

# Menstrual Health: Cycle Phases

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## Abstract

Google Fitbit is launching Cycle Phases for menstrual health, a feature aimed at transforming how users understand and manage their menstrual cycles. Community feedback and our own user research highlight a strong desire among users for more comprehensive information beyond basic period tracking. Users are seeking more in-depth knowledge about their cycles to enable proactive health management.

Cycle Phases responds to this need by breaking down the menstrual cycle into five distinct phases based on users' logged period and ovulation testing information. For each phase, we provide actionable education in nutrition, mental wellbeing, sleep, and activity. These phase-based recommendations are grounded in scientific research and empower users to optimize their lifestyle and self-care routines in alignment with their cycle.

## Background

The menstrual cycle is a complex and dynamic physiological process that impacts menstruating people's physical and emotional health. It plays a crucial role across the lifespan, from puberty and the journey to fertility, to the transition to menopause. For people who menstruate, the menstrual cycle is considered a measurable vital sign that serves as a window into not only a menstruating person's reproductive health but also the function of her body's systems and organs.[1] A comprehensive understanding of menstrual cycle dynamics empowers individuals to make informed decisions regarding their health. Understanding these hormonal fluctuations allows individuals to optimize lifestyle choices, including diet, sleep, exercise, and stress management strategies, to align with each distinct phase. This personalized approach promotes wellbeing and fosters a deeper connection to one's body.

The menstrual cycle starts on the first day of the period and ends the day before the next period begins. It consists of changes in the ovary and uterus that interact via hormones with each other and the brain (specifically, the hypothalamus and the pituitary gland). While the start of the period marks the beginning of the menstrual cycle, ovulation divides the cycle into two main parts (Figure 1).

In the first part, the ovary prepares an egg for release (follicular phase), while the uterus sheds its old lining (period or menstruation) and begins building a new one in anticipation of a possible pregnancy. Next, a mature egg is released from the ovary, also known as ovulation. This marks the start of the second part of the menstrual cycle where the follicle, which housed the egg, now produces hormones to prepare the body for pregnancy (luteal phase). [2] By convention, the phases of the menstrual cycle are named according to ovarian activity with the follicular phase starting on the first day of menstrual bleeding and ending with ovulation and the luteal phase beginning after ovulation until the start of the next period. [3]

A series of hormonal changes during the menstrual cycle brings about distinct physiological effects. Follicle-stimulating hormone (FSH) initiates the process by prompting a rise in estradiol that governs much of the follicular phase. As the cycle progresses, a marked increase in luteinizing hormone (LH) signals the final maturation and imminent release of an egg during ovulation. Following ovulation, the luteal phase is characterized by the rise and fall of progesterone, accompanied by a smaller ebb and flow of estradiol.

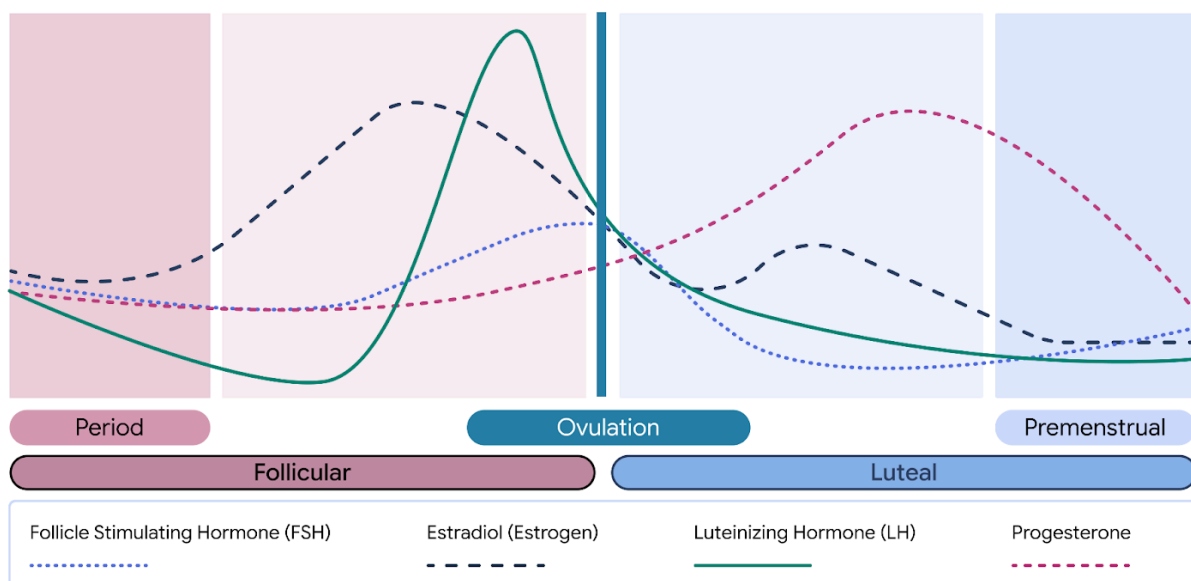


Figure 1: The menstrual cycle, its phases and the major hormones driving the physiologic changes.

The hormonal fluctuations throughout the menstrual cycle impact not only reproductive processes but also various other aspects of a menstruating person's health and wellbeing. Basal body temperature, for instance, experiences a subtle elevation (approximately 0.5°F) around the time of ovulation, serving as a natural indicator of fertility. Heart rate and respiratory rate may also exhibit an increase during the luteal phase.[4], [5] Heart rate variability has been noted to be higher prior to ovulation and reduced in the luteal phase.[6] One explanation for these physiologic

findings is that there is an increase in sympathetic drive or decrease in parasympathetic activity after ovulation.[7] Moreover, premenstrual syndrome and its more severe form, premenstrual dysphoric disorder (PMDD), are clinically recognized disorders with a variety of physical and psychological symptoms during the luteal and premenstrual phases that affect up to 90% of menstruating people.[8] These conditions underscore the broad influence of the menstrual cycle on a menstruating person's body.

Moreover, the menstrual cycle exerts a profound influence on the lives of menstruating people, impacting nutrition, sleep, activity levels, and mood. This intricate interplay highlights the deep connection between a menstruating person's physical and emotional experiences throughout the phases of her cycle. A comprehensive understanding of these hormonal fluctuations empowers menstruating people to make informed choices, tailoring their lifestyle – including diet, sleep, exercise, and self-care practices – to each unique phase. This personalized approach unlocks the potential for optimal health and wellbeing, fostering a harmonious relationship by listening to the body's natural rhythms.

## Google Fitbit's Cycle Phases Feature

### Cycle Phases

While the menstrual cycle is clinically described in terms of two main phases—follicular and luteal—a more nuanced understanding acknowledges further subdivisions that reflect the dynamic shifts in hormones. These hormonal fluctuations mark distinct stages within the cycle, giving rise to five key phases: period, follicular, ovulation, luteal, and premenstrual. This more detailed breakdown provides a more comprehensive view of the cyclical changes and their impact on a menstruating person's body.

- **Period:** This phase spans the first day to the last day of a user's logged or predicted period. While conventionally considered part of the follicular phase, it is highlighted as its own phase due to the unique experience of menstruation and the low levels of major reproductive hormones.
- **Follicular:** This phase encompasses the day after the period ends until the day before the predicted or logged ovulation day. This phase covers the follicular phase that is not part of the period and is characterized by rising estrogen levels. The last five days of this phase are also considered the "fertile window," which is the time in the menstrual cycle with the highest chance of pregnancy.
- **Ovulation:** Ovulation marks the release of a mature egg from the ovary. Due to its crucial role in the menstrual cycle, ovulation is highlighted as its own phase, represented as a single day.

- Luteal: This phase ranges from the day after ovulation to the day before the premenstrual phase. It features a significant rise in progesterone alongside a smaller increase in estrogen, leading to distinctive physiological changes.
- Premenstrual: This phase refers to the five days preceding the predicted/logged period. Although technically part of the luteal phase, it is distinguished by a significant drop in progesterone and a constellation of physical and emotional symptoms.

Our menstrual health feature helps users track their cycle and identifies their cycle phases. However, it's important to remember that this feature is not designed to be used for family planning and is not intended to diagnose or treat any medical conditions. For contraception or conception purposes, please consult with a healthcare professional. Furthermore, privacy is at the core of the Fitbit experience. Users can delete their Google Account and Fitbit data at any time at any time through the Data & Privacy section of their Google Account.

## Actionable Education

For each phase of the menstrual cycle, the Cycle Phases feature provides evidence-based and actionable nutrition, mental wellbeing, sleep and activity education. This information is intended to provide users with a general understanding of how these factors may interact with the menstrual cycle. However, due to individual variations in physiology and lifestyle, these education should be considered general recommendations. For personalized advice and treatment plans, consultation with a qualified healthcare professional is advised.

## Nutrition

Given the myriad of changes during the menstrual cycle, users can learn about mindful nutrition to help them navigate their menstrual cycles. Beginning with the period, blood loss is a unifying factor with normal menstrual blood loss ranging from 5 to 80 ml.[9] Menstrual blood loss (especially heavy menstrual bleeding) is a known cause of iron-deficiency anemia, which can be prevented by eating iron-rich foods such as leafy greens, red meat, lentils and beans.[10]

Basal metabolic rates generally are lower throughout the follicular phase and increased in the premenstrual phase.[11], [12] Estrogen, dominant during the follicular phase, may decrease food intake, while progesterone, dominant during the luteal phase, can stimulate appetite and cravings.[13] In addition, a diet high in carbohydrates, animal protein, saturated fats, and trans fats may disrupt ovulation.[14]

Rising progesterone levels during the luteal phase can also inhibit insulin sensitivity, leading to higher glycemic levels during the luteal phase that can be mitigated by eating foods with low glycemic indices.[15] Moreover, progesterone inhibits gut

motility, which can contribute to bloating.[16] While the exact mechanisms are not fully understood, hormonal fluctuations may cause fluid retention in the premenstrual phase, and reducing salt intake may help alleviate this swelling.[17] Interestingly, studies have shown that calcium and vitamin B6 may help reduce premenstrual symptoms such as fatigue, cravings and low mood.[18]

### **Mental wellbeing**

It's been long recognized that the menstrual cycle significantly influences menstruating people's mental wellbeing, with hormonal fluctuations across different phases contributing to variations in mood and energy levels. Previous research has focused on the premenstrual phase, which is often associated with heightened emotional sensitivity, irritability, anger, and increased vulnerability to mood swings like anxiety and depression.[19] While a more recent review of 47 English-language prospective studies by Roman et al. did not demonstrate a specific premenstrual negative mood syndrome in the general population,[20] larger international studies have seen a distinct increase in sadness in the week prior to the start of the period.[21] Moreover, studies have also demonstrated a significantly heightened mood (friendliness, cheerfulness, concentration, energy) and a decrease in negative dimensions of mood (anxiety, depression, fatigue, hostility) during the late follicular/periovulatory time of the menstrual cycle.[22]

While mental wellbeing is important at any time of the menstrual cycle, recognizing these cyclical patterns empowers menstruating people to proactively manage their mental health. For example, prioritizing self-care practices like stress management techniques, regular exercise, and adequate sleep can mitigate mood disturbances during the premenstrual phase. Consider scheduling social events around ovulation to potentially capitalize on improved mood. Although mental wellbeing is multi-dimensional, understanding how cycle phases can affect emotions and mood can help individuals adapt and manage their mental wellbeing.

### **Sleep**

Research suggests a nuanced relationship between the menstrual cycle and sleep patterns. While some studies, such as Baker et al.'s review, indicate that sleep architecture (timing and sleep stage composition) remains relatively consistent throughout the cycle, subjective sleep quality appears to be significantly impacted.[23] Notably, both Baker et al. and Roman et al. independently observed a decline in perceived sleep quality during the premenstrual phase, specifically three to six days prior to and during the first four days of menstruation.[24] This highlights the importance of considering subjective experiences alongside objective measures when understanding the impact of the menstrual cycle on sleep.

In terms of hormonal effects, studies have demonstrated that progesterone, which rises during the luteal phase, may have a sedative effect, promoting sleepiness.[25]

However, there is an associated increase in body temperature, which can disrupt sleep and lead to more frequent awakenings.[23] In a community-based longitudinal study, as progesterone and estrogen falls in the premenstrual phase, there is a significant decrease in total sleep time (sleep duration) of approximately 25 minutes and 5% less sleep efficiency (ratio of total sleep time to time in bed) compared to the week before.[26]

Healthy sleep hygiene such as a consistent sleep schedule is important throughout the menstrual cycle. However, knowing these cyclic sleep changes can help menstruating people adopt strategies aligned with their menstrual cycle. During the luteal phase when progesterone levels are high, ensuring a cool sleep environment and practicing relaxation techniques before bed may improve sleep quality. In the premenstrual phase, prioritizing maintaining a consistent sleep schedule and avoiding known substances (e.g. alcohol, nicotine or caffeine) that can exacerbate sleep difficulties are key to mitigating sleep disturbances.

### Activity

In recent years, there has been a focus on tailoring workouts and activities to the menstrual cycle. While further investigation is needed to fully elucidate the relationship between menstrual cycle phases and exercise, there is growing evidence the influence of fluctuating hormones extends beyond reproductive processes, impacting menstruating people's overall exercise experience.[27] This individualized approach fosters a positive relationship with physical activity during their menstrual cycle, encouraging menstruating people to honor their bodies and adapt their routines based on their unique needs and preferences.

Starting with the period phase, marked by menstruation, this is a time of diverse experiences. While some individuals navigate mood changes, low energy, and cramps, others report increased energy and minimal symptoms. This is reflected in studies that show exercise performance may be slightly reduced during this time, this reduction is generally negligible.[28]

Contrary to popular belief, engaging in physical activity during menstruation is not detrimental.[29] For those experiencing a range of menstrual symptoms, prioritizing restorative practices and low-intensity exercises such as yoga, Pilates, stretching, or walking can be beneficial.[30] However, if individuals feel inclined, moderate activity is also appropriate. The key is to prioritize self-awareness and engage in activities that feel comfortable and supportive.

The bulk of the research focuses on the follicular and luteal phases where many show distinct differences in aerobic, anaerobic endurance and strength performances (Figure 2). In general, during the follicular and through ovulation phases, rising estrogen levels often correspond with increased energy and greater strength, resistance and



aerobic performance. Endurance is likely enhanced during this time as well.[31] These phases may be ideal for high-intensity and more challenging workouts, but less ideal for anaerobic exercises.[32]

In contrast to the follicular and ovulatory phases, the luteal phase is characterized by rising levels of progesterone. This hormonal shift leads to physiological changes, including increased body temperature, resting heart rate, and respiratory rate, alongside decreased heart rate variability. These physiological alterations may contribute to the observed decline in strength, endurance and aerobic exercise performance during this time.[33] [34] Conversely, studies have shown that anaerobic exercise such as weightlifting, calisthenics and circuit training may be greatest during the mid-luteal phase.[31]

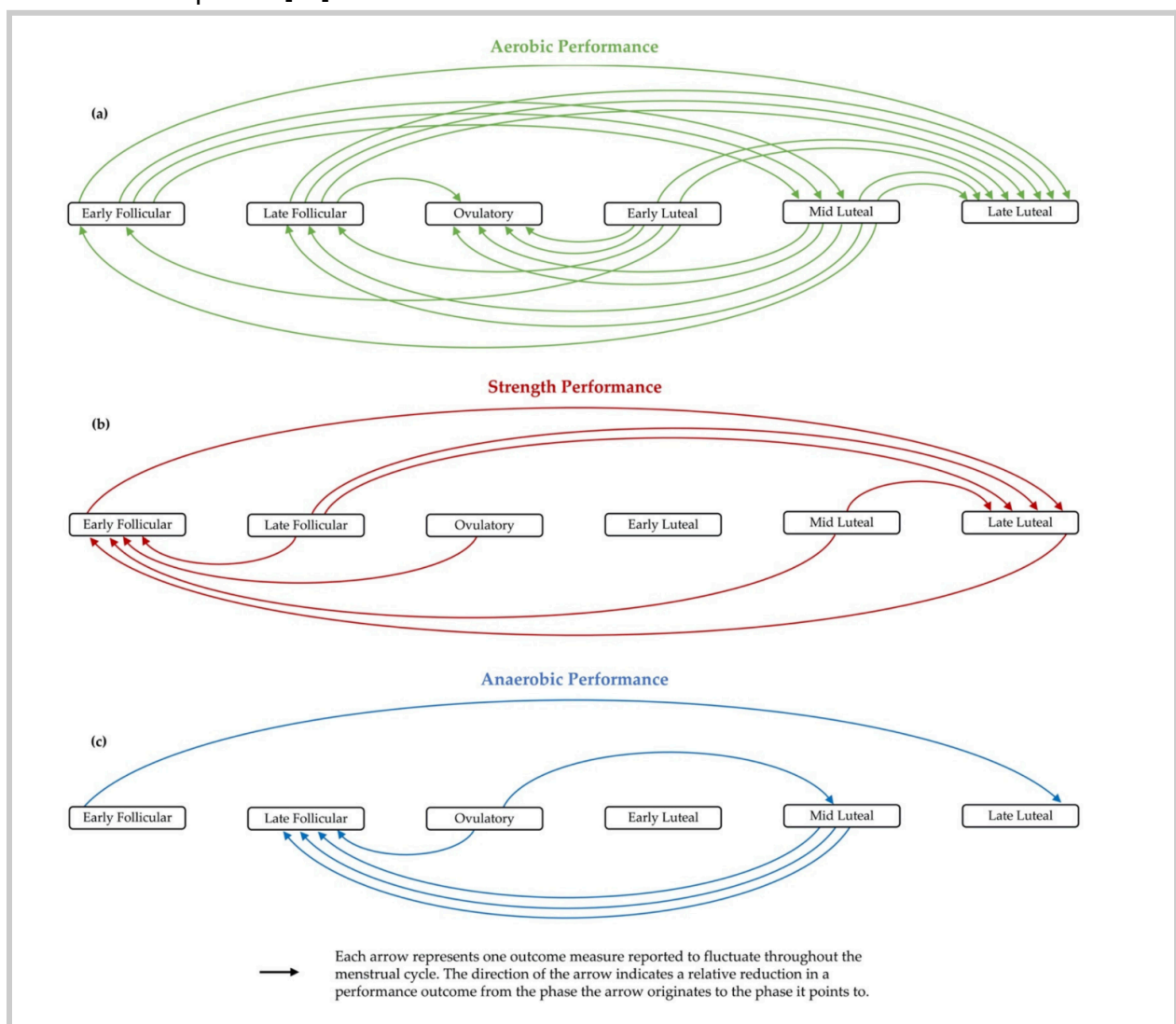


Figure 2: Summary of the changes in physical performance outcomes throughout the menstrual cycle in studies that reported physical performance fluctuated across the menstrual cycle. Source: Carmichael, et al. "The Impact of Menstrual Cycle Phase on Athletes' Performance: A Narrative Review."

For the premenstrual phase, muscular strength as well anaerobic and aerobic performance are most commonly reported to be impaired during this time.[31] This is aligned with perceived performance where female athletes report their performance to be relatively worse during the premenstrual and period phases.[31] [35] Exercise modifications are often beneficial during the premenstrual phase. Menstruating people are encouraged to prioritize lower-impact activities, adjust intensity based on individual needs, and incorporate restorative practices like gentle stretching or mindful movement. Prioritizing rest and remaining attuned to the body's signals are essential during this phase.

When aligning workouts with the phases of the menstrual cycle, it's essential to recognize that individual experiences vary. Factors such as fitness level, individual preferences, and specific training goals should be considered when tailoring activity levels throughout the cycle. By paying attention to their bodies and adapting their routines accordingly, women can maintain consistent physical activity and optimize their health throughout the menstrual cycle.

## Summary

Google Fitbit's Cycle Phases feature is designed to empower users to take control of their health and wellbeing by providing a comprehensive understanding of the complexities in their menstrual cycle. This innovative tool goes beyond basic period tracking by dividing the cycle into five distinct phases: menstruation, follicular, ovulation, luteal, and premenstrual. For each phase, Fitbit offers evidence-based education and actionable recommendations related to nutrition, mental wellbeing, sleep, and activity — but remember, a healthcare professional is always the best source for personalized medical advice.

Users can now cultivate a deeper connection to their health and gain valuable knowledge about their body by aligning lifestyle choices with their bodies' natural rhythms. Google Fitbit's Cycle Phases feature exemplifies the company's commitment to supporting users on their holistic health journeys. By providing the tools and knowledge necessary to navigate the menstrual cycle, Google Fitbit empowers menstruating people to embrace their cyclical nature, optimize their health, and live their lives to the fullest.

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