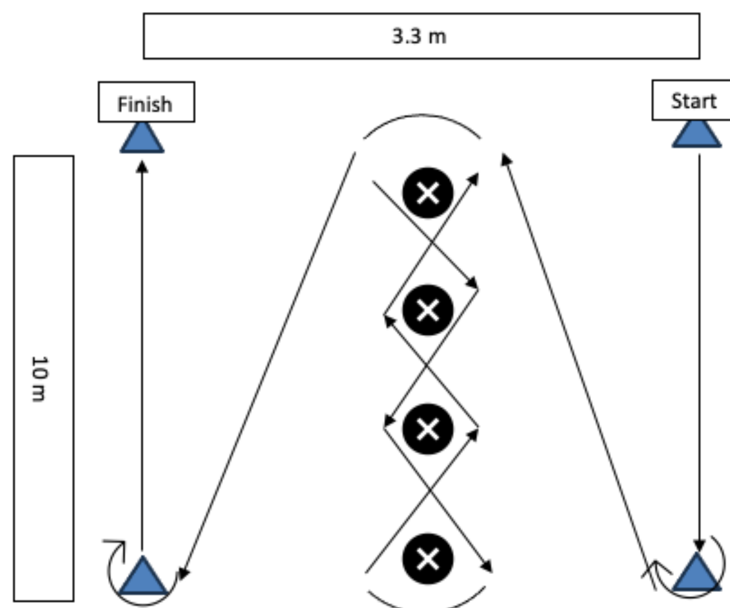

Figure 4. IAT illustration, modified from Cureton (1951)

6.3.2 Reactive Agility Test (“Y-shaped” running test)

The "Y-shaped" running test is commonly used for the reactive agility test in team sports, incorporating light, video, or human stimulation. The intraclass correlation coefficient score for the "Y-shaped" running test was found to be high for both males (ICC 0.81) and females (ICC 0.86). Furthermore, light stimulation demonstrates moderate reliability, making it suitable for both laboratory and field tests, and is recommended as a training tool. However, it is not always accessible for all studies. Alternatively, human stimulation is also found to have moderate reliability and high validity. (Paul et al., 2015)

In this study, a "Y-shaped" running test was conducted with human participants to evaluate performance metrics. Data collection employed a stopwatch and manual timekeeping methods. The experimental setup featured three gates, each 1.5 meters wide, labeled A, B1, and B2. Participants began at the starting line behind gate A in a sprint start position. After a 5-meter dash to gate A, they proceeded towards either gate B1 or B2. The test concluded when a participant crossed the finish line at either gate, with any part of their body. Attempts failing to navigate the gates correctly were deemed invalid and excluded from analysis. Total time, recorded in seconds, was collected, and the optimal performance from three attempts was used for further analysis, with a 3-minute recovery period between each attempt.

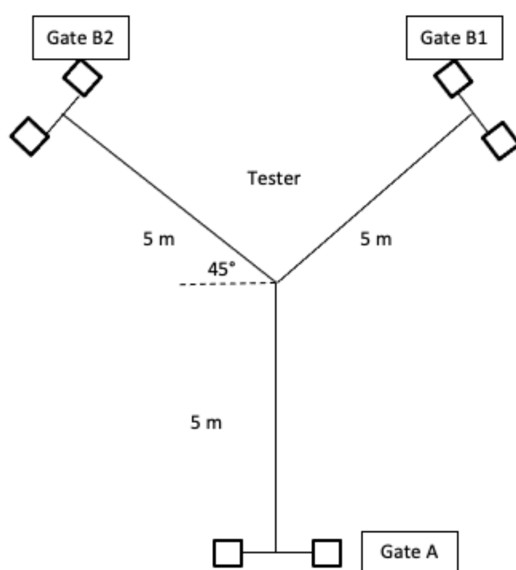

Figure 5. "Y-shaped" running test illustration

6.4 Statistical analysis

The correlation coefficient was utilized to evaluate the variations in agility run times associated with different phases of the menstrual cycle/oral contraceptive pill-taking. The correlation coefficients for the Illinois Agility Test and the reactive agility test were assessed separately concerning the different phases of the menstrual cycle and contraceptive pill cycles. Furthermore, the correlation coefficient for the control group, which consists of users of oral contraceptives, was also calculated, allowing for a comparison with the group experiencing a natural menstrual cycle. To assess these correlations, Pearson's r and Spearman's rho were employed. A correlation coefficient approaching 1 signifies a strong positive correlation between the variables, whereas a coefficient nearing -1 indicates a strong negative correlation. Conversely, a coefficient close to 0 reflects a weak association between the variables (Bhandari, 2021b). The interpretation of Pearson's and Spearman's coefficients adhered to Chan's (2003) guidelines: a coefficient of at least 0.8 indicates a very strong relationship, 0.6 to 0.8 signifies a moderately strong relationship, 0.3 to 0.5 denotes a fair relationship, and any value below 0.3 is considered poor.

Furthermore, a detailed analysis of the differences between phases 1, 2, and 4 was conducted, presenting the findings through box plots. These plots showcased key summary statistics, including the minimum, median, mean, and maximum values, while also identifying any outliers. The mean values (± standard deviation, SD) for each test across different menstrual cycle phases were computed to provide a comprehensive overview of the data. All results were compiled into an Excel file, streamlining the process and enabling efficient comparisons of test results. This systematic approach allows for the identification of potential trends and developments.

7 Results

7.1 Illinois Agility Test

The results of the Illinois Agility Test were recorded across three phases of the menstrual cycle for the naturally menstruating group (Table 5). In Phase 1, the mean completion time was 18.19 seconds (SD = 0.40, N = 3). In Phase 2, a single participant completed the test with a mean time of 18.00 seconds (N = 1), and therefore, no standard deviation was calculated. In Phase 4, the mean time was 18.81 seconds (SD = 1.19, N = 3). Across all phases, the overall mean was 18.43 seconds with a standard deviation of 0.81 (N = 7).

Phase of Menstrual Cycle	Mean (sec)	N	Standard Deviation
Phase 1	18.19	3	0.40
Phase 2	18.00	1	N/A*
Phase 4	18.81	3	1.19
Total	18.43	7	0.81

Table 4. Results of the Illinois Agility Test in phase 1, 2, and 4, presented in mean and standard deviation. *Only one valid data.

Correlation analyses were performed to investigate the relationship between the menstrual cycle phases and performance on the Illinois Agility Test. The results from Pearson’s correlation coefficient indicated a moderate positive linear correlation ($r = 0.413$), suggesting that agility test times tend to increase moderately as individuals progress through the later phases of their menstrual cycle (Figure 6). In contrast, Spearman’s rank correlation coefficient indicated a weaker positive monotonic association ($\rho = 0.230$), reflecting a similar trend when analyzing the ranked data.

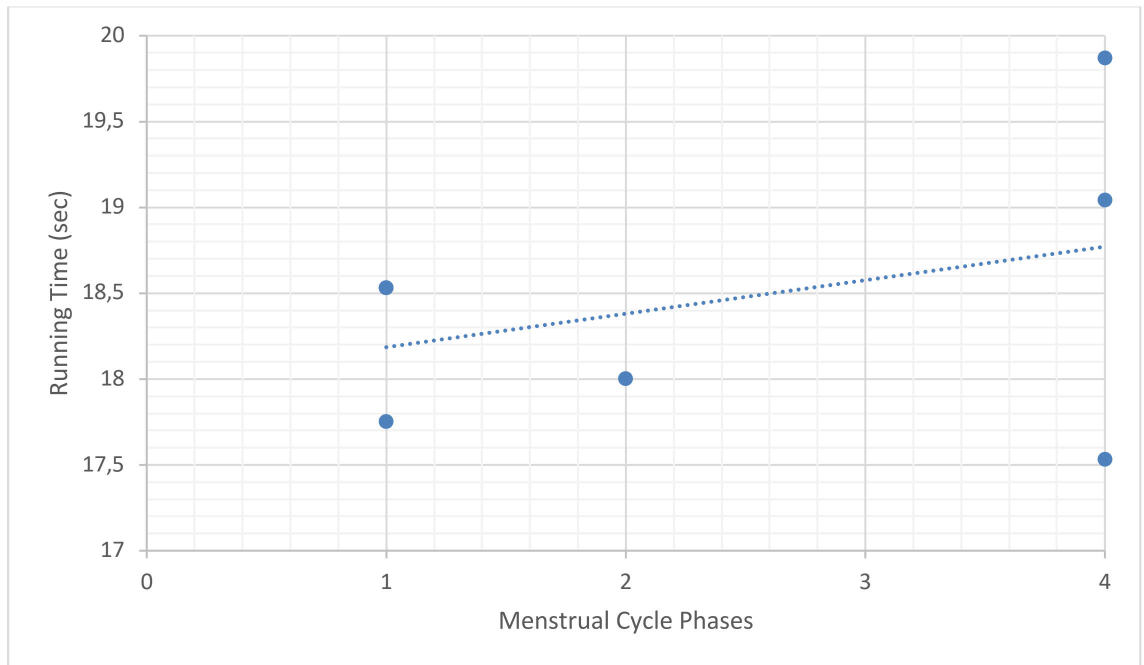

Figure 6. Illinois Agility Test running time as a function of menstrual cycle phases 1, 2 &4.

In the group of oral contraceptive users, tests were conducted in three evenly spaced sessions, and the results are summarized in Table 5. Notably, only one participant (33%) completed all three assessments. For Test 1, the average completion time was 18.04 seconds (SD = 1.22, N = 3). In Test 2, the average time slightly increased to 18.15 seconds (SD = 1.37, N = 3). Test 3 was completed by a single participant, resulting in a mean time of 17.07 seconds (N = 1), for which a standard deviation could not be calculated. Overall, the mean completion time across all tests was calculated to be 17.95 seconds, with a standard deviation of 1.13 (N = 7).

Test session	Mean (sec)	N	Standard Deviation
Test 1	18.04	3	1.22
Test 2	18.15	3	1.37
Test 3	17.07	1	N/A*
Total	17.95	7	1.13

Table 5. Results of the Illinois Agility Test in three test sessions, presented in mean and standard deviation. *Only one valid data.

Correlation analyses were conducted to investigate the relationship between test sessions and performance on the Illinois Agility Test within the oral contraceptive group. Pearson's correlation coefficient (see scatter graph in Appendix) indicated a weak negative linear relationship ($r = -0.22$), while Spearman's rank correlation coefficient also suggested a weak negative monotonic relationship ($\rho = -0.12$).

7.2 Reactive Agility Test ("Y-shaped" running test)

The performance of reactive agility was evaluated using the Y-shaped agility test during three different phases of the menstrual cycle (Table 6). In Phase 1, the average completion time was 2.73 seconds (SD = 0.34, N = 3). Phase 2 had only one participant, who achieved a time of 2.68 seconds (N = 1), so a standard deviation could not be calculated for this phase. In Phase 4, the average time recorded was 2.65 seconds (SD = 0.10, N = 3). Across all phases, the overall average completion time was 2.69 seconds with a standard deviation of 0.21 (N = 7).

Phase of Menstrual Cycle	Mean (sec)	N	Standard Deviation
Phase 1	2.73	3	0.34
Phase 2	2.68	1	N/A*
Phase 4	2.65	3	0.10
Total	2.69	7	0.21

Table 6. Results of the Reactive Agility Test in phase 1, 2, and 4, presented in mean and standard deviation. *Only one valid data.

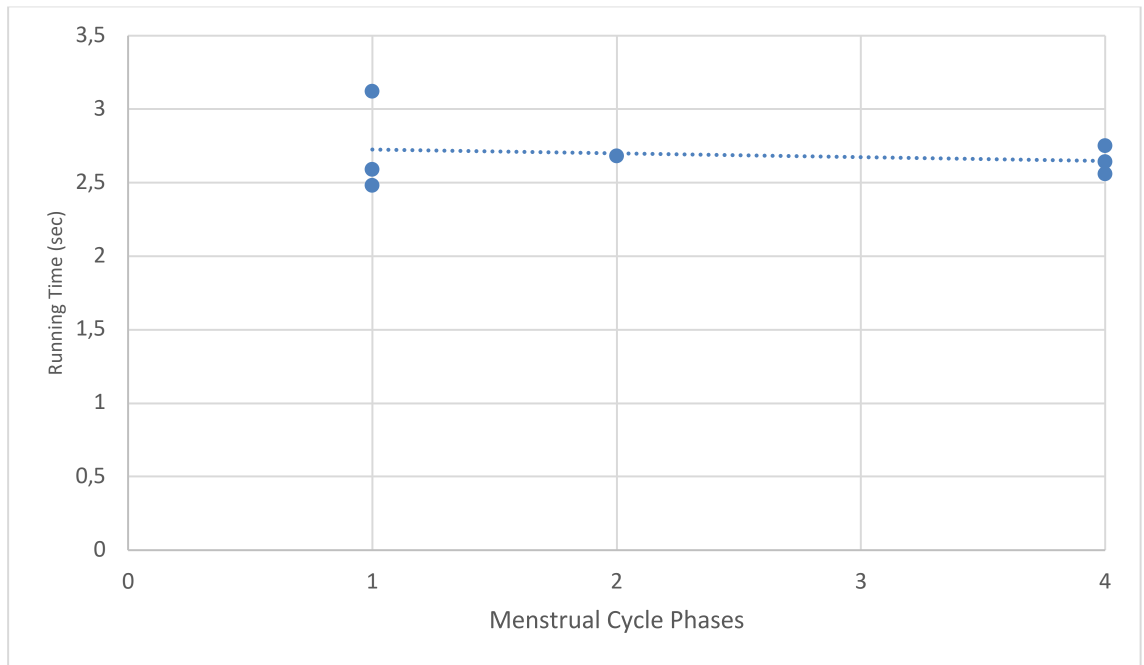

Figure 7. Reactive agility test running time as a function of menstrual cycle phases 1, 2 & 4.

To examine the relationship between menstrual cycle phases and reactive agility performance, a correlation analysis was conducted. The results from Pearson's correlation coefficient (see scatter Figure 7) indicated a weak negative linear association (r = -0.19). In contrast, Spearman's rank correlation coefficient revealed a very weak positive monotonic relationship (ρ = 0.08). These findings suggest minimal correlation between the menstrual cycle phases and reactive agility performance.

The same analysis was performed on the oral contraceptive group, and the results across three test sessions are summarized below (Table 7). In Test 1, the mean completion time was 2.31 seconds (SD = 0.38) based on 3 participants. Test 2 recorded a mean completion time of 2.61 seconds (SD = 0.02), also with 3 participants. In Test 3, the mean completion time was 2.44 seconds with only 1 participant, and the standard deviation could not be calculated due to the limited number of participants. When aggregating the results from all test sessions, the overall mean completion time was 2.46 seconds, with a standard deviation of 0.27, based on a total of 7 observations.

Test session	Mean (sec)	N	Standard Deviation
Test 1	2.31	3	0.38
Test 2	2.61	3	0.02

Test 3	2.44	1	N/A
Total	2.46	7	0.27

Table 7. Results of the Reactive Agility Test in three test sessions, presented in mean and standard deviation. *Only one valid data.

The Spearman's correlation coefficient for the data was found to be 0.15, indicating a weak positive relationship between the variables. Pearson's correlation coefficient was 0.35, suggesting a moderate positive relationship (see scatter graph in Appendix).

7.3 Self-Reported symptoms

The naturally menstruating participants utilized a weekly self-reported questionnaire to monitor the duration of their menstrual cycles and to document the associated symptoms. The table 8 presents subjective data collected from participants regarding their levels of anxiety, tiredness, and stress throughout the four phases of the menstrual cycle.

During Phase 1, the average anxiety score was 2.75, tiredness was measured at 2.25, and stress averaged 2.88. The most common responses included "mildly anguished" (n=3), "slightly tired" (n=3), and "mildly stressed" (n=4). In Phase 2, there was a notable decline in anxiety and tiredness scores, with averages of 1.20 and 1.40, respectively. Participants frequently reported feeling "not anguished at all" (n=4) and "not tired at all" (n=3). Although stress remained slightly elevated, with a mean score of 2.00, the predominant response was "slightly stressed" (n=3). Phase 3 saw a slight increase in tiredness (2.20) and stress (2.40); however, anxiety remained relatively low at 2.00. The most common responses during this phase included "not anguished at all" (n=3), "not tired at all" (n=2), and "slightly stressed" (n=2). In Phase 4, participants reported the lowest scores across all three areas. The average anxiety score dropped to 1.00, tiredness to 1.60, and stress to 1.80. Participants predominantly indicated they were "not anguished at all" (n=5), "not tired at all" (n=3), and "not stressed at all" (n=2), with a smaller number reporting they were "slightly stressed" (n=2).

	Phase 1 (n=8)			Phase 2 (n=5)		
	Anxiety	Tiredness	Stress	Anxiety	Tiredness	Stress
Mode	Mildly an-guished (3)	Slightly tired (2)	Mildly stressed (3)	Not an-guished at all (1)	Not tired at all (1)	Slightly stressed (2)
Mean	2.75	2.25	2.88	1.20	1.40	2.00
Stander deviation	1.39	1.04	0.99	0.45	0.55	0.71
	Phase 3 (n=5)			Phase 4 (n=5)		
	Anxiety	Tiredness	Stress	Anxiety	Tiredness	Stress
Mode	Not an-guished at all (1)	Not tired at all (1)	Slightly stressed (2)	Not an-guished at all (1)	Not tired at all (1)	Not stressed at all (1)
Mean	1.40	2.20	2.40	1.00	1.60	1.80
Stander deviation	0.55	1.30	1.14	0.00	0.89	0.84

Table 8. Results of psychological symptoms across the menstrual cycle, presented in mode, mean, and standard deviation.

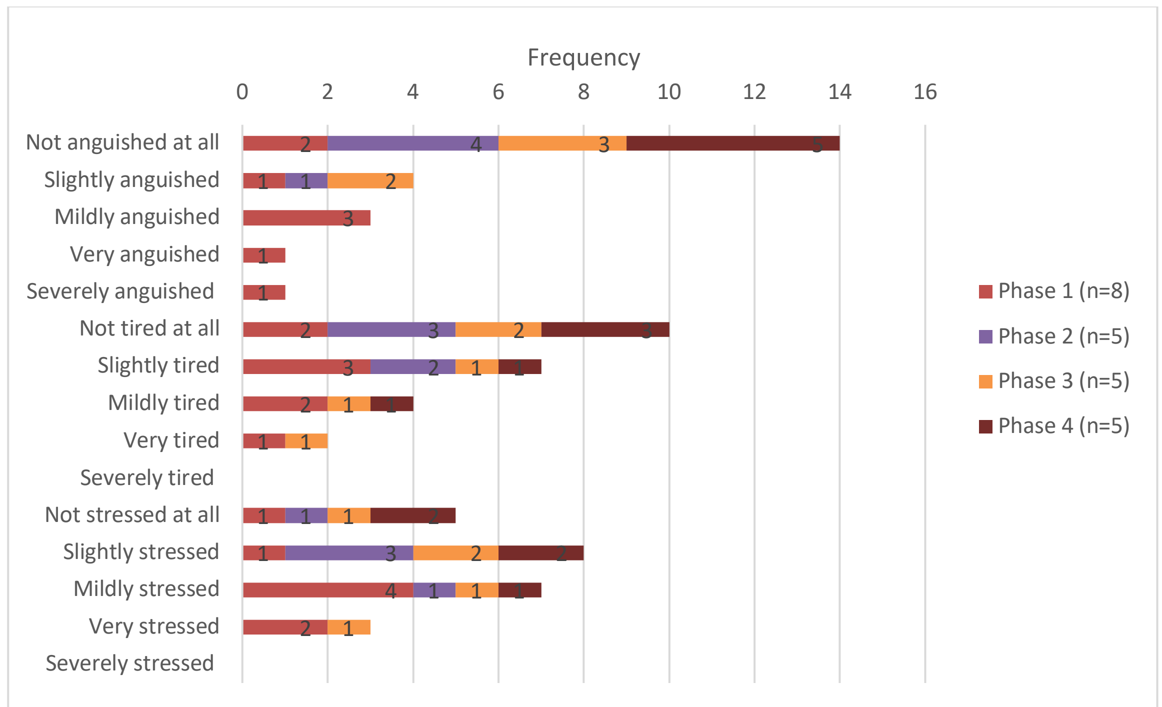

Figure 8. Results of psychological symptoms across the menstrual cycle, presented in count.

Participants were also asked to report specific physical symptoms experienced during each menstrual cycle phase, and Figure 9 presents the collected data. Phase 1 exhibited the highest concentration of reported symptoms. Three respondents experienced abdominal or pelvic pain, while several reported heavy legs (4) and headaches or migraines (2). Additional symptoms included bloating (1), nausea (1), increased appetite (1), decreased appetite (1), chest pain (1), back pain (1), and weight gain (1). Notably, only 2 responses (25%) reported experiencing no symptoms at all. In Phase 2, only one response reported headaches or migraines, and another experienced back pain. Additionally, three responses (60%) indicated that they had none of the symptoms. Phase 3 saw a mild resurgence of physical complaints, with two responses reporting headaches or migraines, one noting decreased appetite, and another reporting abdominal pain. Nonetheless, three responses (60%) maintained that they experienced no symptoms. In Phase 4, a few symptoms reemerged, including headaches (1 participant), muscle pain (1), back pain (1), and chest pain (1). Once again, three responses (60%) reported experiencing none of the symptoms.

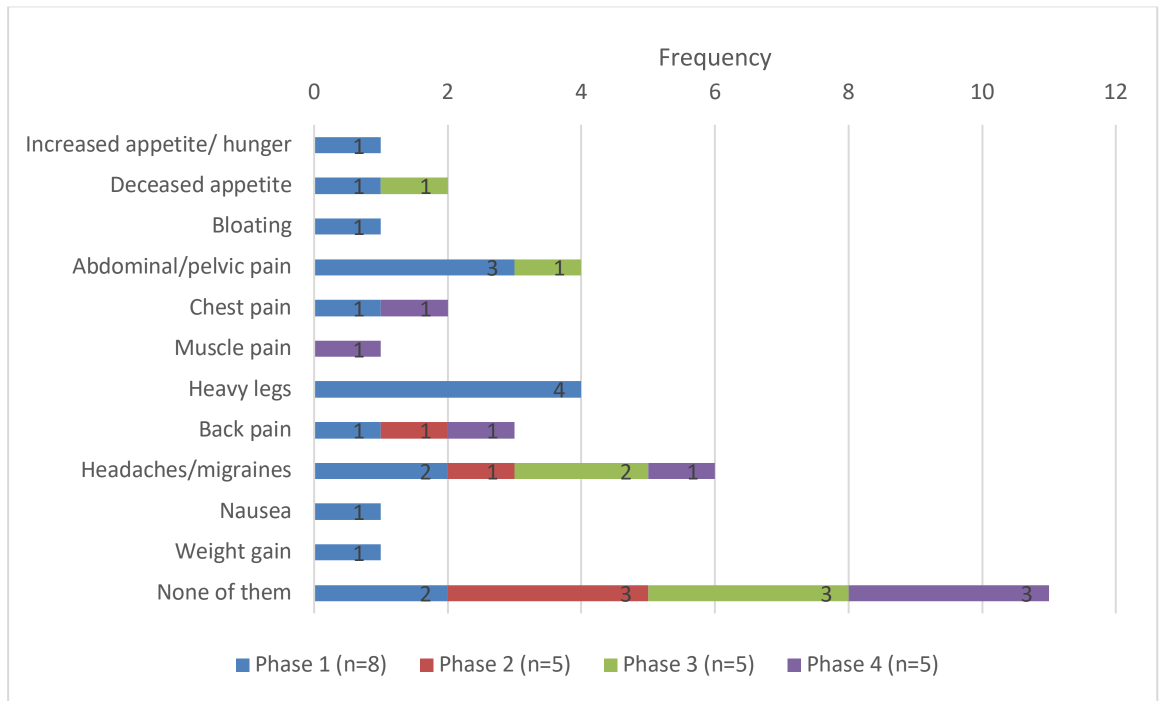

Figure 9. Results of physical symptoms across the menstrual cycle, presented in count.

8 Discussion

This study aimed to investigate the relationship between menstrual cycle phases and agility performance in female football players. The findings indicate that agility performance could be affected by the menstrual cycle; nonetheless, the correlation is considered weak, and the overall trend lacks clarity.

8.1 Review of results

The results from the Illinois Agility Test on the naturally menstruating group indicate that phase 2 yields the best agility performance, with the lowest average running time, while phase 4 is associated with the slowest average time (Figure 10). This suggests a potential trend of decreased agility performance in phase 4, when progesterone levels are typically elevated. Conversely, phases 1 and 2 demonstrate more consistent or even improved performance, particularly in phase 2, when progesterone should be low and estrogen levels are significantly higher. Nevertheless, the small sample size, especially in phase 2 (which includes only one test result), limits the reliability of these interpretations. These findings align with the study of Karim (2016), which utilized a T-Test to evaluate agility performance across different menstrual cycle phases. Karim's study found that during the mid-cycle phase (akin to phase 2 in this research), estrogen levels increased. However, the results also highlighted some inconsistencies. The per-protocol analysis revealed a significant difference in T-Test agility times between the mid-cycle and early follicular phases, with times of 12.56 ± 0.90 seconds and 12.3 ± 0.89 seconds, respectively ($p=0.007$). Conversely, the intent-to-treat analysis did not show a significant difference, reporting times of 12.76 ± 1.15 seconds and 12.89 ± 1.65 seconds ($p=0.623$). Furthermore, the findings of this study contrast with the research conducted by Juillard et al. (2024), who examined 18 elite female academy football players using the Illinois Agility Test, taking into account their menstrual cycles along with various psychological and physical factors. In Juillard's study, no significant differences were observed throughout the menstrual cycle, suggesting that hormonal fluctuations do not impact psychological or physical performance markers. One potential explanation for this discrepancy is the small sample size; both Karim's study and this study involve a notably limited number of participants, especially compared to Juillard's study. Additionally, the selection of subjects may contribute to these conflicting results. A systematic review by Meignié et al. (2021) highlighted the

existence of conflicting evidence regarding the effects of the menstrual cycle on athletic performance, particularly when comparing elite and non-elite athletes.

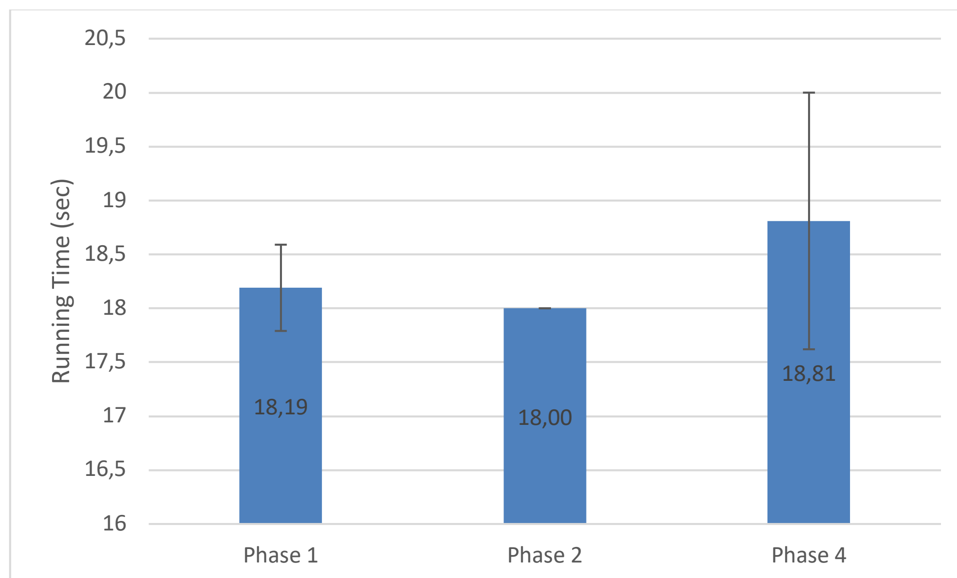

Figure 10. Sum of the Illinois Agility Test running time in phase 1, 2, and 4. Bar chat presented in mean and standard deviation.

The correlation coefficients (r = 0.413, ρ = 0.230) suggest a slight trend toward slower agility performance in the later phases of the menstrual cycle. Nevertheless, this relationship is weak to moderate and does not strongly indicate a definitive direction. While these coefficients imply some level of association, their practical significance is minimal, particularly given the small sample size.

The results from the oral contraceptive group demonstrate a diminished correlation between the phases of the pill cycle and agility performance (Figure 11). The results from test 1 and 2 exhibited a notable degree of stability; however, test 3 revealed substantial discrepancies. These variations may be attributed to the limited sample size (only one subject in test 3) and the participants' familiarity with the drill employed in the third test. Furthermore, both Spearman and Pearson correlation coefficients (r = -0.22, ρ = -0.12) indicate a weak association between the phases of the pill cycle and agility performance.

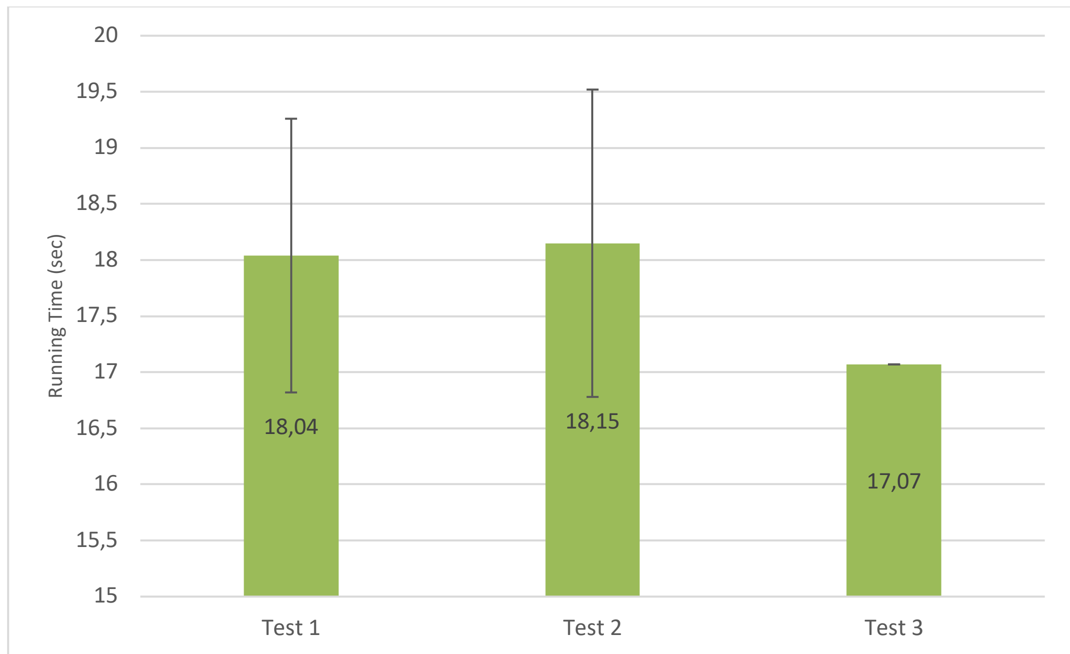

Figure 11. Sum of the Illinois Agility Test running time in session 1, 2, and 4. Bar chat presented in mean and standard deviation.

In terms of reactive agility performance, both the naturally menstruating group and the oral contraceptive group demonstrated only a weak correlation between the phases of the menstrual cycle and agility times. The correlation coefficients were as follows: naturally menstruating group ($r = –0.19$, $p = 0.08$) and oral contraceptive group ($r = 0.35$, $p = 0.25$). These findings indicate that there are no significant differences in reactive agility times across the various menstrual cycle phases.

Additionally, the results from the naturally menstruating group align with those of Karim (2016), who conducted a similar "Y-shaped" reactive test with a live test administrator and a more refined categorization into four movement patterns. Karim (2016) proposed that fluctuations in estrogen may not influence mental processing during athletic maneuvers, as demonstrated by the consistent agility times observed during menstruation compared to those measured mid-cycle. Karim (2016) explained that the absence of a significant difference in agility times between the mid-cycle and early follicular phases during the reactive agility test may stem from the test involving only one or two changes of direction. In contrast, both the T-Test conducted by Karim and the Illinois Agility Test employed in this study feature a broader variety of movement patterns.

Although symptoms were not the primary focus of this research, they were incorporated into the results to substantiate the interpretation of individual differences and to augment the depth of this exploratory analysis with a limited sample size.

In the context of self-reported symptoms, phase 2 emerged as the most stable and favorable regarding mental state, exhibiting notably low levels of anxiety and stress. Furthermore, the mean tiredness level recorded during phase 2 was the lowest across the study, suggesting this phase may represent an optimal opportunity for engaging in higher-intensity training or performance-related tasks. Conversely, phase 4 displayed the least anxiety and stress levels of all four phases analyzed. Both phases 2 and 4 exhibited a comparatively low standard deviation, indicating a consistently stable experience of anxiety, tiredness, and stress.

Although the findings pertaining to phase 4 may appear counterintuitive, particularly given that the luteal phase—which encompasses phases 3 and 4—is typically associates with premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD), characterized by psychological symptoms such as anxiety, irritability, anger, and fatigue, which intensify a week prior to menstruation and peak approximately two days before its onset (Gudipally & Sharma, 2023; Mishra, Elliott & Marwaha, 2023). The observed results may potentially reflect individual coping mechanisms or variations in symptom manifestation across the menstrual cycle. An alternative explanation for the observed abnormal results may be that the method employed to determine the phases (day-counting) is less reliable than the urinary hormone assessment. A more comprehensive discussion of this issue is provided in the limitations section.

In contrast, Phase 1 was identified as the most emotionally and physically challenging, marked by the highest levels of stress, tiredness, and anxiety. This phase may considerably affect motivation and perceived readiness for training, suggesting a need for adjustments to training loads or prioritization of recovery during this period.

In the context of the menstrual cycle, phase 1 exhibited the highest prevalence of physical symptoms, characterized by only 25% of respondents indicating an absence of symptoms. The major symptoms reported during this phase included abdominal/pelvic pain, heavy legs, back pain, headaches/migraines, and nausea. These manifestations may be indicative of dysmenorrhea, a condition defined as pain associated with the menstrual cycle. According to Nagy, Carlson, and Khan (2023), menstrual pain is typically localized in the lower abdomen, with potential radiance to the inner thighs and back. Accompanying symptoms may encompass nausea, vomiting, headaches, dizziness, fatigue, and sleep disturbances. Conversely, phase 2 was marked by a relative lack of symptoms, with only two instances of back pain and headaches/migraines recorded. In phase 4, all reported symptoms were related to pain, including chest pain, back pain, muscle pain, and headaches or migraines, underscoring a significant shift in symptomatology during this phase.

In general, phase 2 exhibited a reduced incidence of both physical and emotional symptoms, indicating an overall sense of stability and a generally positive mental state. This phase may be particularly conducive to high-intensity training or competitive activities, as athletes are likely to experience increased capability and energy. Conversely, phase 1 can present significant physical and emotional challenges that can adversely affect performance and training capacity. Therefore, it is advisable to decrease training loads or incorporate additional recovery strategies during this phase to enhance athlete well-being.

8.2 Limitations

It is crucial to acknowledge specific elements that could constrain the interpretation of the findings in this study. The small sample size (n=6) constrains the capacity to draw broad conclusions, particularly as not all participants completed all three assessments. Moreover, given that the study is specifically centered on football, the applicability of its findings to other sports should be approached with caution. The methods employed to track and identify menstrual cycle phases—self-reporting and day-counting—exhibit several limitations. The variability in the length of the follicular phase is greater than that of the luteal phase, which complicates the accurate estimation of ovulation timing when using the day-counting method (Janse de Jonge et al., 2019). Additionally, this method fails to differentiate between ovulatory cycles and non-ovulatory or luteal phase-deficient cycles. It presumes that all participants with regular menstruation experience cycles characterized by ovulation and typical hormonal variations; however, occurrences of luteal phase deficiency and anovulation can be present in active women who have regular menstrual bleeding (Janse de Jonge et al., 2019). Both Janse de Jonge et al. (2019) and Wideman et al. (2012) recommend that self-reported menstrual histories and calendar-based counting (day-counting) methods should not be relied upon independently if precise identification of ovulation is necessary.

8.3 Researcher reflection

From the perspective of a student researcher, conducting this study presented various practical and methodological challenges along with a valuable learning experience. Engaging with the topic offered significant insights into both the physiological aspects of female athlete performance and

the methodological intricacies involved in conducting hormone-related field research. Despite several limitations, including participant attrition and variability in contraceptive use, the process provided meaningful learning experiences in research design, data collection, and critical analysis. These experiences have significantly contributed to the author's academic development and preparedness for future research endeavors in sport science.

8.4 Considerations and conclusions

This study suggests that the menstrual cycle may have an effect on agility. However, the relationship is regarded as weak according to the study's findings, and the pattern of change remains unclear. While variations in performance were observed across different phases, the pattern of change is not consistent enough to draw definitive conclusions. To obtain more reliable insights, future research should involve larger sample sizes and enhanced methods for accurately identifying menstrual cycle phases, in addition to conducting regular hormonal assessments and daily agility tests. Relying on only two or three measurements of hormonal fluctuations and their corresponding impacts on athletic performance is insufficient for drawing definitive conclusions.

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Research data management plan for the thesis

Fill in this form only if you collect research data in your work.

1. General description of the data

What type of research data (for example interview, survey, observation) is collected or used in the thesis?

The data will be collected and used in this thesis includes surveys and physical tests.

2. Documentation and quality of the data

How is the research data documented, for example, what kind of identifying information is used? How is the quality of the data and its documentation ensured?

The identifiable information (for example, name) of the subjects will be anonymized.

3. Storage and backup

How is the data stored? How is its information security ensured (for example, access to the data) during the thesis process? Who gets to access and process the data?

The data will be stored in the author's personal laptop in an Excel file, with backup data stored on the author's external hard drive. The subjects will have access to their own data, while the author and the supervising teacher will have the right to access and process all the collected data. Upon completion of the research, the team coaches will have full access to the data.

4. Ethical and legal issues related to storage

How are possible ethical questions related to the storage of the data (for example, sensitive information linked to individuals, access to the data by others) considered? How are ownership and usage rights of the data managed?

All participants will receive detailed information about the data collection process and will be required to provide consent. To ensure anonymity, their names will be replaced with a sequence of numbers. The data will not be stored in any cloud storage during the study; only the author and the supervising teacher will have access to the data in local storage (the author's laptop and hard drive).

5. Opening of the data and long-term storage

Would it be possible to use the data later? How is this enabled?

The original data will be attached in the Appendix of this thesis, and this thesis is an open source.

Suostumuslomake (Liite 2)

Valmennuksen raportointitehtävä

Olen perehtynyt Valmennuksen raportointitehtävän tutkittaville jaettavaan tietosuojailmoitukseen ja ymmärtänyt sen sisällön. Olen perehtynyt oppimistehtävän mittausten tarkoitukseen ja sisältöön, testattaville aiheutuviin mahdollisiin haittoihin sekä testattavien oikeuksiin ja vakuutusturvaan sekä osallistun siihen omalla vastuullani. Suostun osallistumaan mittauksiin ja toimenpiteisiin annettujen ohjeiden mukaisesti. En osallistu mittauksiin flunssaisena, kuumeisena, toipilaana tai muuten huonovointisena. Voin halutessani peruuttaa tai keskeyttää osallistumiseni tai kieltäytyä testeistä missä vaiheessa tahansa ilman että keskeyttämisestä aiheutuu mitään seuraamuksia. Opiskelijat ja oppimistehtävään liittyvien kurssien opettajat saavat käsitellä tietosuojailmoituksessa esitettyjä henkilötietojani siinä kuvatulla tavalla. Mittaustuloksiani saa käyttää Kajaanin ammattikorkeakoulun liikunnanohjaajakoulutuksen oppimistehtävän raportoinnissa sellaisessa muodossa, jossa yksittäistä tutkittavaa ei voi tunnistaa.

Valmennettavan nimi: ____

Kajaanissa __________202_ ________________________________Puh no:_____________

Valmennettavan allekirjoitus

Kajaanissa __________202_ ________________________________Puh no:_____________

Valmentajan/testaajan allekirjoitus

Written informed consent (Appendix 2)

I have familiarized myself with the privacy notice distributed to the subjects of the reporting task and understood its content. I have answered the questions truthfully to the best of my knowledge. I am familiar with the test procedures and will participate at my own risk. I understand the purpose of this testing and the possible risks of participating in this testing, as well as my rights and insurance responsibilities. I agree to participate in the testing and to follow the instructions given to me. I will not participate in the measurements if I have a cold/flu or fever or if I am recovering from illness, or otherwise not feeling well. I understand that I may drop out/quit the testing at any time without any consequences. My data can be used for reporting in a manner that I cannot be identified from the presentation.

The name of the athlete: ____

In Kajaani ___________202_ ____________________________________Phone:______________

Signature of athlete

In Kajaani ___________202_ ____________________________________Phone:______________

Signature of coach/student

Kyselylomake kuukautiskiertoon liittyen (Liite 3)

Tämän kyselylomakkeen tavoitteena on antaa tutkimusryhmälle tietoa kuukautiskiertosi nykyisestä tilasta.

Nimi:

Päivämäärä:

Ikä:

(1) Mikä on syntymässä määritelty sukupuolesi?

Valitse yksi vaihtoehto.

Nainen

Intersukupuolinen

Mies

(2) Minkä ikäisenä kuukautisesi alkoivat?

(3) Onko sinulla kuukautisvuotoa noin kerran kuussa (noin 20-40 päivän välein)?

Valitse yksi vaihtoehto.

Kyllä Ei

(4) Montako päivää sinulla yleensä on kuukautisvuotojen alkamispäivien välillä?

(5) Oletko tällä hetkellä raskaana tai imetätkö?

Valitse yksi vaihtoehto.

Kyllä Ei

(6) Käytätkö tällä hetkellä jotain seuraavista ehkäisymenetelmistä: ehkäisypillerit, ehkäisylaastarit, ehkäisykapseli, ehkäisyinjektio, ehkäisyrengas tai ehkäisykierukka?

Valitse yksi vaihtoehto.

Kyllä Ei

(7) Käytätkö yllä mainittujen ehkäisymenetelmien ohella muita hormonivalmisteita (esimerkiksi testosteronia)?

Valitse yksi vaihtoehto.

Kyllä (mitä valmisteita?) Ei

(8) Onko krooninen stressi, ikä tai urheilu vaikuttanut kuukautiskiertosi säännöllisyyteen tai ovatko kuukautisesi loppuneet edellä mainittujen syiden takia kokonaan?

Valitse yksi vaihtoehto.

Kyllä Ei

(9) Kärsitkö terävästä, pistävästä tai jomottavasta kivusta kuukautiskierron aikana?

Valitse yksi vaihtoehto.

Kyllä Ei

(10) Onko sinulla diagnosoitu yksi tai useampi seuraavista: endometrioosi, myoomat (kohdun lihaskyhmyt), munasarjarakkulat, lantion alueen kiinnikkeet tai massat tai munasarjojen monirakkulaoireyhtymä?

Valitse yksi vaihtoehto.

Kyllä (mikä/mitkä näistä?) Ei

Questionnaire for Menstrual Cycle Studies (Appendix 3)

This questionnaire is meant to help the study team understand your current menstrual health situation.

Name:

Date:

Age:

(1)What was your assigned sex at birth?

Please select ONE.

Female

Intersex

Male

(2) At what age did you first begin menstruating?

(3) Do you typically have a menstrual period about once per month (usually about every 20-40 days)?

Please select ONE.

YES NO

(4) What is the typical number of days between the start of one menstrual bleeding and the start of the next month's menstrual bleeding?

(5) Are you currently pregnant or breastfeeding?

Please select ONE.

YES NO

(6)Are you currently using oral contraceptive pills, contraceptive patches, a contraceptive implant, a contraceptive injection, a contraceptive vaginal ring, or an IUD?

Please select ONE.

YES NO

(7) Other than the medications above, are you taking other hormones of any kind (e.g., testosterone)?

Please select ONE.

YES (Please describe) NO

(8)Has chronic stress, increasing age or exercise changed the regularity of your period or stopped your period altogether?

Please select ONE.

YES NO

(9) Do you experience sharp, stabbing, or dull aching pains mid-cycle?

Please select ONE.

YES NO

(10)Have you been medically diagnosed with one or more of the following conditions? Endometriosis, uterine fibroids, ovarian cysts, pelvic adhesions or masses, polycystic ovarian ovary syndrome.

Please select ONE.

YES (Which one(s)?) NO

AHA/ACSM KYSELYLOMAKE (Liite 4)

Arvioi terveydentilaasi vastaamalla seuraaviin kysymyksiin:

Esitiedot:

Onko sinulla ollut/onko sinulle tehty

__ sydänkohtaus

__ sydänleikkaus

__ sydämen katetrointi

__ sepelvaltimoiden pallolaajennus

__ tahdistin/rytmihäiriötahdistin/rytmihäiriö

__ sydämen läppävika

__ sydämen vajaatoiminta

__ sydämensiirto

__ synnynnäinen sydänsairaus?

Oireet:

Oletko kokenut

__ Epämiellyttäviä sydäntuntemuksia rasituksen yhteydessä

__ Hengenahdistusta ilman selkeää syytä

__ Heikotusta, pyörtymisiä tai tajuttomuutta?

__Käytät sydänlääkkeitä.

Muut terveydelliset seikat:

__ Sinulla on lihaksiin tai luustoon liittyviä terveysongelmia

__ Sinulla on liikunnan turvallisuuteen liittyviä huolia

__ Käytät reseptilääkkeitä

__ Olet raskaana

Mikäli jokin/jotkut edellä mainituista terveydellisistä seikoista koskevat sinua, olethan yhteydessä sinua hoitavaan terveydenhuollon tahoon ennen liikunnan aloittamista.

Sydän- ja verisuonisairauksien riskitekijät:

__ Olet yli 45-vuotias mies

__ Olet yli 55-vuotias nainen, sinulle on tehty kohdunpoisto tai olet ohittanut vaihdevuodet

__ Tupakoit

__ Verenpaineesi on yli 140/90 mmHg

__ Et tiedä verenpainearvojasi

__ Käytät verenpainelääkkeitä

__ Veren kolesteroliarvosi on yli 13,3 mmol/l

__ Et tiedä kolesteroliarvojasi

__ Lähisukulaisellasi on ollut sydänkohtaus ennen 55 ikävuotta (isä tai veli) tai ennen 65 ikävuotta (äiti tai sisko)

__ Harrastat vähäisesti liikuntaa (esim. alle 30 minuuttia päivässä vähintään kolmena päivänä viikossa)

__ Sinulla on ylipainoa vähintään 9 kiloa

Mikäli vähintään kaksi yllä mainituista sydän- ja verisuonisairauksien riskitekijöistä koskee sinua, olethan yhteydessä sinua hoitavaan terveydenhuollon tahoon ennen liikunnan aloittamista.

__ Mikään yllä mainituista ei ole totta

Tässä tapauksessa liikunnan tulisi olla sinulle lähtökohtaisesti turvallista, kun siinä otetaan yksilölliset tarpeesi huomioon.

AHA/ACSM QUESTIONNAIRE (Appendix 4)

Assess your health needs by marking all true statements.

Medical history:

You have had/you have:

__ a heart attack

__ heart surgery

__ cardiac catheterization

__ coronary angioplasty (PTCA)

__ pacemaker/implantable cardioverter defibrillator/rhythm disturbance

__ valvular heart disease

__ heart failure

__ heart transplantation

__ congenital heart disease

Symptoms:

__ You experience chest discomfort with exertion.

__ You experience unreasonable breathlessness.

__ You experience dizziness, fainting, blackouts.

__You take heart medications.

Other health issues:

__ You have musculoskeletal problems.

__ You have concerns about the safety of exercise.

__ You take prescription medication(s).

__ You are pregnant.

If you marked any of the statements in this section, consult your healthcare provider before engaging in exercise. You may need to use a facility with a medically qualified staff.

Cardiovascular Risk Factors:

__ You are a man older than 45 years.

__ You are a woman older than 55 years or you have had a hysterectomy or you are post- menopausal.

__ You smoke.

__ Your blood pressure is > 140/90 mmHg.

__ You don’t know your blood pressure.

__ You take blood pressure medication.

__ Your blood cholesterol level is > 13,3 mmol/L.

__ You don’t know your cholesterol level.

__ You have a close blood relative who had a heart attack before age 55 (father or brother) or age 65 (mother or sister).

__ You are physically inactive (ie, you get < 30 minutes of physical activity on at least 3 days per week.

__ You are > 9 kilograms overweight.

If you marked 2 or more of the statements in this section, consult your healthcare provider before engaging in exercise. You might benefit by using a facility with a professionally qualified exercise staff to guide your exercise program.

__ None of the above is true.

You should be able to exercise safely without consulting your healthcare provider in almost any facility that meets your exercise program needs

Viikoittaiset kysymykset kuukautiskierron oireiden seurantaan (Liite 5)

1) Päivämäärä: ____________

2) Kuukautiskierron alkamispäivämäärä tässä kuussa: ____________

3) Arvioi seuraavien tunteiden esiintymistä viikon aikana asteikolla 1-5 (1 = hyvin vähän, 5 = hyvin paljon):

Ahdistus ___

Stressi ___

Väsymys ___

4) Oletko kokenut seuraavia oireita viikon aikana (valitse yksi tai useampi):

Suurentunut ruokahalu/nälkä	Raskaat jalat
Vähentynyt ruokahalu	Selkäkipu
Turvotus	Päänsärky/migreeni
Kuumat aallot	Huonovointisuus
Ummetus	Painon putoaminen
Vatsan/lantion alueen kipu	Painon lisääntyminen
Nivelkipu	Mielialan vaihtelut
Rintakipu	Heikotus
Lihaskipu	Ei mitään yllä mainituista
Lisääntynyt virtsaamisen tarve	Muita oireita (mitä?)

Weekly Survey Questions for Measuring Menstrual Cycle Day and Symptoms (Appendix 5)

1)Date of Survey: ____________

2)The start date of your menstrual period for the current month: _________

3) The average condition in / amount of following feelings during the week on a scale from 1 to 5 (1 representing a very little amount and 5 representing a very high amount).

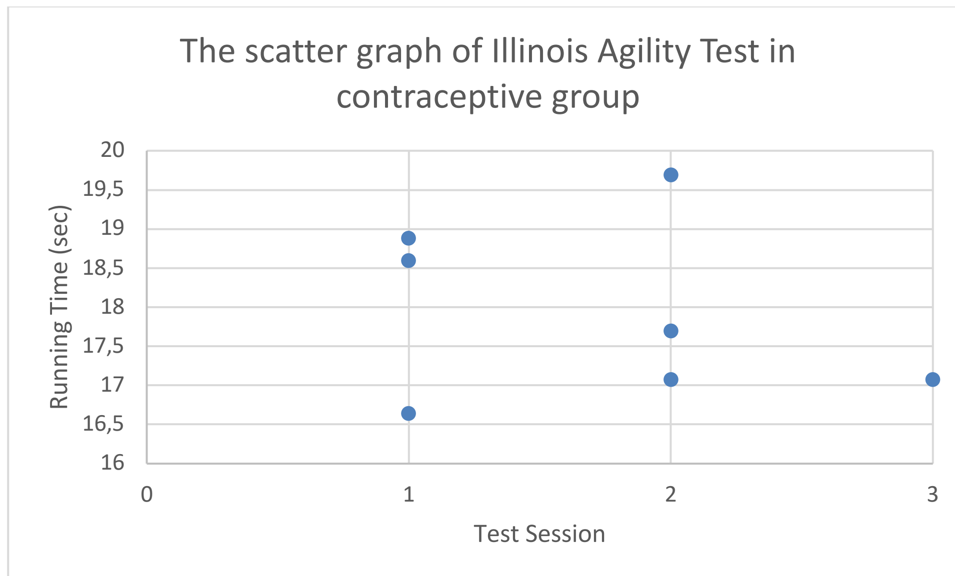
Anxiety ___

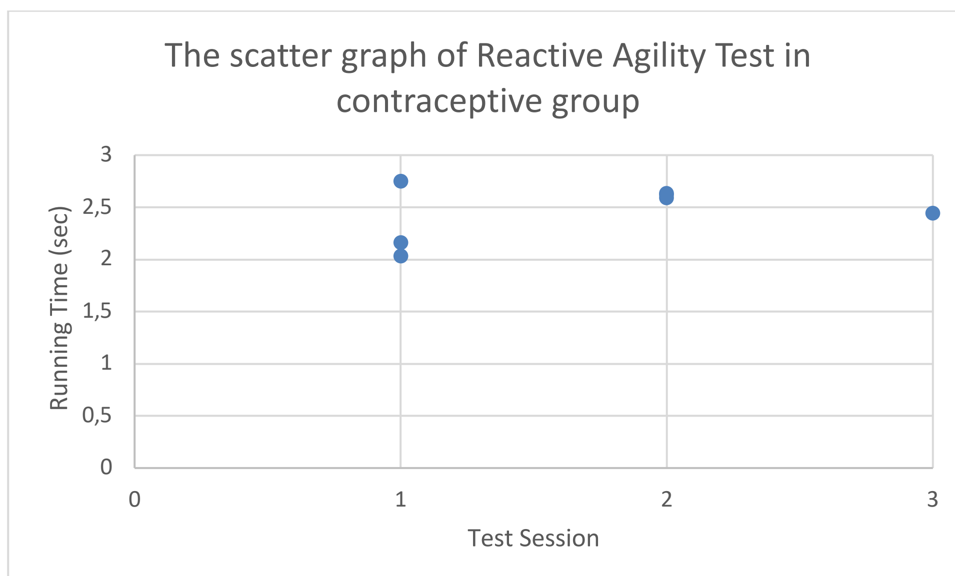
Tiredness ___

Stress ___

4) Any following symptom(s) during the week? (Choose one or more)

Increased appetite/ hunger	Heavy legs
Decreased appetite	Back pain
Bloating	Headaches/migraines
Hot Flashes	Nausea
Constipation	Weight loss
Abdominal/pelvic pain	Weight gain
Joint pain	Mood swing
Chest pain	Dizziness
Muscle pain	None of them
Urges to urinate	Others (Please describe)?


The scatter graph of Illinois Agility Test in contraceptive group
Running Time (sec)
20
19,5
19
18,5
18
17,5
17
16,5
16
0
1
2
3
Test Session


The scatter graph of Reactive Agility Test in contraceptive group
Running Time (sec)
3
2,5
2
1,5
1
0,5
0
0
1
2
3
Test Session