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Research Question: *Examining how Different Menstrual Phases Affect Inhibitory Control.*

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Abstract:

This study investigated how the different menstrual phases may influence inhibitory control, with a specific focus on performance in a Go/No-Go task. By combining self-reported measures of mood and perceived performance, with objective reaction time data, the research underscored the complex interaction between psychological states and biological cycles. The paper has emphasised on inhibitory control as a vital and sensitive part of executive functioning that may fluctuate with hormonal changes across the menstrual cycle. Although no statistically significant effects were found, the descriptive trends demonstrated slower reaction times during the menstrual phase and faster reaction times during the ovulatory phase. This was observed with a discrepancy between perceived and actual performance. These findings contribute to the expanding range of evidence from research that highlights inhibitory control may be shaped by both hormonal fluctuations and mood which may be interlinked. This signifies the importance of integrating subjective and objective measures in cognitive research. The study's contribution lies in drawing attention to the requirement of larger and more balanced investigations into menstrual cycle effects, with potential applications in the fields of education, workplace policies and overall women's health.

Keywords:
Cognitive Functioning; Mental Abilities; Effective Cognitive Functioning; Cognitive Deficit, Cognitive Impairment; Menstrual Cycle; Menstrual Period; Menstrual Phases; Menstrual Phase; Follicular and Proliferative Phases; Ovulation Phase; Luteal Phase; Egg Cell; Oestrogen; Progesterone; Follicule Stimulating Hormone (FSH); Luteinising Hormone (LH); Follicle; Ovary; Endometrium; Ovulation; Proliferation; FSH receptors; LH receptors

Introduction:

The Concept of Cognitive Functioning

Cognitive functioning refers to people's ability to recognise scenarios and act upon them accordingly. It relates to processing day-to-day events, understanding tasks and situations, making choices and demonstrating executing appropriate responses (Gwenith et al., 2019). Thus, cognitive functioning is an umbrella term for the mental processes that people undergo in their daily lives. This includes: acquisition of knowledge, manipulation of information and reasoning. Cognitive functioning involves developing and using various mental abilities such as attention, thinking, learning, memory, remembering, reasoning, problem solving, decision making, perception and language abilities (Kiely, 2014).

The Importance of Having Effective Cognitive Functioning

Cognitive functions are an integral part of an individual's day-to-day life. For example: in people's working life, having healthy cognitive functioning is essential for proper performance of work. In addition, an active cognitive functioning can help maintain cognitive abilities over the years. For instance, healthy cognitive abilities can be present in people while aging, even after retirement (Ahmed et al., 2025).

The National Institute of Aging stresses that good cognitive health ensures people's ability to perform day-to-day tasks, such as driving, paying their bills, taking their medicine, and remembering and knowing how to cook (Ahmed et al., 2025). During the beginning of life, cognitive ability is strongly linked to factors, such as the level of education that is achieved by people, being employed, having healthy behaviours and consistent daily activities (Harvey, 2019).

Understanding Cognitive Hindrance

According to research, hindrance in cognitive functioning is a phenomenon that can occur in people. It is also known by the terms cognitive deficit or cognitive impairment. These are inclusive terms which are used for the characterisation of the impairment of different domains of cognition (Aayush & Bobrin, 2023). Deficits in cognitive function may impact an individual's ability to attend to stimuli, think clearly, reason and remember various details and scenarios which happen regularly (Badgio et al., 2007). This may be a condition which occurs on a short-term basis, or it can progress and become a permanent diagnosis for people. Studies have indicated that this impairment is a common complaint which is expressed by older women in mental health and medical care settings (Aayush & Bobrin, 2023).

The nature of cognitive impairment can span from a spectrum of mild to severe. Mild impairment involves some changes in cognitive functions. However, people still have the ability to perform their day-to-day activities. On the other hand, severe levels of impairment can lead to inabilities to the extent that individuals are unable to live their lives independently. This is because they have lost the skills to plan, carry out everyday tasks and apply their judgement in various daily scenarios. This means that cognitive impairment can lead to dementia or schizophrenia. Therefore, personalised diagnosis for the type and severity of cognitive deficiency is crucial for appropriate planning and providing treatment to each patient (Aayush & Bobrin, 2023).

The Focus of the Research Paper

The study explains what menstrual cycle and phases mean. It identifies the names of phases and what specifically occurs in each phase. The paper will examine how each menstrual phase affects cognitive function in terms of inhibitory control, and what are the implications of this for women. It will highlight what can be done during the menstrual period to enhance cognitive function.

Literature Review:

Explaining the Concept of the Menstrual Cycle

The menstrual cycle's duration is between the first day of a female's period and the day before their following period. The time span of the menstrual cycle can vary. In saying that, the average cycle time is

28 days. Menstrual periods for females usually begin when they have reached puberty at 11 to 14 years of age (Mckellar & Sillence, 2020).

The Signs and Symptoms of Having Menstrual Period

The symptoms of the menstrual periods can include cramps, bloating, having tender breasts, mood swings, irritability, headaches, tiredness and lower back pain (Watson, 2023).

The Phases of the Menstrual Cycle

The menstrual cycle encompasses four stages. These are: the menstrual phase, follicular and proliferative phases, ovulation phase and luteal phase.

Phase 1: The Menstrual Phase

The menstrual phase is the first stage of the menstrual cycle. The phase begins when women get their period. It involves an egg cell from the previous cycle that has not been fertilised by a sperm cell. Thus, pregnancy has not taken place. The levels of the estrogen and progesterone hormones decline (Szmelskyj et al., 2015).

Estrogen is required for sustaining and maintaining reproductive health. The levels can fluctuate naturally during the menstrual cycle. On the other hand, progesterone supports menstruations and assists in the overall maintenance of the initial stages of a pregnancy in females. A lack of progesterone levels can result in complications with pregnancy or induce side effects similar to menopause (Cleveland Clinic, 2022). As hormone levels fall, the thickened lining of the uterus, which is also known as the endometrium is no longer needed, as it ideally functions to support a pregnancy. Due to this, it sheds through the vagina of the female. A combination of the processes leads to the release of a mixture of blood, mucus and tissue from the uterus. This is classified as the menstrual period and it marks the end of the menstrual phase (Szmelskyj et al., 2015).

Phase 2: The Follicular and Proliferative Phases

The next stage of the menstrual cycle is known as the follicular and proliferative phase. This refers to the maturation of the follicles in ovaries and the proliferation of the endometrium (Szmelskyj et al., 2015). The follicles in ovaries are small fluid-filled sacs that are found in a female’s ovaries. They are responsible for secreting the hormones that have an influence on the four phases of the menstrual cycle, and females generally commence puberty with around 300,000 to 400,000 of these follicles. Each follicle has the prospect of releasing an egg for fertilisation (London Women's Clinic, n.d.).

The follicular phase is marked to begin on day 1 of menstrual bleeding. This is also the first day of the menstrual cycle. In the follicular phase, Follicle-Stimulating Hormone (FSH) stimulates a unit of primordial follicles to mature into Graafian follicles, which are relatively large ovarian follicles that contain an antrum filled with follicular fluid (Conti & Chang, 2016). It encourages the production of 17-β estradiol and inhibin B which is a heterodimeric glycoprotein and similar to AMH, in the ovary itself. 17-β estradiol is an 18-carbon steroid hormone that is produced mainly in the ovarian theca interna cells from androgens. This includes androstenedione and testosterone, and is the most dominant type of estrogen with significant physiological activity (Garnett et al., 2020).

According to studies, the majority of the estrogen is produced by the dominant follicle. It is a solitary follicle that begins to develop faster than the rest of the ovarian follicles (Cleveland Clinic, 2022). It continues to grow under the influence of female sex hormones, such as LH and FSH (Shimizu, 2022). Approximately by day 7, many 9 to 10 mm antral follicles are present in each ovary. As a consequence, the non-dominant follicles begin to degrade and are suppressed as both 17-β estradiol and inhibin B work to provide negative feedback to reduce FSH levels (Szmelsky et al., 2015).

On the other hand, FSH stimulates the manufacture of additional FSH receptors within the dominant Graafian follicle. This increases its sensitivity to FSH even when overall FSH levels reduce. The dominant follicle continues to mature. It grows at a speed of approximately 2 mm until it reaches a diameter of 18 to 29 mm (the average is 23.6 mm). Towards the end of the follicular phase, FSH encourages the development of receptors for the Liutenising Hormone (LH) within the dominant follicle. Thus, preparing it for the next phase - ovulation (Szmelsky et al., 2015).

Proliferation of the endometrium occurs in order to prepare for the phase in the menstrual cycle wherein a layer of endometrial cells is prepared for the possible attachment of a fertilised egg (Healthline, 2018). Simultaneously, the proliferative phase in the uterus follows the conclusion of menstrual bleeding and continues until ovulation (Szmelsky et al., 2015).

How the Menstrual Cycles Phases Affect Cognitive Function

Studies have shown that cognitive performance tends to fluctuate across the different phases of the menstrual cycle. This is due to hormonal changes, specifically in estrogen and progesterone levels.

Cognitive domains, such as memory, attention and executive function, are influenced in different ways in correspondence to a particular cycle phase. Executive function refers to the ability to pursue and accomplish a goal by using higher order cognitive skills (Cristofori et al., 2019).

Cognitive functions including working memory and attention function better when estrogen levels peak in the post-ovulatory phase (Maki & Resnick, 2001; Farage et al., 2008). On the other hand, the luteal phase which is characterised by high progesterone levels is linked to a greater variability in cognitive performance. Certain studies have found differences in attentional focus and reaction times, which can be defined as the duration between a stimulus and a voluntary response to that stimulus (Jain et al., 2015).

Cycle-related modulation of prefrontal cortical activity indicates the changes in the brain's prefrontal cortex that occur in coordination with the body's biological cycles. These influence cognitive processes, such as attention and decision-making skills (Folschweiller & Sauer, 2023). Consequently, neuroimaging studies have indicated cycle-related modulation of prefrontal cortical activity during executive tasks (Hwang et al., 2009).

Moreover, a recent meta-analysis has indicated that inhibition and attentional processes demonstrate the strongest trends of fluctuation across the different cycles phases, although degree of influence is small (Ronca et al., 2024). It is important to note that individual differences, such as baseline inhibitory control, is the foundational level of self-control before any applied training or intervention can alter the way these effects manifest. Therefore, producing differences in performance across individuals (Hidalgo-Lopez & Pletzer, 2019).

Inhibitory Control and the Go/No-Go Task

Inhibitory control is the ability to suppress action when they have a lower probability of achieving valuable outcomes (Kang et al., 2022). It is a core component of executive functioning and has been investigated across the menstrual cycle through using tasks, such as the Go/No-Go paradigm. The differences in the cycle phases alter both behavioral performance and neural activation patterns during inhibitory processing. Roberts et al. (2008) discovered that during the follicular phase, females tended to demonstrate a stronger activation in the prefrontal cortex, and an increase in error monitoring as a response to male facial stimuli. This reflected enhanced inhibitory control when estrogen is relatively high. Similarly, Hwang et al. (2009) found variations in prefrontal response as a result of the differences in menstrual phases during inhibitory tasks. Thus, supporting the role of changing sex hormones in cognitive control.

The reason why inhibitory control is chosen in this study as the variable being measured amongst the vast range of cognitive functioning is that it appears to be the most sensitive to menstrual cycle variation (Ronca et al., 2024). This has implications in tasks such as the Go/No-Go paradigm which is a simple test of inhibitory control. It requires participants to respond quickly to 'Go' signals. However, they must hold their response at the appearance of a rare 'No-Go' signal. Due to its focus on accurate, steadfast responses, performance on No-Go trials reflects a person's ability to suppress automatic actions. As a result, it is a widely used measure of impulse control and attention (Simmonds et al., 2008).

Methodology:

Information about Primary Data

In this study, a questionnaire was used to gather data from the participants. This involved a set of 10 questions for participants to answer. This included insightful questions about the menstrual cycle of the participants. The questions were: "What was the date of your last period ending?" and "How would you describe your period? (Regular or Irregular)". In addition, as a part of the study, a Go/No-Go task was included before the performance-related questions in the questionnaire. This task required participants to press the spacebar at the appearance of a green dot on the screen and refrain from pressing it at the appearance of a red dot on the screen. The reaction time (time taken for participants to react by pressing the spacebar at the appearance of a green dot) was the objective measure that was used to draw results, correlations, and conclusions for this study.

Questions regarding mood and the performance of the participants on the task provided were asked. The questionnaire consisted mainly of close-ended questions. Thus, allowing deeper and clear analysis of the responses that are shared by the participants. One open-ended question was also included towards the end of the survey. The question was "Please provide a short description of how you think you performed this week?". This was written to obtain qualitative data with reasoning. Therefore, allowing a scope for explanation. Furthermore, literature reviews, research papers and credible online articles published by known authors were used to provide the explanations, analysis and drawing conclusions from the data sets which were obtained from the questionnaire.

Information about the Research Sample

The sample for this research consisted of 9 young females aged between 14 to 24 years old that participated through convenience sampling. This method was selected due to its practicality and accessibility. This is especially when studying a topic of menstrual cycle, as it can be considered as sensitive or uncomfortable information to share. Recruiting participants from accessible groups, such as peers, allowed the researcher to engage with individuals who were more likely to feel comfortable discussing their experiences in a familiar context. Additionally, convenience sampling facilitated efficient data collection within the given time and resource constraints. Whilst still ensuring that the participants met the specific inclusion criteria: being young and biological females who are currently menstruating.

What is Included in the Data

The data includes the age, current menstrual phase and regularity of the menstrual cycle as reported by the participants. The subjective performance (how the participants thought they performed in the task) and mood score were self-reported by the participants on a scale of 1-10. Lastly, the reaction time in the Go/No-Go Task was directly extracted from the website, Psytoolkit. This was achieved to support the task itself in order to obtain an objective measure of the participants' performance on the task. Overall, the information encompassed demographics, menstrual related data, psychological measures and cognitive performance data.

This was done in order to achieve a holistic understanding of the variables intended to be measured in the study and achieve cross-validation. The comparison between subjective performance and objective reaction time enabled the comparison between perception and actual task outcomes. Furthermore, the inclusion of both close-ended and one open-ended question allowed for statistical analysis to be documented with reasoning. Importantly, the procedure was designed to be as less invasive as possible, which may have improved participants' honesty and compliance.

Information that was Excluded from the Data

The data excludes responses and statistics from participants who filled in the questionnaire without completing the task. The excluded incomplete responses would ensure that the data acquired is of good quality, reliable and consistent. In saying that, it does reduce the overall sample size. The data also excludes the accuracy of the participants' responses in the Go/No-Go task which was initially intended to be a measured variable. However, due to discrepancies in the files obtained from the website that was hosting the task, these values could not be extracted.

Findings and Discussion

Information about the Participants

This study had 9 participants and the average age was 19.78 (S.D = 5.34). More than half (55.6 %) were in the follicular phase of their menstrual cycle. The majority (88.9%) had regular menstrual cycles.

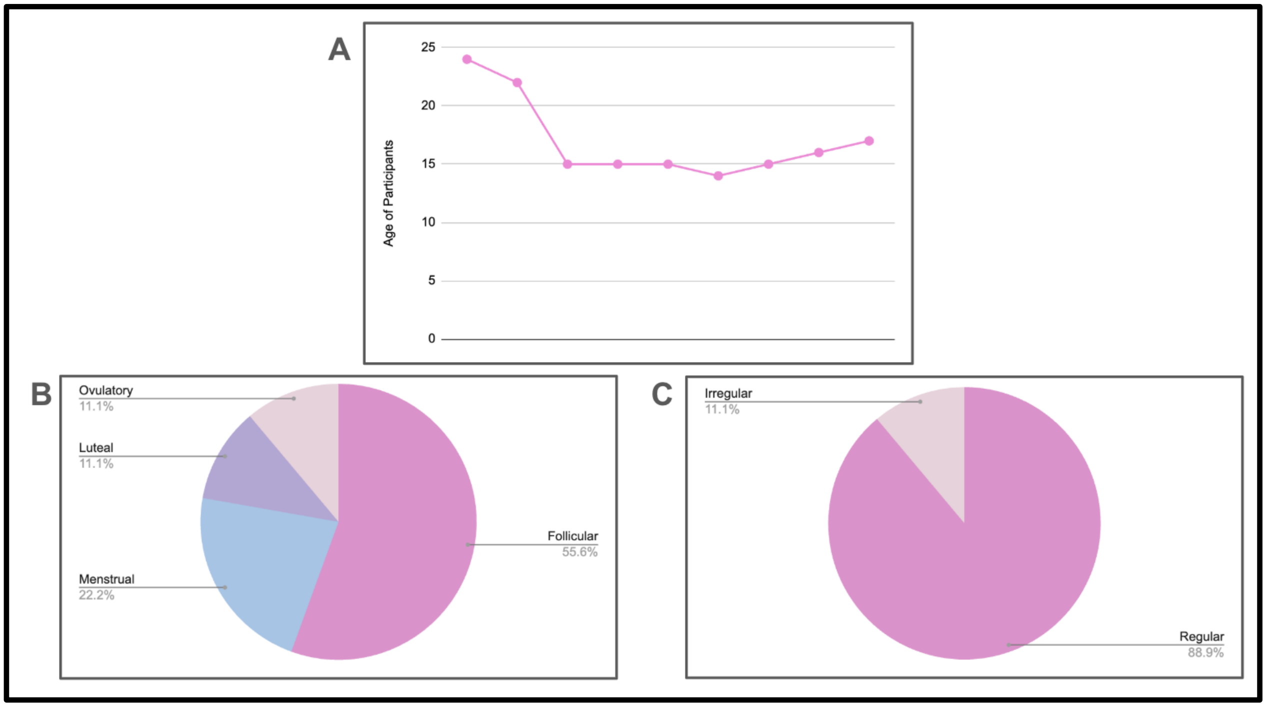
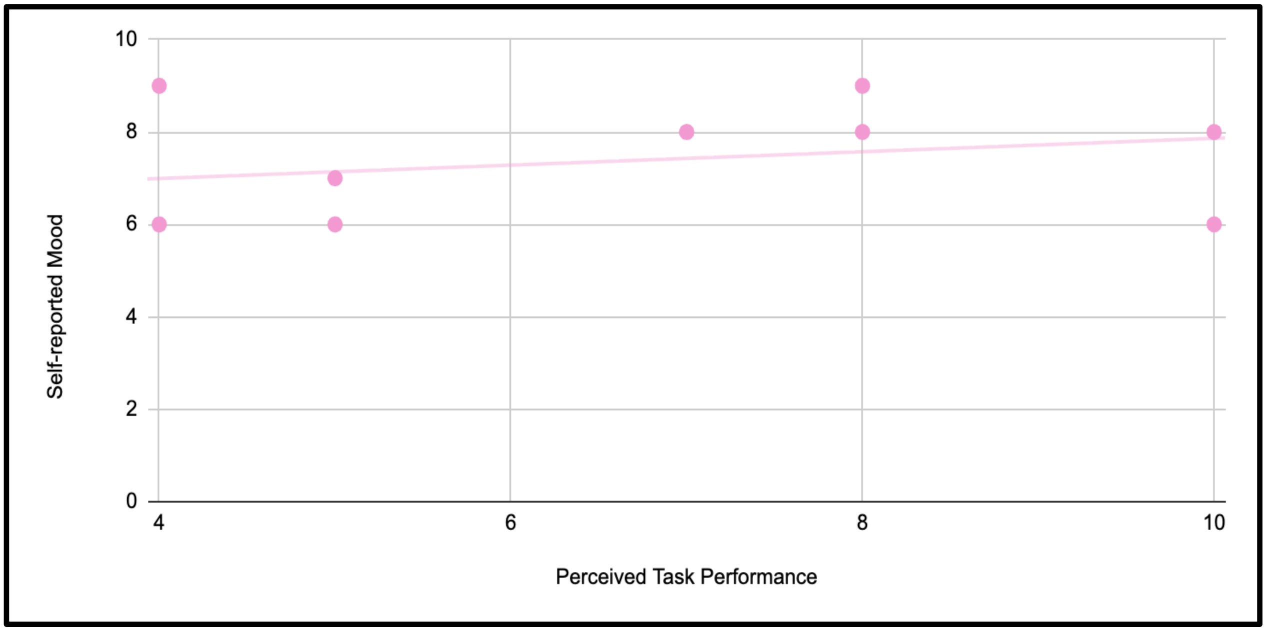


Figure 1: Descriptive statistics of sample: A) Age of participants, B) Menstrual Phase of participants, C) Regularity of menstrual cycle of participants



Question 1a: Self-reported performance on task/ during day vs mood

Figure 2: Graph showing self-reported mood (y axis) against perceived GO/NO-GO task performance (x-axis)

What the Results Mean:

This analysis was conducted to determine whether self-reported mood showed a relationship with perceived task performance. Both variables were taken at the same time point. Despite the positive trend as shown in Figure 2, it was non-significant, $r = 0.50$, $p > .05$. This is likely due to the small sample size of this study.

A positive trend between mood and perceived performance is observed although with considerable variability.

Question 1b: Objective measure of performance (RT) vs mood that day

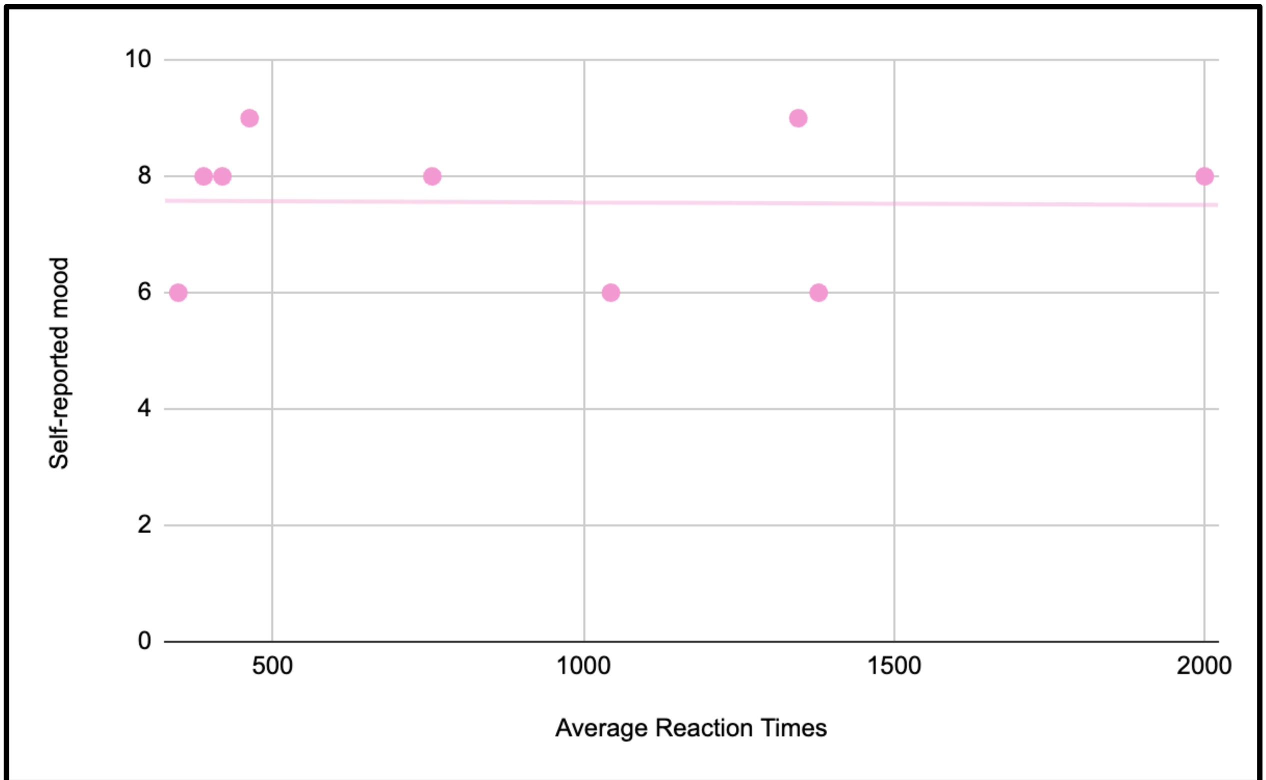


Figure 3: Graph showing self-reported mood (y axis) against average reaction time during GO trials (x-axis)

There was a negative, but non-significant, correlation between self-reported mood and reaction times, $r = -0.02$, $p > 0.5$.

Question 2: Self-reported performance vs actual performance (RT)

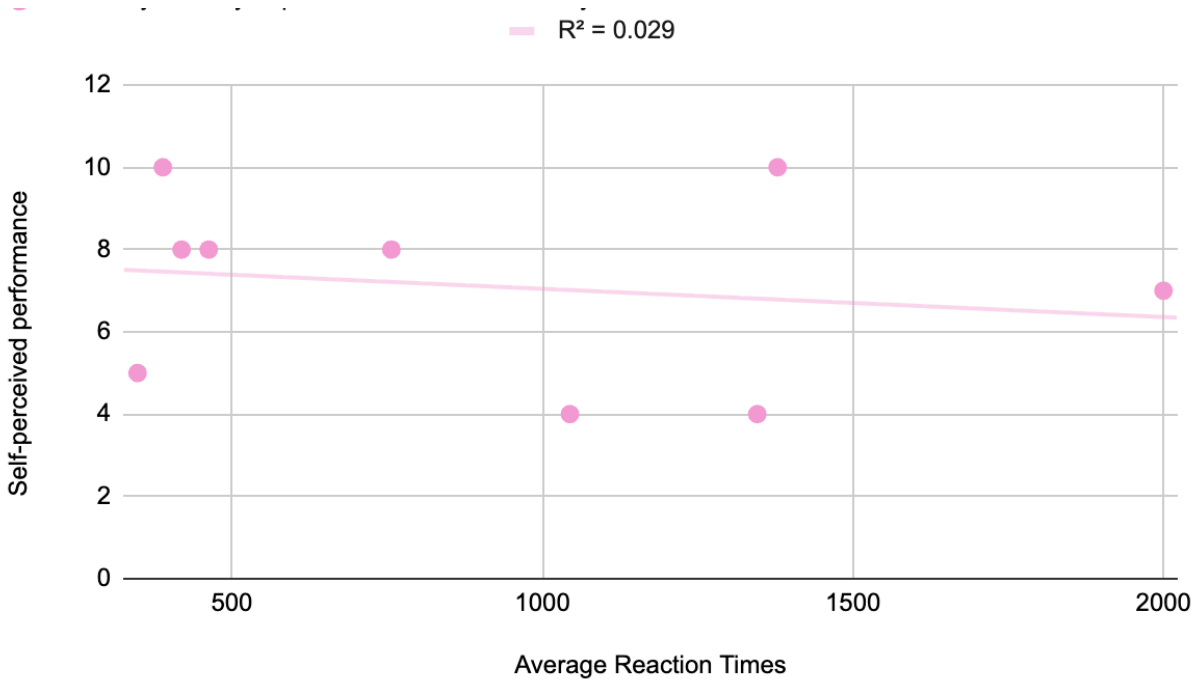


Figure 4: Graph shows perceived performance (y-axis) against average reaction time during GO trials (x-axis)

Graph description: higher rated perceived performance (subjective measure) = faster reaction times (objective performance) - even though there is not a significant difference, the trend is visible.

Negative correlation, non significant (potentially due to the small sample size).

r= -0.17, p >0.5

Question 3a: Objective measure of performance (RT) vs menstrual phase

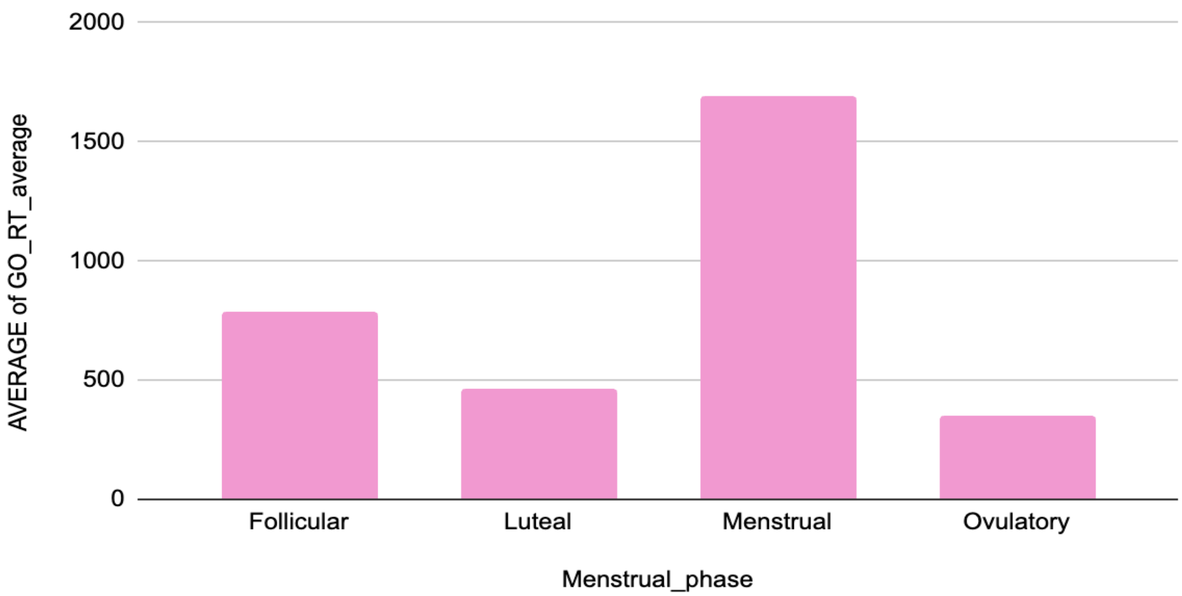


Figure 5: Graph indicates average reaction time during GO trials (y-axis) against menstrual phase (x-axis)

A one-way ANOVA was conducted to compare values across the four menstrual cycle phases (follicular, luteal, menstrual and ovulatory). Descriptive statistics indicated mean values of 791.08 (SD ≈ 410.3) in the follicular phase (n = 5), 462.90 in the luteal phase (n = 1), 1689.35 (SD ≈ 439.4) in the menstrual phase (n = 2), and 348.20 in the ovulatory phase (n = 1).

The ANOVA revealed no statistically significant differences between groups, $F(3, 5) = 3.46$, $p = 0.107$, $\eta^2 \approx 0.68$.

Question 3b: Self-reported performance vs menstrual phase

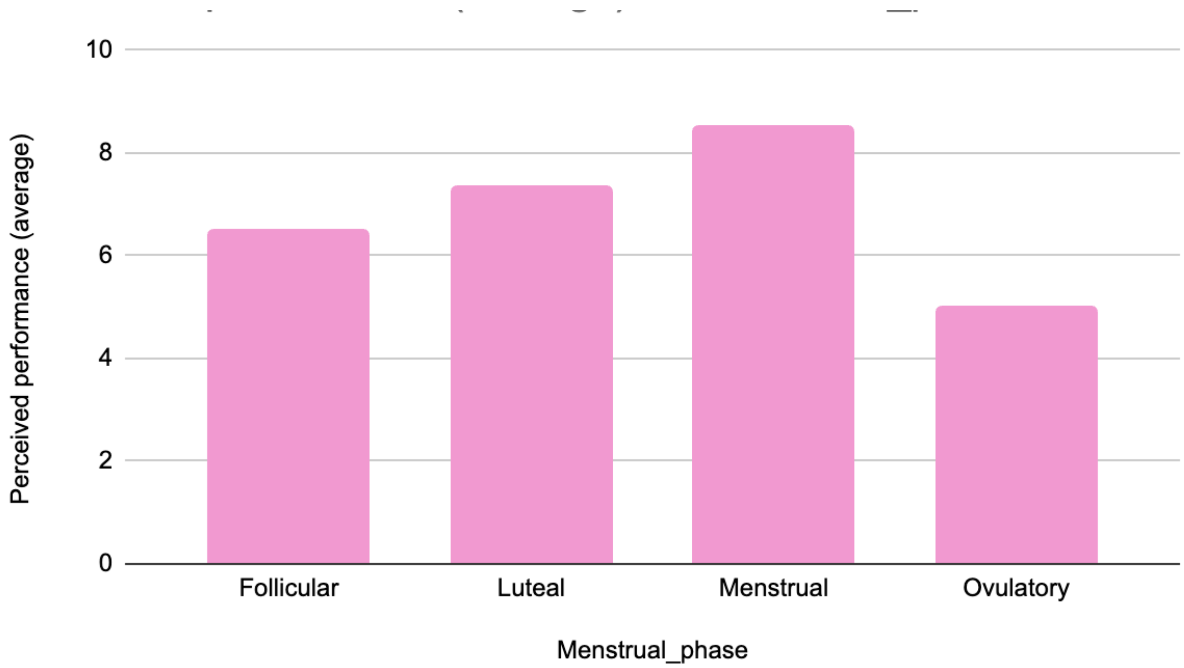


Figure 6: Graph showed perceived performance (y-axis) against menstrual phase (x-axis)

A one-way ANOVA was conducted to compare perceived performance values across the four menstrual cycle phases (follicular, luteal, menstrual and ovulatory). Descriptive statistics indicated mean values of 6.50 (SD ≈ 2.51) in the follicular phase ($n = 6$), 7.33 (SD ≈ 3.06) in the luteal phase ($n = 3$), 8.50 (SD ≈ 2.12) in the menstrual phase ($n = 2$)and 5.00 in the ovulatory phase ($n = 1$).

The analysis revealed no significant effect of menstrual phase on self-perceived performance on the GO/NO-GO task: $F(3, 8) = 0.50$, $p = 0.693$, $\eta^2 = 0.16$. The difference between the perceived performance ratings explained only 16% of the variance.

What the Results Mean

The survey results pinpoint that both subjective (which includes self-reported mood and performance) and objective (reaction times) measures vary across participants and menstrual phases. Although the trends were visible, none of them reached statistical significance. Therefore, indicating potential relationships between the variables measured. However, there is no strong evidence due to the small size of the sample.

Self-reported mood and perceived performance were positively related (Figure 2). Participants who rated their mood higher tended to rate their task performance higher (r = 0.50). Although this correlation did not reach significance, the direction of the relationship is consistent with the understanding that mood can influence how individuals evaluate their cognitive abilities.

On another note, mood showed a very weak and negative relationship with reaction time (Figure 3). In principle, better mood was linked with faster responses but the correlation was almost zero (r = –0.02). This means that mood alone may not be a reliable measure to predict objective task performance, at least in small samples.

Additionally, the comparison between perceived performance and reaction time (Figure 4) revealed a weak negative correlation (r = -0.17). This highlights that participants who believed that they had performed better did tend to respond faster, even if the relationship did not have significance. This trend suggests that subject self-assessment may align somewhat with objective performance. Although there are inconsistencies with the trend.

Variation was observed across menstrual phases (Figures 5 and 6). The average reaction times differed between phases, with the menstrual phase showing the slowest responses (mean ≈ 1689 ms) and the ovulatory phase showing the fastest response (mean ≈ 348 ms). The follicular (≈ 791 ms) and luteal (≈ 463 ms) phases came in between these two phases. Similarly, self-reported performance was highest during the menstrual phase (mean = 8.5) and lowest during the ovulatory phase (mean = 5.0). Although the ANOVA tests revealed no statistically significant differences ($p > .10$ for reaction times, $p > .69$ for self-reported performance). These descriptive patterns suggest that both actual and perceived performance may fluctuate across the different phases of the menstrual cycle.

Overall, the results show that both subjective (self-reported mood and performance) and objective (reaction times) measures differ across menstrual phases. Although there were visible trends, none of them reached statistical significance. Therefore, they suggest potential relationships. However, there is no strong evidence due to the small sample. In line with this, the study found that mood, performance perception and menstrual phase may influence cognitive functioning, specifically inhibitory control and the data suggests possible patterns which have been discussed. In saying that, the results are inconclusive. These findings link directly to the literature about hormonal fluctuations affecting cognition. Estrogen and progesterone shifts are known to influence attention, inhibitory control and reaction times.

Variations Observed in the Data

Variations in reaction times across menstrual phases were observed which specifically was slowest during the menstrual phase and fastest during the ovulatory phase. Additionally, there were variations in perceived performance across phases which were highest in the menstrual phase and lowest in ovulatory phase. Lastly, there were mixed but mostly weak correlations between mood and performance.

The Information That is Presented

The study indicates that cognitive function may fluctuate with menstrual phases, which could affect performance in tasks requiring inhibitory control. However, conclusions cannot be generalised as there seems to be a weak positive link between mood and perceived performance. Moreover, reaction times tend to be directly proportional with perceived performance. The results align with what past literature has found. This includes the fact that there are fluctuations in cognition across the menstrual cycle. The evidence indicates that menstrual phases may play a role in attention and inhibition. In saying that, current results need further research.

The Differences That Exist and Why That is

Differences exist across menstrual phases in terms of reaction times and self-reported performance. This may be a consequence of hormone fluctuations, particularly estrogen and progesterone. This could be the cause of possible variability in cognitive control. However, there is no confirmed significant effect that is witnessed in this study.

The Challenges that Are Visible from the Results and What Can be Done

The results of the study highlight several challenges, such as the small sample size (n = 9), uneven group distribution across menstrual phases (with only one participant in the ovulatory and luteal phases), and missing accurate data. These limitations hinder the accuracy and reliability of the findings, particularly given the reliance on self-reported measures of mood and performance, which may be biased. This can be combated by using a larger and more diverse sample, ensuring balanced recruitment across all menstrual phases, and collecting both reaction time and accuracy data for a more comprehensive assessment. Despite these constraints, the current data provide useful preliminary insights, pinpointing that larger-scale studies may reveal faster reaction times during the ovulatory phase (linked to higher estrogen), slower reaction times during the menstrual phase, and the absence of a link between self-perceived and objectively measured performance.

Conclusion

Summary of the Findings

This study aimed to examine how different menstrual cycles may affect cognitive performance, with a focus on inhibitory control as measured by a Go/No-Go task. Self-reported mood and perceived performance were positively related. Thus, indicating that emotional state can influence how individuals evaluate their inhibitory control. Reaction times demonstrated a weak negative relationship with both mood, which may be a result of the hormones secreted in the menstrual cycle, and perceived performance. This highlights that individuals who felt that they performed better tended to respond faster. Moreover, across menstrual phases, inhibitory control appeared lowest during the menstrual phase (which means slower responses) and strongest during the ovulatory phase (faster responses). Additionally, it is notable that self-perceived performance was highest during the menstrual phase. Therefore, underscoring a potential discrepancy between subjective judgements and objective measures of inhibitory control. None of these results were statistically significant primarily due to the small sample size and uneven distribution of participants across phases.

Support for the Hypothesis

The hypothesis stating that menstrual phases influence cognitive function, particularly inhibitory control, was partially supported. Although the trends were partially consistent with prior literature which pinpointed that hormonal shifts, especially variations in estrogen and progesterone, have the ability to modulate prefrontal cortical activity and executive functioning. The statistical analyses did not confirm significant differences. This means that the evidence aligns with the hypothesis but it is not strong enough to fully support it.

What the Results Conclude

The bigger picture is that women’s cognitive performance may fluctuate with biological rhythms, and psychological states interact with these rhythms. An example of a psychological state that the paper discussed was mood. This highlights the importance of considering both hormonal and emotional factors in cognitive research and potentially in applied contexts, such as education, workplace policies and healthcare. These results can provide preliminary evidence that inhibitory control may fluctuate across the menstrual cycle, and that mood plays an influence on how performance is perceived more than it influences the actual performance.

Trends Existing in the Findings

The findings support that trends do exist between menstrual phases and performance outcomes with the limitation of not being statistically confirmed. In addition, they point out that self-assessment of performance may not always reflect objective reality. Lastly, mood plays an important role in perceived but not necessarily in actual performance.

Implications of the Findings

The implications are that menstrual phases should be considered in studies of cognition and in real-world performance contexts. Educational institutions, employers and healthcare providers may need to acknowledge that fluctuations in hormones and mood can affect attention, inhibitory control and perceived task ability.

What Governments can do

The government can consider funding larger-scale, longitudinal studies in order to better understand the link between the menstrual cycle and cognition. They can incorporate understanding of menstrual health into public health programs, workplace wellness initiatives and educational awareness campaigns in order to publicise the significance of awareness and understanding towards this topic of matter. Moreover, they can support policy shifts that normalise and accommodate cyclical cognitive and emotional fluctuations, similar to existing accommodations for other health-related factors.

Implications for Future Research

Future research can explore larger and more balanced samples across all menstrual phases. Performing longitudinal research or a repeated-measures design can be beneficial as well, in order to track individuals across all menstrual phases and reduce participant variability due to individual differences. Furthermore, both reaction time and accuracy in cognitive tasks can be included.

Lastly, hormone assays can be used to precisely determine the menstrual phase being observed. Consequently, future researchers can consider accounting for extraneous variables, such as sleep, stress, nutrition, exercise and time of day. To improve validity and specificity, the age range of participants can be narrowed and this area of study can also be amplified by comparing adolescents vs. adults. This in turn can allow a more diverse and representative sample beyond simply convenience groups.

Recommended Policy Implications

Policy implications in education and workplaces can be to normalise and acknowledge variations in women's cognitive performance, such as having slower reaction times. In addition, menstrual health discussions should become more common in order to reduce stigma and encourage support. Training programmes should be developed to help women optimise performance during different phases which can include scheduling demanding cognitive tasks when cognitive functioning is typically higher.

Future Impact of the Research

A connected area can include the study of sleep and circadian rhythms alongside menstrual cycles. According to research, sleep patterns are known to affect inhibitory control and reaction times. Combining these lines of research could give a complete and complex picture of how biological systems interact to influence cognition in women.

Finally, potential research questions to further expand knowledge and understanding about this field of study can focus on how stress levels and physical tiredness interact with menstrual phases to influence inhibitory control and cognitive performance. Also, the similarities and differences in the relationship between mood and self-perceived performance across adolescents and adults, and the effect of interventions, such as mindfulness and cognitive training, on cycle-related variability in inhibitory control.

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