The influence of the menstrual cycle on recovery and stress in female soccer players

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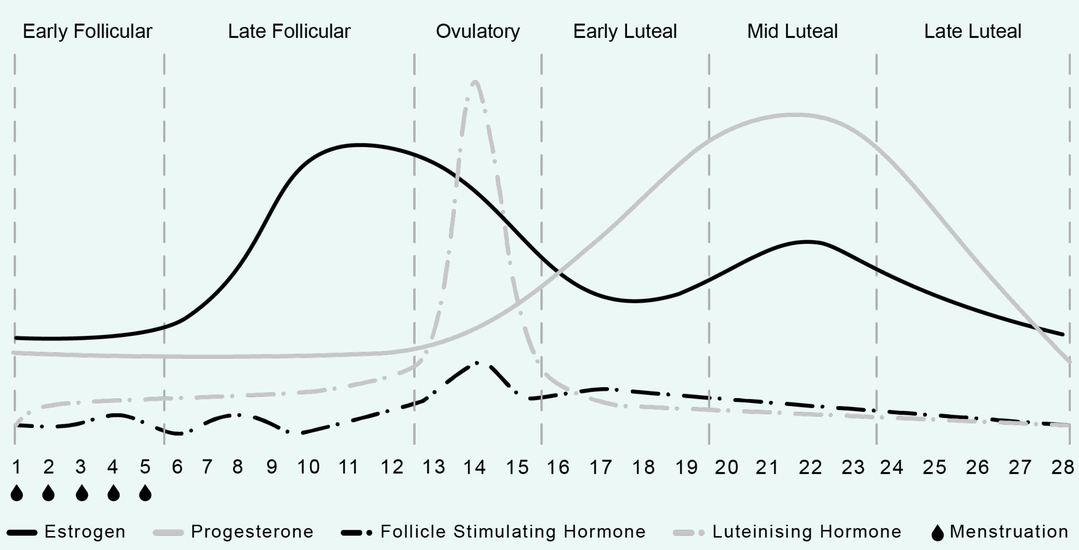
Introduction:

About **90 percent of women experience symptoms** like mood changes, period related pain etc. throughout their menstrual cycle (MC) and **67 - 80 percent report interference of these symptoms with their sports performance** (Bruinvels et al., 2021; Findlay et al., 2020). An increasing number of studies have lately been published (Paludo et al., 2022), investigating the influence of the MC on physical or objective performance parameters including parameters like recovery and/ or stress (Mattu et al., 2019). However, **studies on the influence of the MC on perceived recovery and stress are rare and existing results are contradictory** (Janse De Jonge et al., 2019).

Aim of the study:

The aim of the present study was to **investigate the influence of the menstrual cycle on recovery and stress**. Specifically, it was examined whether there is a **difference in the recovery – stress – state of athletes between the follicular phase and the luteal phase of the menstrual cycle.**

Hypothesis:



H1 - H4:

Scores of the Short **Recovery** Scale are **higher in the follicular phase** compared to the luteal phase.

H5 - H8:

Scores of the Short **Stress** Scale are **higher in the luteal phase** compared to the follicular phase.

Method:

Participants: ***N* = 19 athletes** of a first league German soccer club

- **M_{age} = 22.21 years (*SD* = 3.49), M_{BMI} = 21.95 kg/m² (*SD* = 1.41), $M_{age\ of\ menarche}$ = 14 years (*SD* = 1.41)**
- No history of pregnancy (*N* = 19), no history of oral contraceptive (*N* = 11) / no use of oral contraceptives for at least two years prior to the study (*N* = 8)

Procedure& Measures:

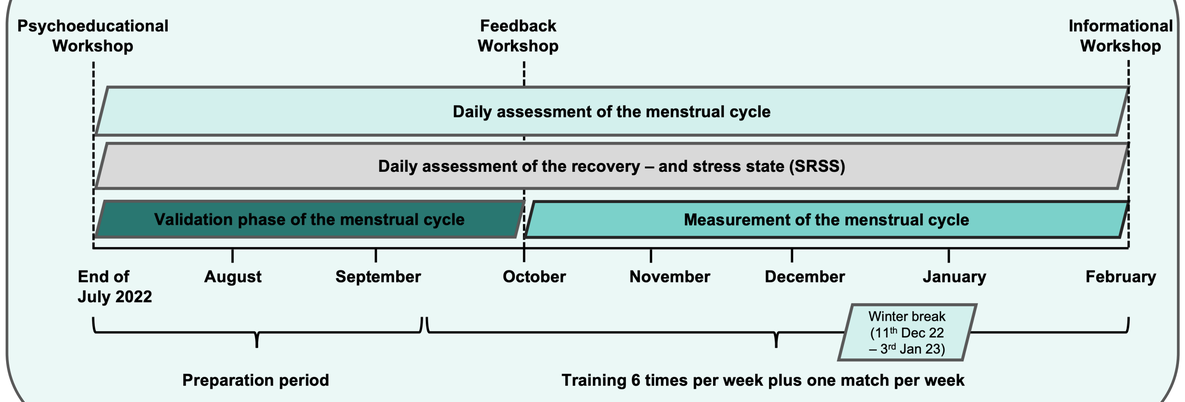
Daily measurement for **7 months** of:

- **The menstrual cycle (menstrual cycle diary)** (adapted from Biowink GmbH, 2023; FitrWoman, 2023; Flo Health Inc., 2023)
- **The recovery – and stress state (Short Recovery and Stress Scale)** (Kellmann & Köllig, 2020)
- **Three additional workshops to accompany monitoring process**

Data analysis:

- Multivariate analyses of variance (**2x3 two – way RM MANOVA**)

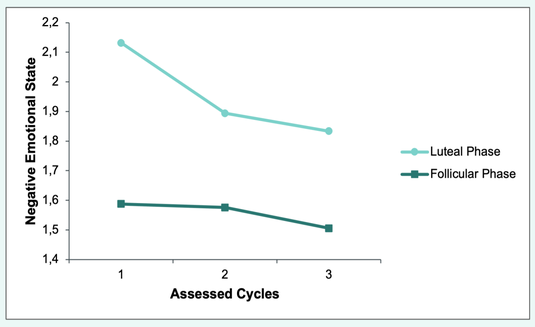
Study Design:



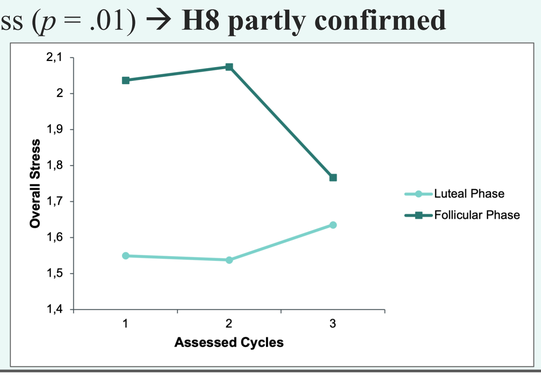
Results:

- No significant results for the *Short Recovery Scale* ($p > .05$)
  → **rejection of H1 – H4**

- Significant difference of cycle phase on the Short Stress Scale ($p = .001$)
  → **H5 partly confirmed**
  - Muscular Stress ($p > .05$) → **rejection of H5**
  - Negative Emotional State ($p = .008$) → **confirmation of H7**



- Overall Stress ($p = .01$) → **H8 partly confirmed**



Discussion:

- One hypothesis could be confirmed (H7); and two were partly confirmed (H5, H8).
- The study functions as a **pilot study** as it lacks power (1-ß) = 0.21.
- Exact mechanism of the influence of the MC on sports performance have yet to be investigated.
- **Education, communication and anti – stigmatization** of the topic are crucial for a successful implementation of the MC into daily training
- Existing studies are rare, **results are largely inconsistent and lack methodological concordance.**
- **More education and research are needed to destigmatize the topic** and to incorporate the MC into training periodization of female athletes

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