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Perimenstrual Vulnerability and Psychiatric Symptom Severity Among Women with Mental Illness in Jamaica: A Transdiagnostic Cross-Sectional Study

Saphire I Longmore

saphire.longmore@gmail.com

University Hospital of the West Indies

Roger C Gibson

University Hospital of the West Indies

Kai A D Morgan

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Keywords: Jamaican women, mental health literacy, menstrual cycle, perimenstrual, symptom severity

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Perimenstrual Vulnerability and Psychiatric Symptom Severity Among Women with Mental Illness in Jamaica: A Transdiagnostic Cross-Sectional Study

Purpose Anecdotal observation at a teaching hospital in Jamaica suggested increased admissions amongst women at the time of or near the onset of their menses. This study investigates menstrual cycle phase association to psychiatric symptom severity with primary psychiatric diagnosis as a covariate.

Method A comprehensive study questionnaire was applied to eligible inpatients and outpatients that recorded whether they were in the perimenstrual phase of their menstrual cycle or not as well as primary psychiatric diagnosis. The Brief Psychiatric Rating Scale (BPRS) was used to measure clinical severity in addition to urine screens for pregnancy, cannabis or cocaine use. Statistical analyses included the Mann Whitney U and linear regression tests to explore the primary relationship and covariate effect.

Results n=96 inpatient and outpatient females of reproductive years with a psychiatric diagnosis. Mean BPRS scores were higher among the group in perimenstrual phase, 33.9 ± 9.3, versus the group in the non-perimenstrual at 29.5 ± 8.7 and was of statistically significance p value = 0.024. Individual diagnoses of schizophrenia and MDD were associated with higher BPRS scores, however, the primary relationship was independent of psychiatric diagnosis as a covariate.

Conclusion Demonstration of the perimenstrual phase of the menstrual cycle being associated with worsening mental health in women, irrespective of primary psychiatric diagnosis, increases mental health literacy for women and practitioners. This study adds to the exploration of the menstrual cycle's role in mental health, enabling the local application of sex specific strategies in the management of clients at individual and systematic levels.

Keywords Jamaican women; mental health literacy; menstrual cycle; perimenstrual; symptom severity

Introduction

The sex-defining menstrual cycle has long been thought to influence the emotional state of women with various descriptions, oftentimes uncomplimentary, being affixed to the phenomenological variations of a female's mental state at the time of and around menstruation[i]. Anecdotal observation of psychiatric symptom exacerbation at consistent times of the menstrual cycle is formalized with recognized psychiatric manifestations associated with menstrual cycle as early as 1902 by Krafft- Ebing in his work Psychosis Menstraulis (Riecher-Rössler, A., et al, 1993)[ii] and was among the first to formally describe women became affected with psychiatric symptomology associated with their menses. Over time diagnoses ranging from Involutional Melancholia (Eriksson, E., et al, 2000)[iii] to the DSM-5-TR's Pre-Menstrual Dysphoric Disorder (Epperson CN, et al, 2000)[iv]. Wieczorek, K. et al (2023)[v] in a narrative review indicates the effect of hormonal changes of the female menstrual cycle affecting several mental health conditions, including depression, PMDD, PTSD, bipolar disorder and schizophrenia. More recently Mazza and Marano in 2025 described the vulnerability of women to premenstrual and menstrual exacerbation of psychiatric conditions including major depressive disorder, bipolar disorder, anxiety disorders (generalized, panic and obsessive compulsive), schizophrenia and personality disorders see (see figure 1; Mazza et al, 2025) [vi]. This clinical association of the menstrual cycle and psychiatric symptomatology having been established in other populations remains a limited area of research in our local setting.

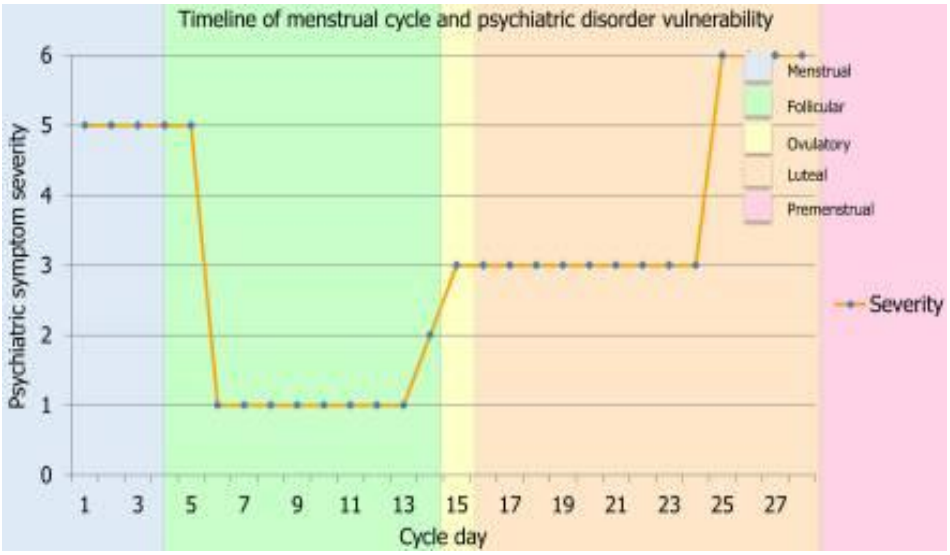


Figure 1. Psychiatric symptom severity across the menstrual cycle. This timeline graph illustrates the correlation between different phases of the menstrual cycle (menstrual, follicular, ovulatory, luteal, and premenstrual) and the relative severity of psychiatric symptoms. Symptom severity tends to peak during the premenstrual and menstrual phases (both synchronous with the perimenstrual phase). **Reproduced from** *Unmasking the cycle: Premenstrual and menstrual exacerbation of psychiatric disorders and impact on female mental health* (Mazza M et al, 2025) Copyright by authors 2025. Reproduced under the terms of the Creative Commons Attribution Noncommercial (CC BY-NC 4.0) License.

Cultural and mythological expressions across the globe surrounding menstruation at times reflects this natural biological phenomenon as a sign of impurity leading to women being shamed, shunned and propagating a negative appreciation of our human reproductive process (Tan D A, et al 2017)[vii]. Objective review shows the normal menstrual cycle as defined by two phases namely the follicular phase that ends at ovulation with the release of an egg/ovum followed thereafter by the luteal phase that ends with menstruation (see figure 2; Nelson et al 2023)[viii]. Under the influence of the hypothalamus via gonadotrophin releasing hormone GnRH, the follicular phase has the reproductive steroid oestrogen rising from initially low levels, with follicle stimulating hormone (FSH) also rising and promoting follicular maturation, while luteinizing hormone (LH) and the other female reproductive steroid, progesterone, remaining comparatively low. The release of the ovum or ovulation occurs midcycle marked by a surge in LH, a smaller rise in FSH, a sharp decline in oestrogen and increasing progesterone. The following luteal phase is characterized by progesterone dominance, with a secondary rise in oestrogen, before both hormones fall precipitously at menstruation if pregnancy

does not occur (Hall, J. E., et al, 2020)[ix] triggering the beginning of a new follicular phase. With further disaggregation of this cycle, we appreciate based on the physical phenomena of menstruation, the isolation of a further phase, the perimenstrual phase, identified as 5 days before and after the onset of the menses (Reilly, T. J., et al, 2020)[x] and is hormonally typified by relatively low oestrogen and progesterone levels, with LH maintaining its low levels and FSH rising (see figure 2; Nelson et al 2023)[xi]. The charting of the menstrual flow of an individual has been shown to be a reliable estimate of which phase is current (Cerminaro, R., et al, 2022)[xii].

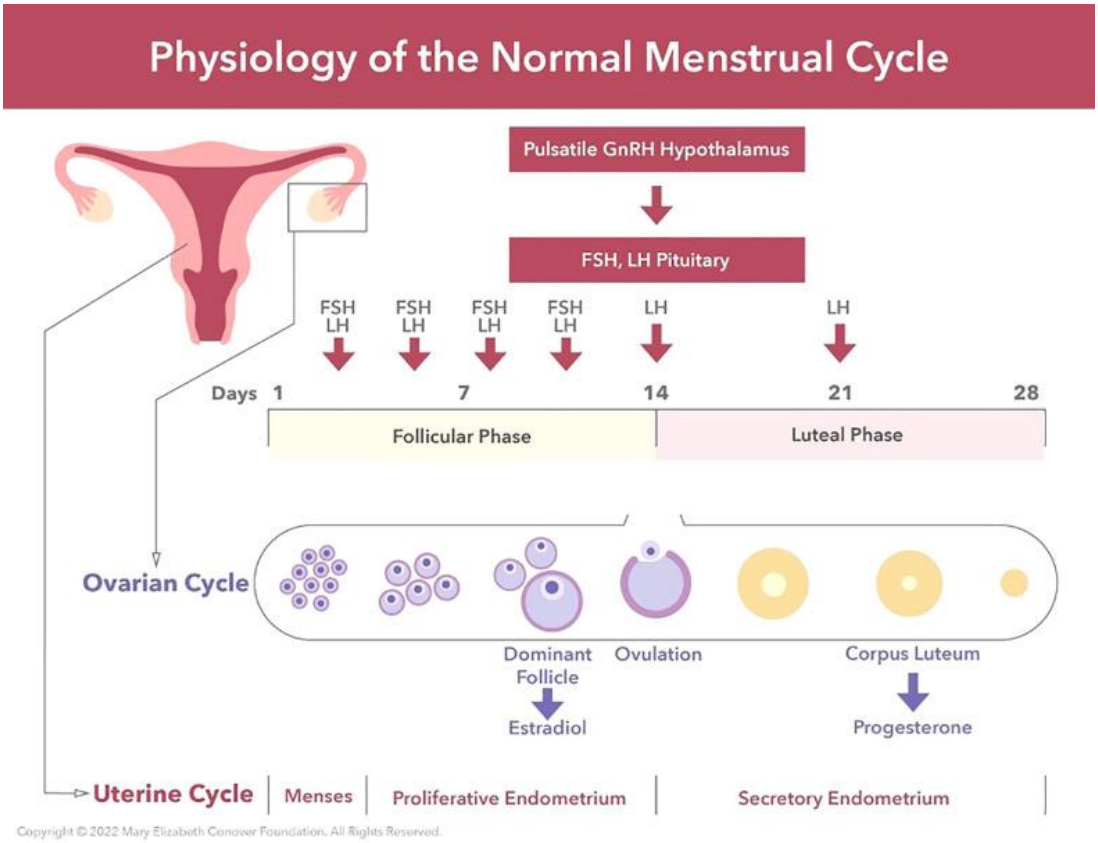


Figure 2. Physiology of the normal menstrual cycle. Reproduced from *My 28 Days: A Global Digital Women's Health Initiative for Evaluation and Management of Secondary Amenorrhea: Case Report and Literature Review* (Nelson LM et al, 2023) Copyright by the authors 2023. Reproduced under the terms of the Creative Commons Attribution License (CC BY).

This reproductive cycle's effect on the severity of mental health conditions is evidenced by its impact on suicidal behavior. Jang D et al in 2019 reported a 26% greater risk of suicide deaths, 17% greater risk of suicide attempts and 20% greater risk of psychiatric admissions at menstruation[xiii]. Findings such as this has established the menstrual cycle as a target for gender-specific mental health care interventions in women (Biskup E al,2020)[xiv]. Such interventions also take into account prevalence rates among men and women being accounted for by both biological and psychosocial factors (Veisani Y et al, 2018[xv]; Bolte S, et al 2023)[xvi] enabling relevant gender-based treatment approaches that influence patient care at the individual and systematic levels (Biskup E al,2020)[xvii]. Locally Jamaican women experience poorer mental health outcomes, including higher rates of depression and anxiety (Monroe et al., 2013)[xviii], increased exposure to violence and trauma (Williams et al., 2018), and rising substance use in younger years (Felker-Kantor et al., 2019)[xix], compared to men. Bourne, P. A. in his 2025 meta-analysis on youth mental health in Jamaica reflects a female predisposition to mental illnesses having found higher incidence of youth depression rates among females[xx]. The 2016 Jamaican Women's Health Survey (Williams, C. W., 2018) [xxi] found a predisposition to violence and trauma with grave consequences for the physiological and psychological health of Jamaican women and their children. Williams C.W. in the 2016 survey[xxii], as well as Kleber R.J., 2019[xxiii] highlight the likelihood that these pathogenic conditions and their adverse effects on women's wellbeing are underreported.

The association between sexual hormones and women mental health is established internationally. Kornstein, S. G., et al in 2002[xxiv] reports women being more adversely affected by anxiety disorders, Steiner M, et al, in 2003 the same fir mood disorders[xxv] and Richardson JR, et al in 2002 regarding the psychologic effects of domestic violence on women versus men[xxvi]. More recently, Comacchio C et al in their 2022 narrative review recognized the biological, psychological and social predisposition of females to developing mental health diagnoses and the stark need for treatment strategies that are that factor these differences in application[xxvii]. This sex stratified evidence, however, originates in high income countries with limited comparative local data. In Jamaica Hickling et al in 2005 underscored the need for population specific exploration of sex-specific factors in mental illnesses[xxviii], noting that local patterns may differ substantially from elsewhere. Such population specific research potentially serving to improve the understanding of psychiatric conditions that are influenced by sex-specific factors that maybe hormone-based,

thereby enhancing diagnostic accuracy, treatment planning and patient outcome (Etyemez, S., et al, 2025)[xxix].

Efforts to improve mental health literacy has been recognized as an important factor in providing care for women. Safaralinezhad et al., 2025 worked with women of reproductive age and identified mental health literacy as a key determinant for clients recognizing mental health concerns, seeking appropriate support and engaging in treatment[xxx]. Similarly, Verma S, et al in 2025, in their systematic review of rural women emphasized the contribution of limited awareness and understanding of mental illness as contributing factors to delayed help-seeking and treatment[xxxi]. In 2021 Chesser A.K. et al emphasized the role of mental health literacy in improving psychiatric diagnosis, treatment, reducing stigma and improving access to services among women[xxxii]. These findings support the need for improved mental health literacy when considering gender specific interventions aimed at reducing the burden of psychiatric disorders in women. Knowledge and awareness of symptom exacerbation is a key target in mental health literacy as disease severity is a major determinant of the clinical outcome, healthcare utilization and economic burden across psychiatric and non-psychiatric illnesses (Stieler et al., 2022; Wang et al., 2025)[xxxiii,xxxiv] . Greater symptom severity in mental health conditions is associated with higher societal and healthcare costs (König et al., 2023) [xxxv] while often-associated stigma further worsens outcome by its effect on quality of life, health seeking behavior, treatment access and engagement (Chukwuma et al., 2024) [xxxvi].

Evidence shows that sex influences the presentation, severity and treatment response of mental disorders and underscores the importance of sex sensitive approaches to mental health care (Christiansen et al., 2022; Biskup et al., 2020) [xxxvii,xxxviii]. Jackson-Best et al in 2021 recognized the dearth of data in Jamaica and the wider Caribbean that examines sex/gender specificity[xxxix]. Expanding such research addresses existing knowledge gaps and contributes to crafting informed, culturally relevant and sustainable healthcare systems that address the mental health needs of women in the region (Gaviria & Rondón, 2010; Diaz-Granados et al., 2011; Karcıoğlu, 2026) [xl,xli,xlii]. The purpose of this study is to investigate the effect of the sex specific perimenstrual phase of the menstrual cycle on psychiatric symptom severity among Jamaican women heterogeneously diagnosed with a psychiatric illness. The hypotheses explored are that the perimenstrual phase of the menstrual cycle impacts psychiatric symptom severity and further that this impact persists regardless of primary psychiatric diagnosis.

This study contributes to the greater awareness of menstrual cycle-related influences on psychiatric disorders locally and further the development of unique tailored responses to the needs of clients.

Materials and Methods

Ethical approval was obtained from the appropriate Ethics Committee. A Clinical Trial number was not applicable. A cross-sectional observational study was conducted at the 500-bed tertiary care facility among female inpatients and outpatients, presenting to the psychiatric service between January 2010 and August 2010. Inclusion criteria were females with menstrual cycles ≤35 days, not pregnant and who had not used hormonal contraceptives in the previous three months. Informed consent was obtained from all participants.

Urine screens included the ACON hCG One Step Ultra Pregnancy Test Device using rapid chromatographic immunoassay for the qualitative detection of human chorionic gonadotropin in the urine. This test qualitatively detects the presence of hCG in the urine specimen at the sensitivity of 10 mlIU/L. After the first missed period hCG levels exceed 100 mlIU/L (ACON hCG product insert)[xliii].

The severity of symptomatology was measured using the Brief Psychiatric Rating Scale (BPRS) developed by J.E. Overall and D.R. Gorham in 1962. The BPRS has become an established tool in psychiatric research (Leucht, S., et al, 2005)[xliv] particularly among inpatients diagnosed with schizophrenia (Sajatovic, M., et al, 2012)[xlv] but also for bipolar, anxiety and depressive disorders (Rush, J., et al, 2000)[xlvi] diagnoses in both in (Varner, R. V., et al, 2000)[xlvii] and outpatient (Ligon, J., et al, 2000)[xlviii] populations. Regarding use of the BPRS it is recognized that a major variance determinant for reliability does not lie with the scale itself but rather with raters, as such, familiarity with the scale is paramount and conducting an anchoring exercise increases inter-rater reliability as well as minimizing interviewer drift. The cross cultural and varied ethnic background use of the BPRS has been demonstrated in Germany (Mass, R., et al, 1997)[xlix], Japan (Kaneda, Y., et al, 2002)[l], Holland (Ruggeri, M., et al, 2005)[li] and China (Chan, D. W., et al, 1993)[lii]. For this study in Jamaica using the BPRS, a reliability anchoring and pilot exercise was done via convenience sample of 30 clients. A Cronbach's α of 0.93 was obtained from the primary investigator. The web-based sample size calculator at http://www.stat.ubc.ca/~rollin/stats/ssize/n2.html revealed the required sample size to be 102 study subjects. Inpatients were recruited consecutively within 24 hours of admission via the emergency room to

the acute stabilization ward, while outpatients were randomly selected using a table of random numbers and the last two digits of the registration numbers of patients scheduled for clinic visits, if no registration number matched that chosen from the table of random numbers, the next number in the table was selected and used to identify another potential participant. All participants were given screens for cannabis, cocaine, and pregnancy before administration of the BPRS and a study questionnaire capturing demographics, psychiatric diagnosis, and their menstrual cycle details via a menstrual cycle calendar. The subject's last menstrual period (LMP) was used to determine if they were in ± 3days of the onset of their menses and therefor in the perimenstrual phase, or not within the perimenstrual phase at the time of interview. Further confirmation of this grouping if needed was had from nursing records.

The in and outpatient subgroups (proxy for patient stability) were analyzed both separately and together for the relationship between presentation in the perimenstrual phase and symptom severity. The entire sample was then analyzed for the effect of patient diagnosis on the relationship if any between the perimenstrual phase and symptom severity

The Statistical Package for Social Sciences (SPSS) 30th version was used to screen the data for normality, outliers and other statistical properties associated with the assumptions underlying the proposed inferential statistical analyses. Early data analysis showed that the BPRS scores for the total population were not normally distributed and, as such, the nonparametric test, Mann Whitney U was used to assess statistical significance of relationships. Further hierarchical multiple regression analyses were conducted to examine whether perimenstrual phase predicted BPRS scores after controlling for the covariate of primary psychiatric diagnosis with bootstrapping procedures employed to obtain robust estimates of standard errors and confidence intervals.

Results

Sample and Sociodemographic

One hundred and thirteen females were recruited; 56 were inpatients and 57 outpatients. The mean age of participants was 30.3 yrs sd 10.8 and with a range of 12 to 54yrs. Of the 113 subjects, for 17 participants the menstrual cycle phase could not be determined because of poor recall or irregular cycles. These participants were excluded so that the final sample size was ninety-six.

Of the 96 subjects, 53 (54.6%) were inpatients and 43 (44.3%) were outpatients. 80% were from an urban address, 16% from a rural and 4% were foreign

nationals. Highest education level is illustrated in figure 3. Employment level was 27% ‘currently employed’ whilst the remaining 73% were not employed.

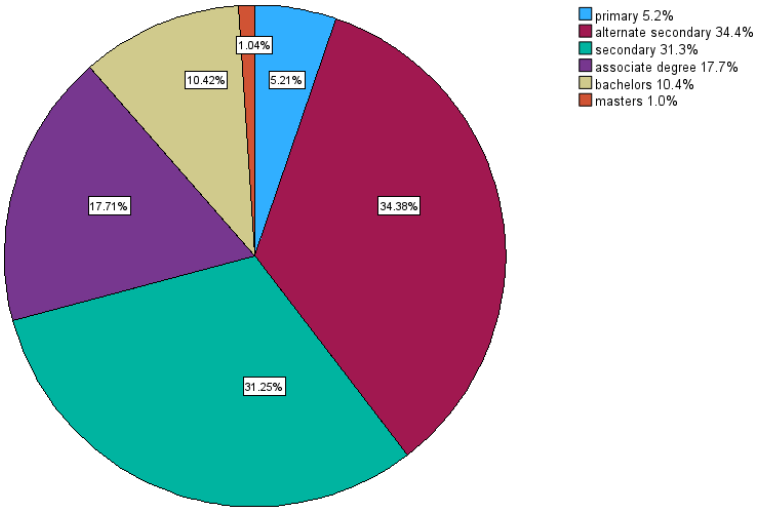


Figure. 3 Distribution of study participants according to highest education level started (n = 96).

The mean score for the total BPRS = 31.1 ± 9.1. The mean score for the inpatient group was BPRS = 37.2 ± 7.3 and for the outpatient group had a mean score of BPRS = 23.6 ± 4.2. The mean ± sd BPRS score for women in the perimenstrual phase was 33.9 ± 9.3 whilst that of the non-perimenstrual group was 29.5 ± 8.7. The median BPRS scores for these categories were 33.0 and 28.0 respectively, see figure 4. An independent-samples Mann–Whitney U test showed that these differences were statistically significant ($p = 0.024$).

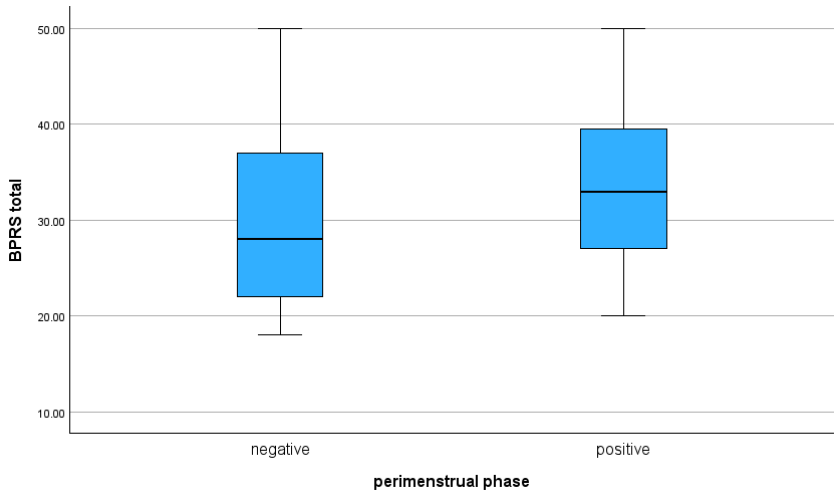


Figure 4. A boxplot comparing BPRS scores of participants within and outside of the perimenstrual phase of the menstrual cycle.

Primary psychiatric diagnosis as a covariate

The frequency of primary psychiatric diagnoses was as follows (n, %): schizophrenia: 51, 52.6%:, major depressive disorder: 14, 14.4%; bipolar disorder: 12, 12.4%; anxiety disorders: 12, 12.4%; schizoaffective disorder: 10, 10.3%; and psychosis secondary to a general medical condition: 3, 3.1%. For 7 (7.1 %) subjects the diagnosis was undetermined at the time of interview. Hierarchical multiple regression was conducted to examine primary psychiatric diagnosis as a possible confounding factor in the statistically significant association of the perimenstrual phase with higher BPRS scores. The covariates used in Step 1 were perimenphase (perimenstrual phase), dxschizo (diagnosis schizophrenia, dxmdd (diagnosis major depressive disorder), dxbpd (diagnosis bipolar disorder), dxanx (diagnosis anxiety disorder), dxschiaff (diagnosis schizoaffective disorder) and dxgmc (diagnosis psychosis secondary to a general medical condition). The main effects model was not statistically significant, $p = .093$, $F(7,88) = 1.82$, but accounted for 12.6% of the variance ($R^2 = .126$, adjusted $R^2 = .057$), however there were individual significant positive predictors of BPRS score with perimenstrual phase ($B = 4.63, p = .020$), schizophrenia ($B = 9.50, p = .026$), and major depressive disorder ($B = 9.63, p = .033$); all other diagnoses did not have any significant associations with BPRS scores. Bootstrap confidence intervals confirmed the reliability of these effects.

In Step 2, the covariates were perimenphase (perimenstrual phase) as well as the interaction terms for perimenstrual phase and each diagnosis, namely, perischiz (perimenstrual phase and diagnosis schizophrenia), perimdd (perimenstrual phase and diagnosis major depressive disorder), peribpd (perimenstrual phase and diagnosis bipolar disorder), perianx (perimenstrual phase and diagnosis anxiety disorder), kjperischiaff (perimenstrual phase and diagnosis schizoaffective disorder) and perigmc (perimenstrual phase and diagnosis psychosis secondary to a general medical condition). As shown in Table 1, perimenstrual phase remained a significant predictor of BPRS total scores, $B = 7.50, SE = 2.59, p = .003$, with the bootstrapped 95% confidence interval not including zero $[2.25, 12.47]$, indicating a robust association between perimenstrual phase and psychiatric symptom severity after accounting for diagnostic variables and interaction terms.

Predictor	**B**	**SE**	**β**	**p**	**95 %CI**
Constant	20.560	4.260	------	<001	12.094,29.026
Perimenstrual (perimenphase)	4.634	1.962	0.246	0.020	0.735, 8.532
Schizophrenia (dxschizo)	9.501	4.207	0.522	0.026	1.140, 17.863
MDD (dxmdd)	9.629	4.437	0.374	0.033	0.811, 18.447
BPD (dxbpd)	7.138	4.592	0.260	0.124	-1.987, 16.263
Anxiety Disorder (dxanx)	4.362	3.530	0.159	0.220	-2.652, 11.377
Schizoaffective Disorder (dxschizaff)	8.300	4.690	0.279	0.080	-1.021, 17.621
GMC (dxgmc)	-2.152	6.591	0.055	0.661	-10.202, 15.993
Step 2					
Constant	23.152	4.362	—	<.001	14.476, 31.828
Perimenstrual (perimenphase)	7.498	2.455	0.397	0.003	2.615, 12.381
Schizophrenia (dxschizo)	5.516	4.476	0.303	0.221	-3.387, 14.419
MDD (dxmdd)	7.138	4.663	0.277	0.130	-2.137, 16.414
BPD (dxbpd)	3.921	4.916	0.143	0.427	-5.857, 13.699
Anxiety Disorder (dxanx)	5.170	3.557	0.188	0.150	-1.904, 12.245
Schizoaffective Disorder (dxschizaff)	9.774	5.007	0.329	0.054	-0.186, 19.734
GMC (dxgmc)	-2.152	7.540	-0.41	0.776	-17.149,12.845
Perimenstrual × MDD (perimdd)	-4.789	7.111	-0.75	0.503	-18.933,9.356
Perimenstrual × BPD (peribpd)	-0.905	6.320	-.017	0.887	-13.474, 11.665
Perimenstrual × Anxiety (perianx)	-14.321	7.594	-.225	0.063	-29.424, 0.783
Perimenstrual × Schizoaffective (perischizaff)	-15.091	6.559	-.289	0.024	-28.136, -2.046
Perimenstrual × GMC (perigmc)	4.502	10.932	.050	0.682	-17.241, 26.245

Table 1. Hierarchical regression examining the effects of perimenstrual phase and primary psychiatric diagnosis and their interaction with BPRS score *Note.* BPRS = Brief Psychiatric Rating Scale; B = unstandardized regression coefficient; SE = standard error; β = standardized regression coefficient; CI = confidence interval; GMC = general medical condition. Bootstrap estimates were based on 5,000 bias-corrected and accelerated (BCa) samples. $p < .05$, $\mathbf{p} < .01$, $\boldsymbol{p} < .001$.

Discussion

Menstrual cycle-associated changes to mood and other mental health manifestations of a female, in folklore and cultural contexts, historically are often met with derogatory and marginalized projections (Garrido M et al, 2025)[liii]. This study is the formal elucidation of the anecdotal observation of psychiatric symptom exacerbation at a teaching hospital in a low to middle income country with the scope of enabling objective appreciation of the female reproductive process being significant to the biological, psychosocial and therapeutic considerations of mental health conditions (Hantsoo L et al, 2025)[liv]. The mean age of participants being 30.3 years (range 12-54 years) was representative of women across the reproductive lifespan in Jamaica[lv], 80% were resident in urban areas, while 4% were foreign nationals and the remaining of a rural abode, this distribution reflects the urban catchment population served by the UHWI, a tertiary care facility in urban Jamaica (Mullings et al., 2018). The educational accomplishments of study participants reflect lower enrollment up to the secondary level 70.5% versus when compared to 78.6%, per data from the Statistical Institute of Jamaica (STATIN)[lvi] for the general female population 15 yrs and older in 2011. However tertiary or above achievement at 29.0 % was higher for the study group versus 12.1% for the general female population comparative in age. Interpretation of these findings takes into consideration the age onset of illnesses in women with diagnoses such as schizophrenia where there are 3 age ranges of peak incidence namely, the primary peak at 20 – 39 years, the secondary peak during the perimenopausal years (~45 – 55 years) and a tertiary peak in the early 60s (Tang, L., et al, 2025)[lvii]. There was a comparatively lower employment rate at 27.0 % versus 68.7 % among women 14 to 54 yrs in 2011 (STATIN, 2016)[lviii] , a finding consistent with both local and international documentation of occupational impairment associated with severe mental illness and an acknowledged contributor to social disadvantage and poorer recovery outcomes among women with serious mental illness (Burgess et al., 2013; Kim UN et al, 2015)[lix].

Among the 96 participants, the inpatient group of 53 participants had a higher mean BPRS score of 37.2 ± 7.3 than the 43 outpatients with a mean BPRS score of 23.6 ± 4.2 which is in keeping with the clinical presentation of patients who warrant acute stabilization via inpatient services versus maintenance care as an

outpatient. A higher mean BPRS score was had among individuals in the perimenstrual phase of their cycle at 33.9 ± 9.3 compared to 29.5 ± 8.7 for women in the non-perimenstrual phase. This association of the perimenstrual phase of presentation and higher BPRS scores was found to be statistically significant relationship (p=0.024). With respect to primary psychiatric diagnosis, multiple regression analysis showed that major depressive disorder and schizophrenia were also significantly associated with higher BPRS scores (p=0.026 and p=0.033 respectively) and further when controlling for the covariate of primary psychiatric diagnosis, the significant association between perimenstrual phase presentation and symptom severity was maintained, p=0.003.

Confirmation of the menstrual cycle's perimenstrual phase being significantly associated with higher symptom severity, despite primary psychiatric diagnosis, calls for reflection on neuropsychiatric differences between the two phases of the cycle explored. The gender specific menstrual cycle is regulated by a complex interplay between FSH, LH, oestrogen and progesterone (Barbieri RL. et al, 2014)[lx]. Amongst these four hormones, oestrogen and progesterone exhibit more pronounced fluctuations between the perimenstrual phase and the non-perimenstrual phase of the cycle when compared to FSH and LH which mainly regulate ovarian function and are not generally regarded as direct modulators of affective neurobiology (Hawkins SM et al, 2008)[lxi]. Given the established influence of the ovarian steroids, oestrogen and progesterone, on the neurobiological processes implicated in mood regulation it is variations in these hormones that may be particularly relevant to interpreting this study's data, as supported by Schiller CE et al in 2016, who recognized changes in levels of the reproductive steroids, as triggers for affective dysregulation in susceptible women during changes in various reproductive states (e.g. premenstrual, pregnancy and postpartum, perimenopause)[lxii].

Relevant to the results of this current investigation is the perimenstrual phase (days leading up to the onset of menstrual flow) of the menstrual cycle being typified by a relative fall in both oestrogen and progesterone levels versus the non-perimenstrual phase (the remainder of the cycle) where oestrogen levels rise post menstrual flow into the follicular phase peaking and then falling just before ovulation and finally rising to a high at the middle of the luteal phase, to again fall to its perimenstrual low. The other reproductive steroid, progesterone, is seen to remain at a relatively low and stable level throughout the days of perimenstration into the follicular phase then starts to rise just before ovulation

to peak mid-luteal phase and finally decreasing to maintain its previous relatively low level[lxiii], see fig 2. Oestrogen's relatively lowered concentration during the perimenstrual phase and therefore a hypoestrogenic state has been shown to increase susceptibility to psychiatric symptoms in vulnerable individuals resulting in greater susceptibility to mental health and other conditions (Lin J et al, 2024)[lxiv], similarly other physiologic hypoestrogenic states seen premenstrually and menstrually (Gerada C, et al, 1988)[lxv], post-partum (Kendell RE, et al, 1987)[lxvi], post menopause and post ovariectomy (Garg, R et al 2025; Chandra PS., 2002)[lxvii],[lxviii] are associated with worsening psychiatric symptomatology leading to the DSM 5 TR recognized distinct diagnosis of PMDD[lxix] and possible use of the specifiers therein such as premenstrual, menstrual, perimenstrual, intrapartum, post-partum, menopausal, perimenopausal, postmenopausal, post oophorectomy when affixing diagnoses to various mental health presentations in women[lxx] and including the emergence of psychosis secondary to oestrogen withdrawal (Mahé V, et al, 2002)[lxxi].

There is growing evidence of oestrogen as a neuroprotectant in psychosis, mood disorders, and cognitive dysfunction leading to exploration of it as therapy in several psychiatric conditions (Hwang, W. J., et al 2020)[lxxii] including monotherapy for perimenopausal depression[lxxiii], Alzheimer's and postmenopausal dementia[lxxiv] and adjunct therapy in schizophrenia[lxxv]. It is postulated that oestrogen's positive effect on mental health conditions is mediated through several mechanisms. The distribution of oestrogen receptors (ERα, ERβ, and G Protein-Coupled Estrogen Receptor ie. GPER) in brain regions pathogenically associated with memory, decision making and emotional regulation such as the hippocampus, prefrontal cortex and amygdala, influences multiple neurotransmitter systems implicated in psychiatric disorders (McEwen, B., 2002)[lxxvi]. Evidence also indicates oestrogen protects against psychosis via its antidopaminergic activity, analogous to antipsychotic drug. Blum M, et al in 1987[lxxvii] found that oestrogen decreases gene transcription of tyrosine hydroxylase the rate–limiting enzyme in dopamine synthesis, reduces dopaminergic neurotransmission and receptor activity having the resultant effect of reduced risk of psychosis during periods of higher oestrogen exposure (Bossé R, et al, 1996 [lxxviii] Dluzen D, et al, 2003[lxxix]).

Oestrogen's neuroprotection also is recognized by effects on the serotonergic system via up regulation of serotonin receptors (Wei LC, et al, 2025)[lxxx], reduced serotonin breakdown through increased activity of tryptophan hydroxylase and is

a monoamine oxidase inhibitor (Bethea CL, et al, 2002)[lxxxi]. These actions may explain the increased prevalence of depressive symptoms, mood lability, and irritability observed during low-oestrogen states such as peri and post menopause, postpartum and post oophorectomy (Turek J., et al 2023)[lxxxii]. Beyond neurotransmitter modulation, oestrogen possesses antioxidant and anti-inflammatory properties that contribute to neuronal resilience. Its antioxidant action as a free radical neutralizer reduces oxidative stress, a major contributor to neurodegeneration (Cutter, W. J., et al, 2003)[lxxxiii], and anti-inflammatory effects linked to disorders such as Alzheimer's disease (Li R, et al, 2005)[lxxxiv]. At the cellular level oestrogen is neuroprotective through several complementary mechanisms namely calcium regulation preventing excitotoxicity and cell death (Gamerdinger M, et al, 2006)[lxxxv], enhanced mitochondrial function (Arnold S, et al, 2012)[lxxxvi], resilience against cell injury and cell death by protection against apoptosis and beta amyloid toxicity (Russell JK, et al, 2019[lxxxvii] ; Hosoda T, et al, 2001)[lxxxviii]. Additionally, oestrogen enables synaptic plasticity and neurogenesis by activation of NMDA receptors (Sato K, et al, 2023)[lxxxix] in the hippocampus boosting memory and learning (Barth C, et al, 2023)[xc], the effects of which are linked to poor verbal memory and learning during low-oestrogen states (Sherwin BB., 2003)[xci].

Of interest to the findings of this study, the cyclic fluctuations of oestrogen warrant a further consideration of its psychiatric role at another occurrence of its relative fall during the normal menstrual cycle, namely, at ovulation and post ovulation[xcii]. This marker for a second relative fall in oestrogen levels and subsequent hypoestrogenic state, may serve as distinct variable in future studies exploring whether mid-cycle/ovulation is similarly associated with worsening psychiatric symptomatology. Such research could help identify an additional female-specific predictor of symptom severity and further inform the role of these hormonal fluctuations in psychiatric processes.

Progesterone, the second female reproductive steroid, is also considered when interpreting the evident neuroprotection of the non-perimenstrual phase seen in this study. Progesterone has several neurobiological properties that may be relevant to psychiatric symptomatology, including anti-inflammatory effects (Ghoumari, A. M., et al, 2020)[xciii], neurotrophic support via brain-derived neurotrophic factor (BDNF), (Singh, M., et al, 2024)[xciv], anti-apoptotic actions (Thomas, P., et al, 2020)[xcv], modulation of GABA A receptor function and its diversification (Maguire, J., et al, 2007)[xcvi], as well as the promotion of myelin

repair and remyelination (Bassani, T. B., et al, 2003)[xcvii]. Despite these mechanisms, there is a paucity of randomized controlled trials evaluating progestins as standalone treatments for psychiatric conditions[xcviii]. Studies examining combined oestrogen-progestin therapy for depression have yielded mixed results, although overall reductions in depressive symptoms have been reported, however, similar benefits have also been observed with oestrogen monotherapy, making it difficult to delineate the specific contribution of progesterone (Londero, A. P., et al, 2024)[xcix]. Further considering that the finding of perimenstrual symptom exacerbation is consistent with the report from a comprehensive review by Handy et al. in 2022 [c] of increased symptom severity during the premenstrual and menstrual phases in individuals with psychotic disorders, bipolar disorder, depressive disorders, suicidal ideation and behavior, and alcohol use disorders; the premenstrual and menstrual phases of the menstrual cycle being synchronistic in timing with the perimenstrual phase, all phases are typified by declined oestrogen levels relative to preceding phases. All taken together, the available evidence suggests that it is the relative fall in oestrogen, rather than low progesterone concentrations that may be the primary hormonal driver of symptom worsening during this phase of the cycle, a position supported by Rubinow D.R., et at in 2019[ci] and Sumien, N., et al in 2021[cii] . It is underscored that there is much to be further deciphered regarding the neurobiological dynamics of the hormones of the menstrual cycle and the pathogenesis of psychiatric disorders (Handy A.B., et al 2022)[ciii].

The diagnoses of schizophrenia and major depressive disorder as diagnostic categories being associated with higher BPRS scores is in keeping with clinical severity of these presentations[civ]. Also of interest to this discussion is the fact that both conditions are associated with low oestrogen states in their pathogenesis. Mu E, et al in 2024 wrote regarding schizophrenia of oestradiol being a “window to the brain and holds great potential for deepening our understanding of the underlying causes of psychotic disorders[cv], a statement that reinforces earlier findings from Riecher-Rössler, A., et al who in 1994 postulated that that blood levels of oestrogen maybe decreased in women with schizophrenia[cvi]. The role of oestrogen in schizophrenia extends to males also diagnosed with the condition as evidenced by acute exacerbation being associated with low serum oestrogen levels (Huber, T. J., et al, 2005)[cvii] and trials of oestrogen therapy in schizophrenic males having promising results (Kulkarni, J., et al, 2013)[cviii].
The clinical state of MDD also has recognized predisposition during hypoestrogenic states to clinical diagnoses of depressive disorders such as

perinatal and postpartum depression (Nielsen, A. M., et al, 2024)[cix], premenstrual dysphoric disorder (Mu, E., et al, 2025)[cx] post hysterectomy, post oophorectomy depression (Garg, A., et al, 2021)[cxi] and similarly post menopause (Turek, J., et al, 2023)[cxii]. The possible role of oestrogen in the development of depressive disorders considers the genetic sensitivity between polymorphism in oestrogen receptor, Erα/Erβ, and depression risk in women (Li, C., et al, 2022) [cxiii], neurotransmitter modulation of serotonin (Amin, Z., et al, 2005)[cxiv] , dopamine, glutamate (Bendis, P. C., et al, 2024) [cxv] and GABA (Barth, C., et al, 2015) [cxvi] . There is also evidence of increased inflammation during low oestrogen states (Straub, R. H., 2007)[cxvii], oestrogen support in neuronal resistance via BDNF support (Mahmoud, R., 2019)[cxviii] and stress hormone signaling via regulation of the HPA axis (Heck, A. L., et al, 2007)[cxix]. We see oestrogen-based therapy effectively treating various presentations of depression during perimenopause, menopause, postpartum, and hormonally-triggered depressive states (Xiang, X., et al, 2019)[cxx].

Upon reflection of this study's identification of a personal, sex specific factor, i.e. the variable of presentation in the perimenstrual phase of the menstrual cycle, being a predictor of worsening psychiatric illness amongst women of reproductive age in Jamaica, not only adds to the understanding of the biological contribution of a woman's natural reproductive process to psychiatric diagnoses(Birhan B., et al, 2025)[cxxi], but also serves to increase mental health literacy among clients and clinician alike (Solmi M,., et al 2023)[cxxii] enabling application of uniquely tailored preventative and therapeutic approaches to mental healthcare women as recommended by Shields et al in 2023[cxxiii] and in the Lancet Psychiatry by Lenz B.,et al in 2025[cxxiv]. The local need for such data driven gender-focused treatment strategies being recognized by the Economic Commission for Latin America (ECLAC) [cxxv] in patient management and in policies outlined by the Mental Health Unit of Jamaica's Ministry of Health and Wellness, 2026[cxxvi].

Incorporating patient specific menstrual-cycle assessment into routine psychiatric evaluations enables clinicians to identify periods of heightened vulnerability and proactively adjust management strategies unique to the client and further enables the client awareness and self-care. Such approach aligns with recommendations of mental health services integrating reproductive factors more comprehensively into psychiatric assessment and treatment planning (Howard L.M., et al, 2025)[cxxvii]. The practicality of charting a client's menstrual cycle is made even

more accessible in today's world with the availability of technology such as smartphones (Mosa, A. S. M., et al, 2012)[cxxviii], a strategy that aligns with recommendations by Gibson R.C. et al. who in 2016 recommended enhanced training and sensitization of primary care physicians in the recognition and management of contributory factors to depression in this local setting[cxxix].

Extrapolated research from this study potentially lies among women predisposed to the emergence of diagnoses during oestrogen withdrawal states namely postpartum, post oophorectomy, peri or post menopause (Fink, G., et al, 1996)[cxxx]. Additionally, the potential of hormone-based care adjunctive to psychiatric management in not only women but men also (Riecher-Rossler, A., et al, 2011)[cxxxi]. Beyond the reproductive years, menopause and post menopause are associated with increased biological and psychosocial vulnerability. Loneliness, adverse life events and lack of family/social support are associated with increased risk of psychotic symptoms and other mental health difficulties (Li X, et al, 2022)[cxxxii]. These considerations pose further possible avenues of research in low to middle income countries where significant gaps remain in knowledge, attitudes, and healthcare practices around menopause (Harrison et al., 2021)[cxxxiii]. The integration of menstrual and reproductive mental health considerations into routine psychiatric practice, public education initiatives, and mental health policy are being adapted as globally (Howard LM et al, 2025) [cxxxiv.] Locally enhanced mental health literacy regarding the effect of the menstrual cycle may improve diagnostic accuracy, reduce stigma, facilitate earlier intervention, and promote more personalized and preventive approaches to psychiatric care for Jamaican women across the reproductive lifespan[cxxxv].

Limitations

Limitations of this study are recognized as follows. Firstly, despite the anecdotal observation that led to the initial investigation persisting to present day, the dataset was collected in 2010 which may limit its applicability based on chronological relevance. Second, the definition of perimenstrual phase (onset menses +/- 3 days) used in this study had to be based on the researcher's anecdotal observation at the as there were no recognized parameters then, relatively more recent in 2020 Reilly T.J el al wrote of definition being ± 5 days of the onset of the menses +/- 5 days [cxxxvi], this limitation saw a more restricted temporal window under investigation. Additionally, the method of self-recall of the subject's perimenstrual status lends to inherent recall bias (Small, C. M., et al, 2007)[cxxxvii],

however it is noted that verification was done via nursing records and next of kin contact. Another limitation was the sample size being 96 compared to the minimum required of 102, although not a great difference, this increased the chances of a Type 2 error of not finding a statistically significant relationship (Bacchetti P., 2010)[cxxxviii], however such was not the case as statistical significance was found. Fourthly, the lack of blood testing to confirm hormone levels (Middle, J. G., et al, 2009)[cxxxix] is yet another critique, nonetheless it is important to recognize it is the subjective relative changes in hormone levels that may underly the pathogenic contribution of these hormones relevant to the findings of this study. Lastly, re the diagnostic groups, the less frequent groups, were perhaps too small to detect statistical significance in the hypothesis being tested (Handy, A. B., et al, 2022)[cxl]. Collectively these limitations underscore the need for future studies employing prospective designs, larger and more diverse samples and more precise methods of menstrual cycle-phase determination.

Conclusion

This study demonstrates the sex specific factor of the menstrual cycle's perimenstrual phase being a significant predictor of worsening symptomology in women of reproductive years, independent of their primary psychiatric diagnosis. Despite the age of the dataset the findings have significant relevance to the management of women diagnosed with a mental illness in the Jamaican population where resources are limited and gender specific strategies are needed (Whitehorne-Smith, P., et al, 2023)[cxli]. The availability of easily accessed individualized recommendations is beneficial and in keeping with suggestions by Mazza M et al[cxlii] in 2025 that profiling symptom patterns in relation to the menstrual cycle and subsequent individualized treatment options of lifestyle modifications, psychotherapy and pharmacological interventions including hormone therapy is recommended as a tailored approach to women with psychiatric diagnoses. Efthimiou, O., et al, 2024 [cxliii] further endorses this approach by proposing that the predictability of worsening symptomatology within sex specific therapeutic guidelines impacts the outcome of patients as well as cost to care at individual and systemic levels. Finally, there is scope for further research into the effects of the menstrual cycle and its hormones adding to local evidence driving data-driven contemporary approaches to treating clients based on their unique biological, social and cultural need (Handy, A. B., et al, 2022)[cxliv].

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