**ORIGINAL RESEARCH ARTICLE**

# Investigating the association of menstrual symptoms and work productivity with the mediating role of emotional well-being

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## Abstract

Menstrual symptoms can have profound effects on the emotional health and professional lives of women. This study aims to explore the impact of menstrual symptoms on emotional engagement, self-regulation, negative affectivity, and cognitive functioning and to acknowledge the mediating role of emotional well-being on work productivity. A cross-sectional survey was conducted among 384 working, menstruating women using validated psychological and occupational health scales. Principal Component Analysis (PCA) and Structural Equation Modelling (SEM) were applied to test the hypothesized pathways. The findings revealed that emotional engagement, self-regulation and cognitive functioning were reduced by menstrual symptoms while negative affectivity increased. Emotional well-being significantly mediated the relationship between menstrual symptoms and work productivity ($\beta = 0.79$, $p < 0.001$). More than half of the participants (52.9%) reported their performance was interrupted by menstrual symptoms. These results emphasize the need for workplace interventions that address both the physical and emotional challenges of menstruation. Policies such as flexible leave, counselling services, and stronger peer support systems can enhance productivity and overall employee well-being. *(Afr J Reprod Health 2026; 30 [3]: 24-37).*

**Keywords:** Menstrual symptoms, emotional engagement, self-regulation, negative affectivity, cognitive functioning

## Résumé

Les symptômes menstruels ont un impact marqué sur la santé émotionnelle et la productivité professionnelle des femmes. Cette étude vise à examiner l'effet des symptômes menstruels sur l'engagement émotionnel, l'autorégulation, l'affectivité négative et le fonctionnement cognitif, ainsi que le rôle médiateur du bien-être émotionnel dans la productivité au travail. Une enquête transversale a été menée auprès de 384 femmes actives en utilisant des échelles psychologiques et professionnelles validées. L'analyse en composantes principales et la modélisation par équations structurelles ont été appliquées. Les résultats montrent que les symptômes menstruels réduisent l'engagement émotionnel, l'autorégulation et le fonctionnement cognitif, tout en augmentant l'affectivité négative. Le bien-être émotionnel joue un rôle médiateur significatif dans la relation entre les symptômes menstruels et la productivité ($\beta = 0.79$, $p < 0.001$). Plus de la moitié des participantes (52,9 %) ont signalé une baisse de leur performance due aux symptômes menstruels. Ces résultats renforcent la nécessité de politiques de soutien au travail, incluant des congés menstruels flexibles, des services de conseil et un meilleur soutien social afin d'améliorer le bien-être émotionnel et la productivité des femmes.. *(Afr J Reprod Health 2026; 30 [3]: 24-37).*

Mots-clés : Symptômes menstruels, Engagement émotionnel, Autorégulation, Affectivité negative, Fonctionnement cognitive, Productivité au travail, Bien-être émotionnel

## Introduction

The menstrual cycle is a natural biological process; however, for many women it is accompanied by discomfort such as cramps, fatigue, mood swings and cognitive difficulties. These symptoms extend beyond physical pain and often affect psychological well-being by increasing stress, lowering self-esteem and intensifying emotional reactivity. The menstrual cycle is also characterized by repeated fluctuations in hormones, especially estrogen and progesterone. The cycle revolves around two phases- follicular and luteal phases. The first part of the cycle or follicular phase lasts from menstruation to ovulation and typically stretches for 14 days. Additionally, the second half of cycle or luteal phase follows ovulation and leads up to menstruation and therefore, lasts for the next fourteen days.[1] Phases of

the cycle were associated with variations in both physical as well as psychological phenomena, where definition as well as intensity differ from person to person.[2] The menstrual effects are not limited to personal health. The symptoms influence workplace performance by reducing in concentration and productivity with increased absenteeism. Many females experience physical irritation and discomfort, such as cramps, breast tenderness and back pain during menses. The condition is associated with an increase in psychological distress as well as a decrease in self-esteem.[3] An increased interpersonal oversensitivity is also reflected among women.[4] Such vulnerabilities are likely to impact relationships and can induce anxiety and depression. Many reports have been published on the intensification of psychotic symptoms across the menstrual cycle.[5] In recognition of this, countries like Spain have introduced paid menstrual leave that emphasizes menstruation as a social and occupational health issue.

Menstrual symptoms like fatigue, pain, and mood fluctuations have been shown to significantly hinder functional routines of women, especially in the workplace.[6] These symptoms can induce a reduction in lower productivity, concentration, and absenteeism.[7] Emotional well-being may mediate this association, as mood disturbances during menstrual cycles can exacerbate women-related symptom burden.[8] Understanding this mediating role is important for the development of supportive workplace policies and interventions.

Spain has become the first European country since 1st June, 2023 to introduce state-funded medical leave for menstrual pain, commencing from the onset of symptoms. Before this legislation, women suffering from menstrual pain that impaired their ability to work could only take unpaid sick leave for up to three days. Under the new law, women experiencing menstrual-related symptoms that interfere with their ability to perform their job responsibilities are now entitled to paid leave. Menstrual pain, along with other associated symptoms, is highly prevalent among young and reproductive-age women, with severe cases affecting up to 20%.It significantly impacts daily functioning, work attendance, and productivity. Conditions like endometriosis worsen symptoms, leading to increased absenteeism. Thus, menstrual disorder is not just a health issue but also a socialconcern.[9-13] Emotional engagement that is characterized by active emotional involvement and connectedness is positively linked to well-being, mental strength, as well as emotional stability.[14] Disruptions in emotional engagement, often observed during menstrual phases, may intensify mood disturbances and emotional dysregulation.[15] Studies suggest that menstrual symptoms could impair emotional engagement, thereby negatively impacting emotional well-being.[16]

Women with higher estrogen levels tended to report fewer premenstrual symptoms, hinting at a mood-protective role of estrogen. A persistent advantage for women in identifying emotions has led researchers to observe the influence of ovarian hormones across the menstrual cycle.[17-23] Hormonal fluctuations, especially peaks in estradiol and progesterone, follow a predictable pattern.[24] Women with high progesterone levels showed increased sensitivity to threat-related facial cues.These women rated fearful, averted-gaze faces as more intense.[25]

Self-emotional regulation refers to individual variations in the ability to respond adaptively to upsetting emotions via understanding awareness, as well as acceptance, which supports goal-directed behaviour.[26-28] Unlike emotion suppression or avoidance, effective emotion management is linked to symptom enhancement.[29]

This suggests that emotion control might influence psychological as well as physiological responses to menstrual cycle-related variations and could additionally guide targeted interventions. Although the specific function of emotion control in menstrual symptoms remains unexplored, difficulties in managing emotions are related to psychological issues such as tension, worry, mood swings and depression, along with anxiety.[30] Recent studies suggest that negative affectivity (NA) interacts with menstrual symptoms to worsen emotional disturbances.

Women with high NA often report more intense mood swings and emotional distress due to heightened sensitivity to hormonal changes and impaired emotion regulation.[31-32] Neuroimaging evidence shows increased amygdala reactivity during the mid-luteal phase, linked to emotional dysregulation in high-NA individuals.[33] Additionally, women with PMS show stronger stress responses and negative affect, suggesting a cumulative effect of NA and menstrual symptoms on

emotional well-being.[34] A significant decline in cognitive processes was observed during the most painful day or 3rd day of the menstrual cycle in females with menstrual pain. A negative correlation between dysmenorrhea and cognitive performance was identified, which calls for further large-scale studies.[35] Menstrual cycle-related variations in emotion as well as cognition were investigated, with emotion-related effects found to be more consistent than cognitive changes. These emotional disturbances have been more strongly connected with progesterone levels as well as the luteal phase.[36]

Emotional well-being significantly influences work productivity, with poor emotional health linked to absenteeism and decreased performance.[37] Menstrual symptoms, including pain and mood swings, as well as fatigue, negatively impact emotional regulation and cognitive function. [38] These emotional disturbances during menstruation often lead to reduced focus, presenteeism, and lower job efficiency.[7] Women with PMDD are particularly affected due to heightened hormonal sensitivity.[39] Supportive workplace policies can help mitigate these effects and improve overall productivity.[40]

Together, this study explores the emotional and occupational effects of menstrual symptoms on the daily work routine of women with the pivotal role of association between physiological experiences and psychological domain. It aims to assess the influence of menstrual symptoms on emotional engagement, self-regulation, negative affectivity and cognitive abilities.

These are the core factors that are responsible for shaping a woman's ability in managing work related demands. Furthermore, the research examines the magnitude of menstrual symptoms affecting the emotional well-being with influence on mood stability, motivation and interpersonal relationships at the workplace. In addition, it measures how emotional engagement, self-regulation, negative affectivity and cognitive

functioning imparts to emotional well-being, thereby emphasizing the interconnectedness of emotional and perceptive processes during menstruation.

The study also figures the direct association between emotional well-being and productivity at work by identifying the translation of fluctuations in emotional states into variations in occupational performance. Eventually, it investigates the mediatig role of emotional well-being in the relationship between menstrualsymptoms and work productivity, thereby providing a unified understanding of the psychological pathways through which menstrual events affect the professional lives of women.

In simpler terms, the study infers that menstrual symptoms have a negative direction towards various aspects of the emotional and cognitive functioning, which in turn affect their work perfomance.

Concisely,it proposes that menstrual symptoms abate emotional engagement, making it difficult for women to remain motivated and united to their work (H1). Hindering of self- regulation is also expected, where women find it challenging for management of the emotions and maintainence of the focus during this period (H2).

In addition, menstrual symptoms increase negative affectivity, that lead to increased sensitivity to irritability, sadness and stress (H3). The symptoms may also debilitate cognitive usefulness, reduction of memory and concentration and decision-making ability (H4). Finally, the study depicts a positive role of emotional well-being in the enhancement of the productivity, which implies that the women with better emotional balance are more likely to perform efficiently and effectively at work (H5).

## *Conceptual framework*

The conceptual framework as depicted in Figure 1 exhibit the hypothesised pathways that link menstrual symptoms (MS), emotional well-being (EWB) and work- productivity (WP).Menstrual symptoms are found to impact emotional engagement (EE), self-regulation (SR), negative affectivity (NA) and cognitive functioning (CF). These psychological factors determine the level of emotional well-being, which in turn affect absenteeism and productivity outcomes.The framework also includes pathways from menstrual symptoms to absenteeism and productivity for capturing empirical effects. Emotional well-being acts as a central mediator that reflects the psychological mechanism through which menstrual experiences get translated into workplace outcomes.

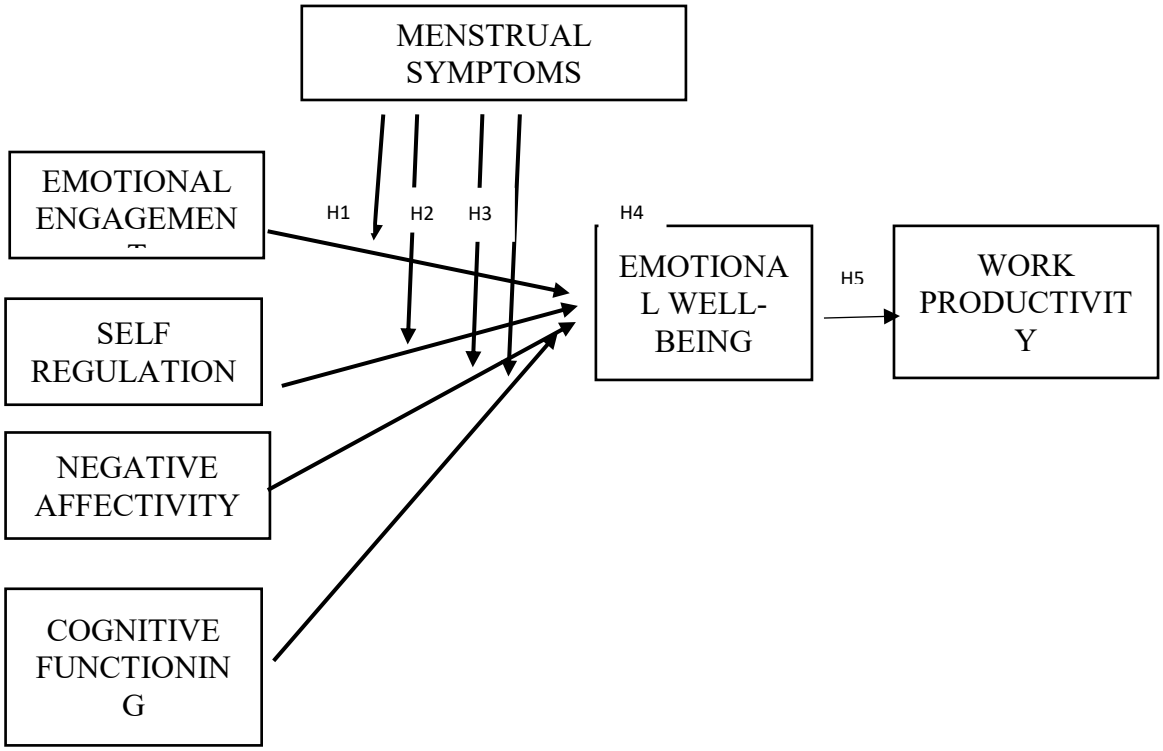


**Figure 1:** Conceptual framework

# Methods

## *Study design and participants*

The study addressed a descriptive and cross-sectional survey design. 312 working women aged 21–45 years were involved in the study across the healthcare, education, and IT sectors that use an online self-administered questionnaire.The participation was voluntary and anonymous. Inclusion criteria comprised of menstruating women with at least one year of continuous employment. Exclusion criteria were women who were pregnant or suffering from any chronic medical conditions to minimize confounding influences. A stratified random sampling was done to maintain balanced distribution across occupations for enhancing the generalization of outcomes.

## *Instrument and measures*

The questionnaire titled *"Work Productivity During Menstruation"* incorporated four sections where Section A captured socio-demographic details, Section B assessed menstrual characteristics and symptoms (pain intensity, fatigue, flow, irregularity) that was adapted from the Menstrual Symptom Questionnaire.[41] Section C measured emotional well-being using the WHO-5 Well-Being Index.[42] Section D evaluated work productivity and the rate of absenteeism using the Work Productivity and Activity Impairment Questionnaire.[43] Psychological dimensions such as emotional engagement, self-regulation, negative affectivity and cognitive functioning were estimated using a set of Likert-scale items that were validated through pilot testing (Cronbach's $\alpha = 0.83$).The Kaiser-Meyer-Olkin (KMO) test resulted a value of 0.826, confirming the suitability of the data for factor analysis. Bartlett's Test of Sphericity was statistically significant ($p<0.001$, $\chi^2 = 3350.194$).

## *Data collection and procedure*

Data were collected online through Google Forms over a three-month period. Informed consent was obtained before participation and the respondents were assured of confidentiality and anonymity.

## *Data analysis*

Statistical analyses were done using SPSS and AMOS (IBM SPSS AMOS 21). Descriptive statistics condensed and summarized the use of

demographic variables. Pearson's correlations tested the associations among variables.

Multiple regression and Structural Equation Modelling (SEM) were applied to evaluate the direct and indirect effects, while the mediation of emotional well-being was analysed using bootstrapping.[44]

### *Ethical considerations*

This study received ethical clearance from the Lincoln University College Research Ethics Committee,Malaysia(Ref:LUC/CPGS/2025/01/21). The proposal was approved in line with the Declaration of Helsinki, national guidelines and institutional policies. The Committee does not issue separate approval numbers beyond the official reference. However, written confirmation is available upon request. Participation was entirely voluntary and respondents provided digital informed consent before beginning the survey. Confidentiality, anonymity and the right to withdraw were ensured throughout the study.

## Results

The reliability analysis yielded a 0.860 Cronbach's Alpha for the six-item scale that indicates proper internal consistency. This high reliability supports the validity of subsequent analyses aimed at examining the impact of menstrual syndromes on emotional well-being and work productivity, including the proposed mediation effects and the influence of observed variables on productivity.

The conceptual framework demonstrates that menstrual symptoms influence work productivity through a set of psychological and emotional mechanisms, with emotional well-being acting as a central mediator. Menstrual symptoms, including fatigue, pain, and irritability, as well as mood fluctuations, can impair emotional engagement, self-regulation, cognitive functioning, and can increase negative affectivity.[45] These psychological factors represent how individuals relate emotionally to their work, manage behaviours and impulses, process tasks, and experience emotional distress. When these areas are negatively affected, individuals may experience a decline in their emotional well-being.[46] Emotional well-being has a major role in determining how effectively a person can cope with menstrual discomfort and maintain functional performance at work. Poor emotional well-being has been linked to lower productivity, higher absenteeism, and reduced job satisfaction.[47-48]

By positioning emotional well-being as a mediator, the framework highlights that the effect of menstrual symptoms on work productivity is not merely physical but deeply rooted in psychological responses. This suggests that interventions aimed at enhancing emotional support and stress management may buffer the negative effect of menstruation on job performance.[49] Overall, the model supports a biopsychosocial understanding of menstruation, underscoring the need for workplace policies that address the emotional and cognitive challenges menstruating individuals face.

The skewness and kurtosis values indicate that most variables slightly deviate from normality, with emotional engagement items ("Do you feel enthusiastic?") showing negative skewness and low kurtosis that suggest most participants report higher engagement levels. In contrast, negative affectivity items ("Do you feel upset?") show positive skewness and higher kurtosis, indicating that a few participants experience stronger negative emotions.

These patterns support the hypothesis that menstrual symptoms may reduce positive emotional states and increase negative affectivity, reflecting emotional and behavioural shifts common during menstruation. Such results align with research carried out by various researchers.[9] The significant adequacy of sampling, indicated by the KMO value of 0.836, suggests that the data is appropriate for factor analysis. Additionally, Bartlett's Test of Sphericity is extremely significant ($p < .001$, $\chi^2 = 3350.194$). More than half of the respondents (52.9%) reported that menstrual symptoms affected their work performance, supporting the hypothesis that menstrual symptoms impair productivity (H5). Results are in line with prior research showing that menstrual discomfort disrupts concentration, emotional regulation, and overall job functioning. [50] These findings reinforce the significance of recognizing emotional well-being as a key mediator in mitigating the occupational effects of menstrual symptoms.

**Table 1 :** Factor loadings of emotional engagement items

| Item | Factor Loading | Interpretation |
|---|---|---|
| Do you feel interested in work? | 0.914 | Strong representation |
| Does work excite you? | 0.912 | Strong representation |
| Do you feel enthusiastic? | 0.910 | Strong representation |
| Do you feel inspired? | 0.928 | Strong representation |
| Do you feel active? | 0.937 | Strong representation |
| Do you feel upset? | 0.108 | Excluded (negative affect) |

Participants who disagreed with feeling close to colleagues reported no impact of menstrual symptoms on work, while those neutral or agreeing showed higher reports of affected performance (60.2% and 46.9%, respectively). This is suggestive of the social connectedness that may influence how menstrual symptoms affect work productivity, supporting the hypothesis that emotional well-being mediates this relationship (H5). Prior research underscores that workplace social support can buffer negative effects of menstrual symptoms on job performance. [51-53]

The Pearson Chi-Square test ($\chi^2 = 34.984$, df = 2, $p < .001$) and Likelihood Ratio ($\chi^2 = 44.601$, df = 2, $p < .001$) represent a significant association between feeling close to people at work and menstrual symptoms affecting work performance. However, the Linear-by-Linear Association ($\chi^2 = 2.013$, $p = 0.156$) suggests no significant linear trend across categories. These results confirm that social connectedness relates to perceived menstrual impact on productivity but not in a strictly linear manner.

The factor loadings in Table 1 show that five items i.e. feeling interested in work (0.914), excited by work (0.912), enthusiastic (0.910), inspired (0.928) and active (0.937) strongly represent the construct, indicating they are reliable measures.

The item "Do you feel upset?" had a very low loading (0.108) and was therefore excluded as it reflects negative affect rather than the intended construct. This supports Hypothesis H1**,** which indicates that menstrual symptoms can disrupt emotional engagement by diminishing positive emotional states at work. These outcomes are in line with previous investigations showing that menstrual discomfort can impair motivation, mood and workplace enthusiasm, emphasizing the psychological toll of menstruation on emotional functioning.[54-55]As pointed out in Table 2, *Emotional Engagement at Work* accounts for 78.48% of the total variance, far exceeding the contribution of other components. This finding indicates its central role in tailoring the psychological experience of menstruating individuals and provides support for Hypothesis H1, thereby stating that menstrual symptoms significantly affect emotional engagement.

As depicted in Table 3, the factor analysis shows that *Emotional engagement at work* accounts for the largest share of variance (42.81%). Hence, it supports Hypothesis H1 that menstrual symptoms strongly influence emotional engagement.

*Self-Regulation* (21.34%) and *Negative Affectivity* (10.31%) are also consistent with Hypotheses H2 and H3, suggesting the impact of emotional and behavioural domains by menstrual symptoms. Taken together, the components highlight the multifaceted psychological effects of menstruation on work productivity, in line with previous research.[50]

The strong factor loadings in Table 4 for Emotional Engagement at Work (0.851–0.871), Self-Regulation (0.733–0.816), Negative Affectivity (0.922), and Cognitive Functioning (0.886) affirm the distinctiveness and reliability of each construct. These results validate Hypotheses H1, H2, H3 and H4, indicating menstrual symptoms adversely affect emotional and cognitive domains critical to occupational functioning. This is consistent with previous studies highlighting the negative emotional, behavioral, and cognitive outcomes of menstruation, including reduced motivation, heightened emotional reactivity, impaired concentration, and increased stress. [56-57]

The model (Figure 1) illustrates the complex interplay between menstrual symptoms and work productivity, highlighting the mediating roles of emotional well-being and job satisfaction, along with the moderating effect of access to hygiene resources.

**Table 2:** Principal component analysis of key psychological constructs

| Component (Factor) | Initial Eigenvalue | % of Variance | Cumulative % | Extraction Sum of Squared Loadings | % of Variance | Cumulative % |
|---|---|---|---|---|---|---|
| Emotional engagement at work | 4.709 | 78.476 | 78.476 | 4.709 | 78.476 | 78.476 |
| Self-regulation | .917 | 15.285 | 93.762 | | | |
| Negative affectivity | .173 | 2.892 | 96.653 | | | |
| Cognitive Functioning | .119 | 1.978 | 98.631 | | | |
| Work productivity | .045 | .743 | 99.374 | | | |
| Emotional engagement at work | .038 | .626 | 100.000 | | | |

**Table 3:** Total variance explained by extracted components

| Component (Factor) | Initial Eigenvalue | % of Variance | Cumulative % | Extraction Sum of Squared Loadings | % of Variance | Cumulative % |
|---|---|---|---|---|---|---|
| Emotional engagement at work | 4.709 | 42.81% | 42.81% | 4.709 | 42.81% | 42.81% |
| Self-regulation | 2.347 | 21.34% | 64.15% | – | | – |
| Negative affectivity | 1.134 | 10.31% | 74.46% | – | – | – |
| Cognitive Functioning | 0.917 | 8.34% | 82.80% | – | – | – |
| Work productivity | 2.893 (combined) | 17.20% | 100.00% | – | – | – |

**Table 4:** Rotated component matrix

| Item | Emotional Engagement at Work | Self-Regulation | Negative Affectivity | Cognitive Functioning |
|---|---|---|---|---|
| Emotional engagement at work | 0.871 | – | – | – |
| | 0.851 | – | – | – |
| | 0.868 | – | – | – |
| | 0.862 | – | – | – |
| | 0.857 | – | – | – |
| Self-regulation | – | 0.816 | – | – |
| | – | 0.789 | – | – |
| | – | 0.733 | – | – |
| Negative affectivity | – | – | 0.922 | – |
| Cognitive Functioning | – | – | – | 0.886 |

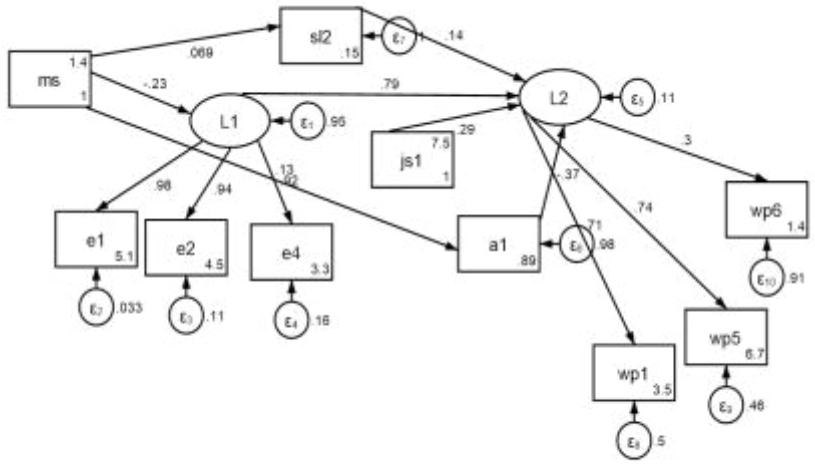


**Figure 1:** Structural mode

**Table 5:** Standardized path coefficients

| Pathway | β Value | p-value | Significance |
|---|---|---|---|
| Menstrual Symptoms → Emotional Well-being | –0.23 | <0.001 | Significant |
| Emotional Well-being → Productivity | 0.79 | <0.001 | Significant |
| Menstrual Symptoms → Productivity (Direct) | –0.37 | <0.001 | Significant |
| Social Connectedness → Productivity | 0.14 | 0.002 | Significant |
| Hygiene Access → Productivity | –0.36 | <0.001 | Significant |

Menstrual symptoms (MS) directly impair emotional well-being (L1), suggesting that increased physical discomfort or hormonal fluctuations during menstruation negatively influence mood, self-regulation, and affective stability. This deterioration in emotional well-being subsequently reduces productivity (L2), indicating that emotional strain serves as a pathway through which menstrual symptoms impact work output. Furthermore, emotional well-being positively influences job satisfaction (JS), implying that individuals who maintain emotional balance amid menstrual symptoms tend to report higher levels of job fulfilment.

In turn, job satisfaction enhances productivity, reinforcing its role as a motivational factor in sustaining work performance. Notably, the model includes access to hygiene resources (A1) as a moderator in the relationship between menstrual symptoms as well as emotional well-being. This suggests that adequate hygiene facilities and menstrual support can alleviate the emotional toll of menstruation, thereby mitigating its indirect impact on productivity. Overall, the framework underscores how menstrual health, emotional resilience, supportive infrastructure, and job-related satisfaction collectively shape women's work productivity.

The structural model provides several significant relationships as stated in Table 5. Firstly, access to hygiene resources (A1) shows a positive association with menstrual symptoms (β=0.1284, $p$=0.010), recommending that better access may increase awareness or reporting of symptoms. Secondly, emotional well-being (L1) reduces menstrual symptoms (β = –0.2324, $p$<0.001), substantiating the idea that psychological health can buffer symptom severity. However, workplace support (SL2) does not significantly affect menstrual symptoms ($p$=0.173). Lastly, for productivity (L2), emotional well-being (L1) exerts the strongest positive effect (β = 0.7946, $p$ <0.001), followed by job satisfaction (JS) (β=0.2910, $p$<0.001) and workplace support (SL2) (β = 0.1386, $p$=0.002). However, access to hygiene (A1) has a negative effect on productivity (β= –0.3688, $p$<0.001) which

possibly reflect contextual or behavioral challenges. Although this result appears counterintuitive, it may reflect increased awareness and reporting of symptoms due to improved facilities, or conversely, the persistence of cultural stigma that continues to limit openness.

Although better access to hygiene resources enhances awareness and timely reporting of menstrual symptoms, it might also illuminate the time, effort, or workplace interruptions associated with managing these needs, which could temporarily reduce productivity. This finding suggests that simply providing hygiene resources may not be sufficient to improve productivity unless accompanied by supportive workplace policies and practices that allow employees to manage menstrual health effectively.Emotional well-being indicators — E1_L1(β =0.983), E2_L1 (β=0.941), and E4_L1 (β= 0.919) show very strong and significant associations ($\boldsymbol{p} < 0.001$), thereby confirming that menstrual symptoms negatively affect emotional engagement, self-regulation, and mood. Therefore, hypotheses H1, H2 and H3 are readily supported. Emotional well-being also has a strong positive effect on work productivity, shown by WP1_L2 (β=0.707) and WP5_L2 (β=0.735), confirming H5.

A smaller but significant effect for WP6_L2 (β=0.298) indicates that menstrual symptoms may impair cognitive functioning, advocating H4. Overall, these results focus on the negative impact of menstrual symptoms on emotional and cognitive functioning while accentuating the importance of emotional well-being in maintaining productivity.

## Discussion

Current research examined the impact of menstrual symptoms on emotional well-being as well as work productivity, accentuating the mediating role of psychological and emotional mechanisms. With a Cronbach's alpha of 0.860, the reliability analysis verified the excellent internal consistency of the scale used, guaranteeing resilience while analysing the intricate linkages suggested in the conceptual framework.

Consistent with prior research findings, they demonstrate that menstrual symptoms, including fatigue, pain, and irritability as well as mood fluctuations, significantly impair emotional engagement, self-regulation, cognitive functioning, and increase negative affectivity. This aligns with the biopsychosocial model of menstruation, emphasizing that consequences of menstrual discomfort go beyond physical symptoms to affect psychological processes critical for workplace functioning.[49]

The factor analysis revealed that emotional engagement at work accounts for a substantial portion of variance, underscoring its central role in mediating the effects of menstrual symptoms on productivity. This is supported by studies showing reduced motivation and enthusiasm during menstruation. [54-55] Low factor loading for negative affectivity items on emotional engagement further delineates the distinct influence of negative emotional states, reinforcing the multifaceted emotional impact of menstrual symptoms.

More than half of respondents reported that menstrual symptoms impacted their work performance, which is consistent with prior results highlighting the significant occupational burden of menstruation. [7] Moreover, the observed association between social connectedness at work and the impact of menstrual symptoms on productivity supports the buffering effect of workplace social support documented in prior studies.[58-59] The chi-square results reinforce that emotional well-being and social relationships are critical factors influencing how menstrual symptoms translate into productivity impairments.

The structural equation model confirmed the mediating role of emotional well-being between menstrual symptoms along work productivity, validating hypotheses that emotional health serves as a key psychological pathway in this relationship. [60] Fascinatingly, access to hygiene resources showed a positive association with reporting menstrual symptoms but a negative association with productivity. This paradox might reflect contextual or behavioural nuances, such as increased symptom awareness or workplace stigma, warranting further qualitative exploration.

Emotional well-being significantly predicted job satisfaction, which in turn enhanced productivity, highlighting the motivational role of positive affective states in sustaining work performance amid menstrual challenges. This

finding aligns with literature emphasizing the interplay between emotional resilience and job fulfilment in mitigating work-related stressors.[48,61-63] This study accentuates the impairment of psychological domains necessary for workplace performance. Lessen emotional engagement, weaker self-regulation, increased negative affectivity, and reduced cognitive functioning that overall contribute to a decline in emotional well-being, thereby mediating the relationship with productivity.[64-67] The unexpected negative link between access of hygiene facilities and productivity affirms that infrastructure without supportive culture may not be adequate. Stigma, workplace perceptions and increased reporting may point to this paradox. These findings call for more qualitative exploration for better understanding of the socio-cultural dynamics.[68-70] Additionally, workplace social support surfaced as a protective factor, with supportive peer networks and awareness programs reducing the occupational burden of menstruation.[71-72]

## Conclusion

Study confirms that menstrual symptoms negatively impact emotional engagement, self-regulation, and increase negative affectivity, while also impairing cognitive functioning. Emotional well-being plays a crucial mediating role, significantly influencing work productivity. These findings focusing on the effects of menstrual symptoms on workplace performance are deeply psychological, bolstering the need for supportive workplace policies focused on emotional health. Addressing menstrual-related emotional challenges can help improve productivity and job satisfaction. Organizations should take practical measures such as flexible work hours, menstrual leave and access to counselling for normalizing conversation about menstruation. Such initiatives will not only reduce productivity loss but will also foster healthier workplaces.

## Limitations and future directions

While research provides comprehensive observations, it is limited by its cross-sectional design, which precludes causal inference. Forthcoming longitudinal study is suggested to better understand temporal dynamics. Additionally, the unexpected negative impact of hygiene access on productivity calls for deeper qualitative research to unpack underlying factors such as stigma or workplace culture. Incorporating diverse occupational contexts and exploring individual differences in symptom perception and coping could further enrich understanding and inform targeted workplace interventions.

### *Informed consent*

Informed consent was obtained from all individual participants included in the study prior to their inclusion in the study. Participants were assured of confidentiality and their right to withdraw at any stage without any repercussions.

## Conflict of interest

The authors confirm that they have no financial or personal relationships, interests, or affiliations whether direct or indirect with any individuals, organizations or entities that could have influenced or been influenced by the content, findings, or materials discussed in this manuscript.

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## Data availability

The data supporting the findings of this study can be obtained by reaching out to the corresponding author, who will gladly share them upon a reasonable request. All information has been carefully managed with full respect for participants' privacy and ethical standards.

## Author’s contribution

All three authors played important and clearly defined roles in the development of this research. Dr. Dipanwita Chattopadhyay led the project, taking

charge of designing the study, gathering and analyzing the data and writing the initial draft of the manuscript. Dr. Suriyakala Perumal Chandran contributed by helping shape the research framework and provided valuable input during the analysis phase. Dr. Soumendra Nath Bandyopadhyay offered guidance throughout the project, overseeing the work and contributing thoughtful, critical feedback to strengthen the final paper. Each author has reviewed and approved the final version of the manuscript and accepts full responsibility for the integrity and accuracy of the work.

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