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## Perception of The Impact of the Menstrual Cycle On the Creativity of Medical Students at A Mexican University

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### Abstract

*The present research aimed to map and identify the perception of creativity among undergraduate students at a Mexican university, explicitly focusing on Medicine. The objective was to comprehensively analyze how these perceptions could vary according to the phases of the menstrual cycle, comparing the results with surveys administered to creativity specialists. The research addressed the need to adapt equality and gender policies for greater flexibility in microcurricular academic processes that often prove rigid. A mixed-methods approach was designed to achieve this, combining quantitative surveys with qualitative interviews. In the quantitative phase, data were collected from Medicine students to analyze patterns and trends in the perception of creativity during the different stages of the menstrual cycle. In the qualitative phase, semi-structured interviews were conducted with students and experts in neuroscience and creativity, allowing for an in-depth exploration of individual experiences. The triangulation of quantitative and qualitative data reinforced the validity of the findings. The research suggested significant differences in the perception of creativity, motivation, and the ability to synthesize ideas depending on the participants' different phases of the menstrual cycle. As a result, a model of adaptation and methodological strategies based on agile methodologies, such as design thinking, was proposed to enhance flexibility and equity in the academic environment. This approach could transform how creative and educational dynamics are managed and addressed in university contexts.*

**Keywords:** Creativity, Neurosciences, Feminism, Hormones, Menstruation

### Introduction

Higher education has undergone significant transformations due to globalization and the SARS-COV-19 pandemic, highlighting the importance of creativity and innovation within a gender equity framework (Fukuda-Parr, 2014; United Nations, 2015). The Sustainable Development Goals (SDGs), established in the 2030 Agenda, promote quality education that transcends formal instruction, addressing fundamental pillars such as learning to know, do, live together, and be (Delors et al., 1997). However, fulfilling the SDGs faces challenges related to vague wording and support for free-market policies (Bohorquez, 2017).

In this context, the need arises to investigate the relationship between menstrual cycles and creativity in university students, considering the importance of the female cyclical brain in neurocognitive processes (Hampson, 2018; Gingnell et al., 2016). Studies suggest that the follicular phase, associated with increased estrogen levels, enhances verbal memory and associative thinking, while the luteal and premenstrual phases may negatively influence attention and creative motivation (Duque et al., 2014; Egan, 2018). Despite this, evidence of significant

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differences in creativity between genders and during the menstrual cycle remains limited (Joel et al., 2015; Marwha, Halari, & Eliot, 2017; Sanchis-Segura et al., 2019).

Creativity is a multidimensional construct that depends on intelligence, context, motivation, and emotions (Sternberg & Lubart, 1992; Gardner, 2001). It is a key component in higher education, promoting innovative solutions to complex problems (Kaufman & Sternberg, 2019). Furthermore, Empathy, as a cognitive-emotional construct, plays a crucial role in social interaction and creative development (Davis, 1996; Auné et al., 2015).

Regarding public policy, gender biases persist in educational materials, and gender neutrality is assumed in policies, underscoring the need for educational approaches that consider neurocognitive and hormonal differences (Verge & Alonso, 2019). This approach is essential for fostering competencies such as complex problem-solving and enhancing students' emotional well-being (Martínez, 2020; Martínez & Slater, 2023).

The menstrual cycle, regulated by the hypothalamic-pituitary axis and ovaries, could influence neurocognitive functions such as creativity and decision-making. However, the lack of significant evidence presents an opportunity to rethink current models from a humanistic perspective (Tortora, 2013; López et al., 2020).

Finally, this research aims to analyze how the menstrual cycle affects creativity in female medical students, justifying more flexible curricular structures aligned with the SDG 5 Gender Equality goals (United Nations, 2017). During the luteal phase, many women experience physical and psychological symptoms such as breast pain, headaches, anxiety, irritability, and changes in appetite, associated with progesterone levels and the decrease in estrogen (Moreno-Gómez, 2022). The National Association for Premenstrual Syndrome indicates that between 80% and 90% of women of reproductive age present premenstrual symptoms (De Souza, 2018). Additionally, dietary patterns related to this phase, such as "food cravings," have been identified (Manikandan, 2019).

The menstrual cycle not only has a biological impact but also a cultural one. Cultural and religious practices have perpetuated negative constructs about the menstrual cycle (Ramírez Morales, 2019). In biomedical science, the historical emphasis on reproduction has limited a comprehensive understanding of the menstrual cycle. This poses a challenge to advancing toward approaches recognizing this process as essential for empowerment and human behavior.

The analysis of the experiential phases of the menstrual cycle will be divided into three categories:

**Premenstrual:** Before menstruation.

**Menstrual:** During the flow and bleeding.

**Non-menstrual:** Associated with the post-menstrual and ovulatory period.

Despite biological perspectives, research on the hormonal influence on neurocognitive processes remains scarce. Exploring this field from a more inclusive approach is crucial, combining scientific and humanistic perspectives to enrich our understanding of the menstrual cycle and its impact.

Menstruation remains a taboo subject, even though it has affected half of humanity for 40 years (Pérez Ávila, 2017; Sánchez, 2019). Studies on menstruation began in the 1900s, focusing on

biomedical aspects such as cervical cytology and hormonal control (Laqueur, 1994). Later, the hygienic control of menstrual fluids was promoted, leading to a capitalist focus that commercializes menstrual hygiene products (Felitti, 2016). This has resulted in consequences such as ignorance about menstrual psychology and the perpetuation of menstrual poverty.

Menstrual poverty, defined as the lack of access to hygiene products, education on menstrual health, water, and waste management infrastructure, mainly affects women in vulnerable conditions (Moya González, 2019). According to UNESCO, around 130 million girls and young women drop out of school due to reasons like the lack of menstrual hygiene products. In Mexico, menstrual poverty triggers discrimination and social stigma, requiring inclusive public policies with a gender focus (Domínguez-Aguilera, 2022).

From a neurocognitive perspective, hormonal fluctuations during the menstrual cycle influence skills such as memory and attention, with specific differences observed in patients with neuropsychiatric diagnoses like schizophrenia (Kao et al., 2013; Ramos-Loyo et al., 2014). Preliminary studies also suggest that the menstrual cycle can impact creative processes and decision-making, though further research is needed to validate these observations (Hampson et al., 1988; Dreher et al., 2006).

Cultural analysis highlights that menstruation has historically been stigmatized and linked to negative concepts such as weakness and contamination. This reinforces gender inequalities and affects women's self-perception (Gómez et al., 2020; Jackson, 2019). Therefore, this research addresses questions about how self-awareness of the menstrual cycle can empower women in their personal and professional development, fostering inclusive and equality-based educational models.

The brain, as a complex and unique organ in every individual, is the foundation of processes that enable the acquisition of new learning throughout human experiences (Burgueño, 2022; Conrado Parejo, 2022). Despite these advances, neuroscience still maintains a positivist discourse that associates brain characteristics with sex, which needs to be reviewed from a feminist epistemological perspective (Fine, 2011). This approach seeks to challenge biological paradigms, value sociocultural interaction in neurocognitive processes, and design experimental studies considering cultural and social differences (Ruiz Díaz, 2020).

**Brain plasticity** is key to adapting the nervous system, allowing organizational changes and restructurings in response to internal or external experiences (Garcés-Vieira & Suarez-Escudero, 2014). This process facilitates learning in individuals with different rhythms and needs, regardless of sex or gender (Gómez-Ara, 2018). Moreover, neuroscience has emphasized that cognitive functions of the brain cannot be exclusively evaluated from a biological perspective, as social and cultural contexts significantly impact the construction of educational and cognitive realities.

Phenomenology and social constructivism complement this perspective, highlighting that learning is intersubjective, influenced by perception, experiences, and environmental interaction (Merleau-Ponty, 1994; Iñiguez, 2005). This interdisciplinary approach is essential for creating an inclusive educational ecosystem that considers emotions, attentional states, and adaptive methodologies, fostering creativity and resolving complex problems among students.

**Creativity**, a multidimensional neurocognitive process, cannot be detached from affective and social factors. Hormonal fluctuations in menstruating females, such as estradiol and

progesterone, have been shown to influence cognitive abilities like attention, memory, and decision-making (Hampson et al., 1988; Dreher et al., 2006). These interactions between biological and social aspects underline the need for evaluation methods that account for these dynamics, challenging the validity of traditional standardized tests.

Universities face the challenge of adapting to new circumstances. They promote processes of creation and innovation that develop capacities for accessing knowledge, along with an attitude of analysis and understanding of current social dynamics (Arias et al., 2013). This approach seeks to train professionals with high social commitment and reflective, creative abilities to respond to a changing world (Valera, 2010).

Regarding educational policies, this research aims to generate questions about micro-curricular proposals that address the needs of menstruating students. This includes designing more inclusive and dynamic methodologies consistent with the principles of critical and counter-hegemonic education (Freire, 1969; Giroux, 2019; McLaren, 1997). Likewise, students are encouraged to actively participate in pedagogical practices that promote creativity and gender perspective (Martínez Martín et al., 2020).

Finally, **self-awareness and emotional connection** are essential for students, facilitating their relationships with themselves and others. This fosters the development of creative thinking and strengthens qualities such as self-esteem and self-worth (Gamarra-Moscoso, 2020). A paradigm shift is needed, integrating subjectivities and individual perceptions of the world and overcoming normalized and homogeneous visions of the educational process.

The classroom must become a reflective and critical space that enriches students' capacity to generate ideas. Joint work between teacher and student should focus on discovering professional knowledge as a tool to shape creative and motivated personalities (Tauler, 2020). This requires self-knowledge, reflection, and a profound understanding of the context in which they operate.

In conclusion, research must continue exploring how hormonal fluctuations and sociocultural contexts impact creativity and perception, promoting pedagogical approaches that empower women and foster gender equality in higher education. This analysis seeks not only to generate more inclusive methodological strategies but also to strengthen self-awareness and self-efficacy among students, contributing to their integral and professional development.

### **Material and Method**

The research was conducted in 2023 and focused on undergraduate students from the Medicine program at Universidad Justo Sierra in Mexico City, Mexico. The population consisted of menstruating individuals identified as such, enrolled in university programs focused on creativity, and meeting specific inclusion criteria (Hernández et al., 2014). The participants were regular female students aged 18 to 23 who signed informed consent for voluntary participation after meeting the established requirements. Initially, the research was exploratory and descriptive but evolved into an explanatory approach to promote methodological strategies based on the results obtained. This study analyzed the neurocognitive variables of creativity and perception related to the menstrual cycle phases in Medicine students.

### **Discussion**

The study integrates neurocognitive variables associated with cyclical hormonal changes from a multidisciplinary perspective, combining psychology, biological sciences, biomedical sciences,

and social sciences, with psychology taking the lead in epistemological stances on creativity. This phenomenon is approached from cognitive, sociocultural, and personality frameworks, analyzing mental processes, social and cultural influences, and individual characteristics that affect the generation of creative ideas. The research explores how students perceive their creativity in relation to the menstrual cycle phases, complemented by contributions from experts in education and neurocognition (Stengers, 1997; Alberti, 2008).

The triangulation of results, as described by Elliot (2000), allowed for the corroboration of information from multiple sources, enriching the analysis and facilitating the construction of new meta-inferences. Previous documentary data and matrices were used to record findings that comprehensively understand the studied phenomenon (LeCompte et al., 1999). This transformative approach was designed under the framework of Hernández-Sampieri (2021), combining quantitative and qualitative methods to generate meaningful conclusions.

This approach seeks to make higher education curricula more flexible, promoting a more inclusive teaching style better adapted to the realities perceived by students and specialists (Sampieri, 2018). The diagram in the first image appears to be a graphical representation outlining the plan for analyzing primary and secondary data, detailing the methodological steps, data collection techniques, and analytical approaches needed to effectively integrate and compare both types of data.

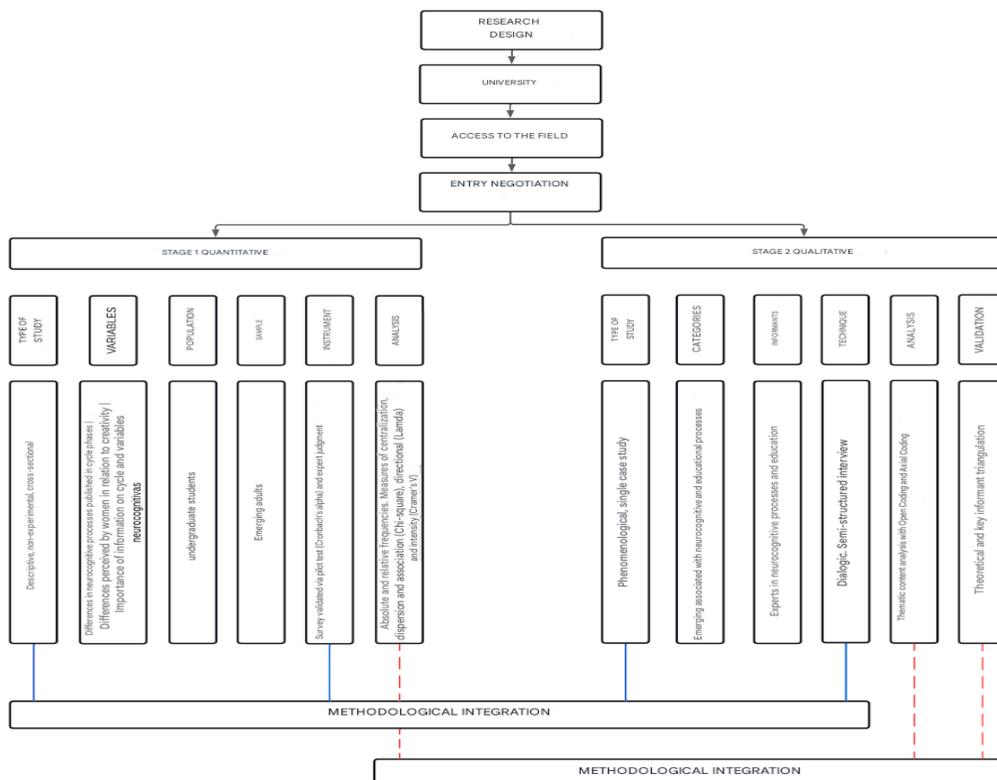


Image 1: Research design outline

The universe was composed of female medical students, and probabilistic sampling was used, assigning equal selection probability to each member of the population. This ensured representativeness and a measurable error (Pastor, 2019). Based on the standard error, sample size calculation was essential to test hypotheses and adjust study assumptions (Sormani, 2017; Burmeister et al., 2012). This calculation minimized risks by limiting the number of participants needed, improving feasibility and sustainability (Faber et al., 2014). A 50% probability was assumed to ensure an equitable and random distribution, maximizing statistical precision and reducing the standard error. This approach facilitated hypothesis testing and strengthened the study's representativeness.

**Creativity**, as an operational construct, can be evaluated using various methods and approaches depending on the context and specific aspects being analyzed (Karwowski & Beghetto, 2019). These authors highlight the importance of evaluation methods that capture originality and functionality in specific contexts. This study did not use psychometric tests; instead, questionnaires evaluated personality traits related to creativity, such as openness to new experiences, independence, and creative self-efficacy. This approach was complemented by structured and semi-structured interviews, which provided a qualitative understanding of the construct by exploring how participants perceive and experience their creativity (Yardley & Bishop, 2008).

### **Data Analysis Strategy**

The data analysis included a phenomenological approach to understanding the interactive dynamics between creativity and menstrual cycle phases from the students' perspectives. It was assumed that knowledge involves cognitive and affective abilities in social interactions. Data reduction was conducted by coding, identifying keywords, recurring patterns, and categorizing. Information was organized into matrices to facilitate trend identification, contradictions, and absences, and it was validated through triangulation, pilot analysis, and Cronbach's Alpha application.

The strategy integrated quantitative and qualitative data using mixed methods, comparing results to identify convergences and divergences.

#### **Phase 1: Quantitative**

Quantitative data were processed using SPSS for descriptive and inferential analyses. Measures of central tendency and dispersion were calculated, and results were graphed. This approach allowed for identifying patterns and significant relationships between variables (Pallant, 2020; Field, 2018).

#### **Phase 2: Qualitative**

Qualitative data obtained through interviews were analyzed using ATLAS.ti with thematic coding. This facilitated the identification of patterns, emerging themes, and relationships between codes. Graphical visualizations were generated to aid in understanding the findings (Friese, 2019).

#### **Mixed Data Analysis and Triangulation**

Quantitative and qualitative data were integrated through triangulation to compare and contrast findings, enriching the interpretation of the phenomenon under investigation. This integration

provided a more comprehensive view of the perceived relationship between the menstrual cycle and creativity.

### Relevance of Findings

The findings have significant implications for future studies and interventions. Quantitative results identified statistical patterns, while qualitative findings offered a deep understanding of individual experiences. This information could guide the design of educational programs sensitive to cyclical variations affecting creativity in menstruating women and inform teachers to adjust their pedagogical practices. Additionally, the study contributes to advancing knowledge in psychology, neuroscience, and education by addressing an underexplored topic and expanding the understanding of how biological and psychological factors influence creativity in educational contexts.

Universidad Justo Sierra, Mexico's ethical scientific committee, supported the research.

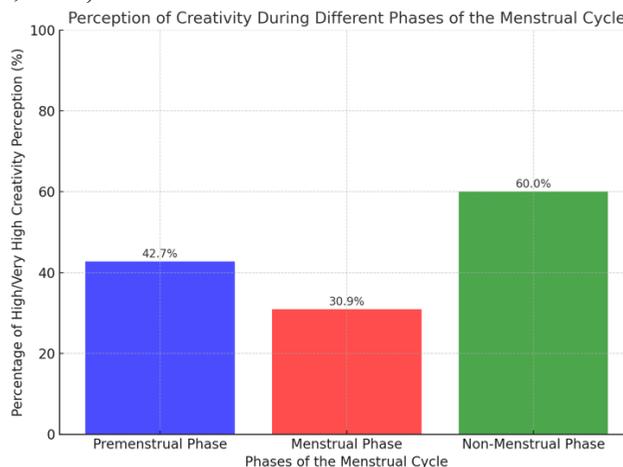
### Quantitative Analysis

Creativity is a multidimensional construct essential for innovation and solving social problems, influenced by individual differences, personality factors, and context (Kapoula et al., 2018). As a biopsychosocial process, menstruation is imbued with social and cultural connotations that affect women's beliefs and behaviors during the menstrual cycle (Botello-Hermosa, 2014). Studies have linked these experiences to gender inequalities influencing mental health and academic performance (Zugman et al., 2023).

### Population Characterization

Out of 295 participants:

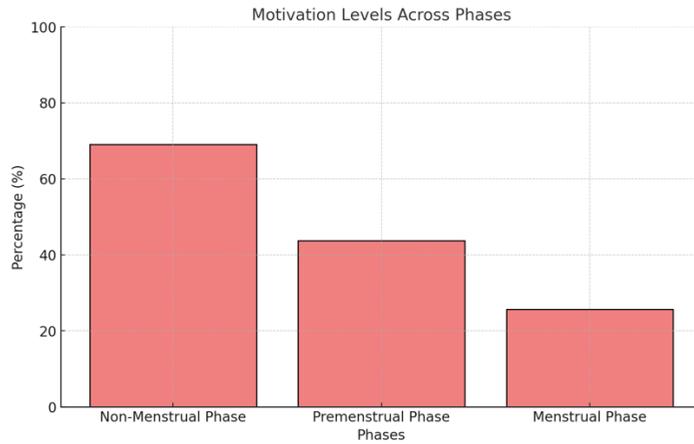
- 99% menstruate regularly.
- 59.7% have consulted a gynecologist or midwife.
- 24.1% have been diagnosed with conditions affecting the menstrual cycle.
- 35.3% report severe pain associated with headaches, vomiting, or diarrhea (Latthe & Champaneria, 2014).



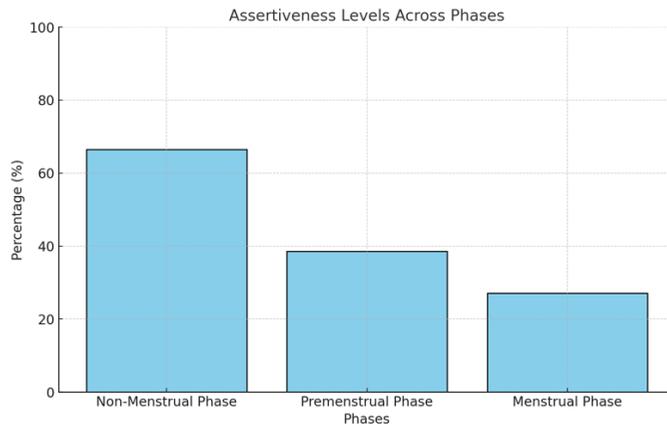
**Image 1: Perceptions about creativity**

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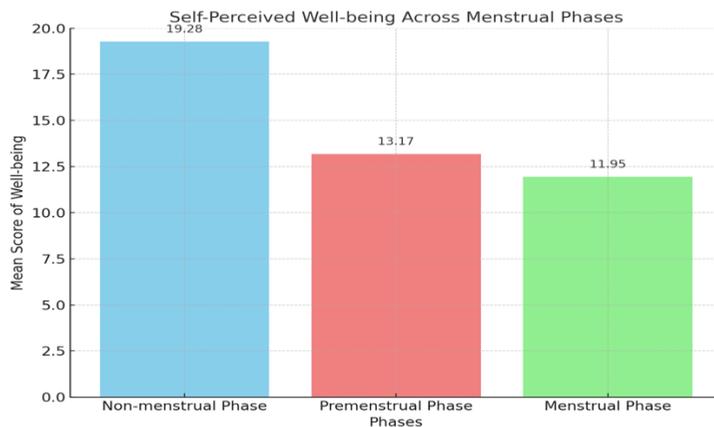
Estas diferencias están alineadas con hallazgos que indican que fluctuaciones hormonales pueden influir en procesos neurocognitivos como la memoria visual y la creatividad (Santos et al., 2024).



**Image 2: Perception of motivation**



**Image 3: Perception about assertiveness**



**Image 4: Summative indices and variability analysis**

Indexes were created to measure self-perceived well-being during the premenstrual, menstrual, and non-menstrual phases. Analyses showed that scores were higher in the non-menstrual phase (mean of 19.28) compared to the premenstrual (mean of 13.17) and menstrual phases (mean of 11.95). The Friedman test and pairwise comparisons confirmed significant differences between phases ( $p < 0.001$ ) (Image 4)

No significant associations were found between diagnoses of medical conditions affecting the menstrual cycle and perceptions of creativity, assertiveness, or motivation across different menstrual cycle phases. However, a moderate association was identified between the diagnosis of medical conditions and the perception of pain levels during menstruation (Cramer's  $V = 0.233$ ,  $p < 0.001$ ).

The results suggest that perceptions of creativity and well-being vary significantly across the menstrual cycle phases, with better self-perceptions observed during the non-menstrual phase. These findings underscore the importance of understanding how biological and cultural factors influence women's creativity and well-being, providing valuable insights for designing gender-sensitive educational strategies and policies.

Finally, integrating quantitative and qualitative data offers a comprehensive view of the phenomenon, enabling a deeper understanding of the relationship between the menstrual cycle and creative processes in educational contexts.

A qualitative analysis, based on interviews and coded with Atlas, reveals the perceptions and experiences of female university students regarding the relationship between the menstrual cycle and creativity. The study explored the effects of hormonal fluctuations, cultural and social contexts, and individual perspectives on creativity and performance in various domains.

### **Qualitative Analysis**

- Participants described how hormonal fluctuations throughout the menstrual cycle influence their creativity and emotional state. For example, more incredible energy and creativity were reported during the non-menstrual phase, while irritability and lack of concentration were identified as obstacles during the premenstrual phase (Code: Hormones and Creativity: Emotional State).
- "During certain stages of the menstrual cycle, we experience significant changes in our mood and energy, which can influence our creativity" (ID1).

### **Cultural Context and Social Perception**

- The analysis revealed how cultural and social factors, such as taboos and social pressure, affect women's perception of creativity in relation to the menstrual cycle. It highlighted the need to overcome stigmas and promote normalization of the topic (Code: Ridicule or Taboo).
- "Society has not connected creativity with the menstrual cycle because of stereotypes associated with mood swings" (ID4).

### **Lack of Research and Knowledge Gaps**

- Several interviewees pointed out the scarcity of scientific research exploring the in-depth relationship between the menstrual cycle and creativity, which limits understanding and

recognition of this connection (Code: Menstrual Creativity: Unstudied Relationship).

- "There's nothing so specific studied; they haven't connected or even investigated it" (ID2).

### **Personal Perception and Self-Awareness**

- The importance of self-awareness in managing the menstrual cycle to identify optimal moments for creativity and performance was emphasized. Some interviewees, after discontinuing contraceptives, discovered new connections between their bodies and their creative abilities (Code: Menstrual Creativity: Rediscovering the Body).
- "Recognizing how your body is and how these different phases are recognized" (ID8).

### **Educational and Workplace Impact**

- The significance of educating teachers and students about how the menstrual cycle influences academic and professional performance was identified. Interviewees suggested adapting pedagogical strategies to optimize teamwork and productivity (Code: Importance of Information for Faculty).
- "If we work in teams, we can know who is in a certain phase with certain capacities" (ID5).

### **Psychological and Social Dimensions**

- The analysis addressed the effects of the menstrual cycle on self-concept and self-esteem. Some participants expressed how social expectations of constancy and productivity affect their perception of personal worth during the cycle (Code: Social Pressure).
- "We are expected to always be the same, always productive, always in the same mood" (ID9).

The analysis reinforces the need to approach the menstrual cycle from a comprehensive perspective that acknowledges its influence on creativity and well-being, promoting female empowerment and gender equity.

The analysis reveals significant interest in understanding how the menstrual cycle affects creativity—a perceived connection reflected in recurring phrases such as "the relationship between the menstrual cycle and creativity." This idea underscores how hormonal and emotional fluctuations throughout the cycle can impact women's creative capacity, highlighting the variability in their experiences and abilities across different menstrual stages.

Additionally, there is a clear interest in obtaining more information about the menstrual cycle, as evidenced by expressions pointing to the need for studies and data on this topic. This interest stems from the necessity to understand better how these variations influence creativity and academic performance in women.

From a gender perspective, there is a particular sensitivity toward how the menstrual cycle affects women's quality of life and work performance. Terms like "women's work throughout the cycle" reflect concerns about the specific challenges they face due to their cycle's physiological and emotional changes.

Moreover, there is curiosity about exploring the neurocognitive mechanisms linking the

menstrual cycle to creativity. Concepts such as "neurocognitive processes" and "neurocognitive variables" suggest a more scientific approach to understanding how hormonal fluctuations influence cognitive function and creativity.

On the other hand, the aim is to analyze how creativity is perceived in different contexts and how these perceptions vary throughout the menstrual cycle. This interest, reflected in phrases like "the perception of creativity in students," emphasizes the importance of understanding the attitudes and beliefs surrounding creativity about menstrual stages.

This analysis underscores the need for an integrated approach to understanding the relationship between the menstrual cycle and creativity from neurocognitive, social, and gender perspectives. Such an approach would enrich scientific research and help normalize and highlight these interactions in educational and workplace contexts, fostering more significant equity and understanding.

The analysis of the menstrual cycle and its impact on creativity in Mexican medical students highlights a complex relationship encompassing biological, emotional, social, and gender aspects. In a context where the scientific literature on the neurocognitive changes associated with the menstrual cycle is limited, this research offers relevant findings to understand how hormonal fluctuations influence women's academic and creative performance.

One of the main findings is the perception of a direct relationship between menstrual cycle phases and creativity. Students reported higher energy, motivation, and creative capacity during the non-menstrual (ovulatory) phase, whereas menstruation was associated with decreased energy and motivation. These results highlight how hormonal fluctuations affect emotional states and cognitive abilities, suggesting that the menstrual cycle significantly modulates creativity.

The variability in menstrual cycle experiences was also evident. Each phase presents unique challenges and opportunities for women, reflecting the diversity of emotional, cognitive, and physical responses. This variability underscores the need to recognize individuality in menstrual cycle experiences and their influence on performance and creative perception.

The study highlights the participants' growing interest in learning about their menstrual cycle and its effects on creativity and performance. This interest reflects a process of self-exploration and empowerment aimed at optimizing their performance in academic and professional settings. However, social and cultural barriers persist, hindering open discussions about this topic and perpetuating historical taboos and prejudices. This lack of knowledge also translates into not integrating the menstrual cycle as a relevant subject in educational and workplace settings.

From a gender perspective, the findings show how social norms and expectations deeply influence experiences related to the menstrual cycle. Historically, menstruation has been viewed as a private topic surrounded by negative connotations that limit its inclusion in scientific research and educational policies. These views perpetuate power dynamics that disadvantage women, particularly in demanding fields like Medicine.

The research underscores the importance of promoting menstrual education and awareness in academic and workplace settings. This involves demystifying misconceptions and stigmas and providing tools for women to understand their cycles better and harness their capabilities at different times. Innovative methodologies, such as menstrual pedagogy, are redefining the menstrual cycle as a positive process, promoting more inclusive and empowering images of the female body.

## **Results**

Our research identified key findings highlighting the relationship between the menstrual cycle and creativity in female higher education students. Data show that during the non-menstrual phase, higher levels of motivation, concentration, and synthesis capacity were reported, supporting the cycle's impact on specific cognitive abilities. These findings address the objective of unveiling the perceived impact of the menstrual cycle on the creativity of menstruating women, emphasizing the importance of understanding this process for health and well-being.

No statistical association was found between medical or surgical diagnoses or contraceptive use and the cognitive abilities evaluated, allowing the results to be interpreted from a descriptive perspective. This reinforces that the menstrual cycle has biopsychosocial implications beyond purely physiological aspects, aligning with previous studies (Botello-Hermosa, 2014).

Creativity is understood as a multidimensional capacity crucial for addressing social challenges and driving progress. It depends on cognitive abilities and environmental and personality factors (Kapoula et al., 2018). However, the cognitive mechanisms underlying creativity are not yet fully understood, though the role of associative processes in generating meaningful links between unrelated concepts is noted (Beaty et al., 2014; Volle, 2018).

Our research also highlights how cultural and social perceptions influence the menstrual cycle experience, affecting what women feel and how they behave (Botello-Hermosa & Casado-Mejía, 2017). This cultural context perpetuates gender inequalities that can affect mental health, academic performance, and women's self-perception of their own abilities. Recent studies suggest that these inequalities may even manifest in brain differences associated with adverse socio-environmental conditions, being more pronounced in countries with high gender inequality (Zugman et al., 2023).

From a gender perspective, studies have addressed how social and physiological differences affect the perception and experience of the menstrual cycle (Esteban, 2004). Education and group workshops emerge as fundamental tools for dispelling misconceptions and promoting equity in the perception of the menstrual cycle and its impact on creativity (Botello-Hermosa & Casado-Mejía, 2017).

In the context of creativity as a sexually selected trait, studies suggest that women in the fertile phase exhibit more excellent divergent thinking associated with the probability of conception (Galasińska & Szymków, 2022). This divergent thinking, crucial for creativity, allows for multiple solutions to the same problem, aligning with our findings. In a study by Galasińska and Szymków (2022), 72 Polish women were evaluated during different phases of the menstrual cycle, showing that creative originality increases during the fertile phase, likely as a mental ornamentation mechanism to enhance mate attraction.

Although these studies support our findings, our respondents reflect variability in the perception of the relationship between their creativity and the different phases of the menstrual cycle. This underscores the individuality and complexity of the experiences associated with the cycle. Differences in the perception of creativity during the menstrual and non-menstrual phases highlight the need to continue exploring this topic from an interdisciplinary perspective to deepen its understanding and promote educational and social strategies that recognize and respect these variabilities.

The research analyzes the perceived impact of the menstrual cycle on the creative capacity of higher education students at a Mexican university, highlighting several relevant findings.

Firstly, respondents reported higher motivation, concentration, and synthesis capacity during the non-menstrual phase. About 69.1% expressed feeling more motivated during this stage, with 34.9% strongly agreeing, "I consider myself more motivated to do things during my non-menstrual phase." Regarding concentration and idea synthesis, 35.6% strongly agreed with the statement, "When I read, I concentrate and synthesize better during the non-menstrual phase," while 33.2% expressed very high agreement.

The results show variability in perceptions regarding the ability to generate diverse solutions to the same problem, highlighting the complexity and individuality of these experiences. However, interviews revealed that the non-menstrual phase is perceived as a moment of greater divergent ideation.

Regarding collaborative work, participants highly valued diversity, noting that the different phases of the menstrual cycle can enrich outcomes in this context. This recognition emphasizes the importance of considering individual variations as a valuable team contribution.

Finally, the research highlights the respondents' interest in studies that expand knowledge from a gender perspective. Participants believe that accessing this information empowers their lives and strengthens team dynamics and outcomes. This underscores the importance of continuing to promote research that addresses the relationship between the menstrual cycle and creativity from an inclusive and multidimensional approach. As a result, a model of adaptation and methodological strategies based on agile methodologies, such as design thinking, was proposed to enhance flexibility and equity in the academic environment. This combined approach aims to transform how creative and educational dynamics are managed and addressed in university contexts, fostering inclusivity and empowering individuals through gender-informed practices.

## **Conclusions**

- **Higher motivation during the non-menstrual phase:** Participants reported feeling more motivated during this stage of their menstrual cycle, with a significant proportion expressing increased drive and engagement.
- **Increased concentration and synthesis capacity in the non-menstrual phase:** Greater sharpness in concentration and the ability to synthesize information were perceived during this phase, supporting its positive impact on cognitive abilities.
- **Understanding the menstrual cycle is important:** The study emphasized the relevance of women understanding how their menstrual cycle impacts aspects such as creativity, health, and overall well-being. This understanding empowers them in their daily and professional lives.

Participants believe that accessing this information empowers their lives and strengthens team dynamics and outcomes. This underscores the importance of continuing to promote research that addresses the relationship between the menstrual cycle and creativity from an inclusive and multidimensional approach.

As a result, a model of adaptation and methodological strategies based on agile methodologies, such as design thinking, was proposed to enhance flexibility and equity in the academic

environment. This combined approach aims to transform how creative and educational dynamics are managed and addressed in university contexts, fostering inclusivity, empowering individuals through gender-informed practices, and recognizing the individuality of women's experiences.

## Recommendations

The recommendations outlined emphasize the need for integrated and inclusive approaches to address the relationship between the menstrual cycle and neurocognitive processes. Promoting menstrual education is fundamental, requiring programs that explore how the menstrual cycle impacts creativity, motivation, and decision-making. An interdisciplinary and gender-sensitive perspective should guide these initiatives, recognizing the academic, professional, and personal implications. Furthermore, this research proposes integrating institutional gender policies with academic guidelines to enable advanced planning of intervention or innovation projects. Such an approach would allow students to organize their participation when they perceive greater self-efficacy in creative and reflective processes without disrupting the academic calendar.

Fostering scientific research is another critical recommendation, emphasizing in-depth studies that investigate the complex connections between hormonal fluctuations and cognitive capabilities. Additionally, societal stigmas and prejudices need to be actively challenged through awareness campaigns. These efforts aim to normalize hormonal variations and their influence on individual capacities, fostering an environment of understanding and acceptance. The study also suggests making academic product submission formats more flexible, promoting diversity, and adapting evaluation tools to accommodate various student submissions. This flexible approach, paired with a model outlining submission steps for strategies requiring divergent and convergent thinking, ensures that students can adjust to their own pace without significant deviations from scheduled timelines or disruptions to academic processes. This combination of educational, research, and institutional reforms seeks to empower students and enhance understanding of the menstrual cycle's impact on neurocognitive and creative processes.

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