

The Menstrual Cycle, Personality, and Academic Performance

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• Considerable research supports the widespread complaint of mood and behavioral changes during the menstrual cycle. However, there is little evidence of effects on intellectual performance, even though students commonly complain of it. We studied the results obtained by 244 female medical and paramedical students in all examinations taken during one year. In view of suspected correlations between personality characteristics and degree of dysmenorrhea, an Eysenck Personality Inventory, measuring extroversion and neuroticism, was administered. The examination results of high and low scorers on these personality scales and of those women with prolonged (\geq six days) menses were reanalyzed. Not one of these analyses revealed significant menstrual-cycle effects on examination performance. Thus, while some persons may suffer, it does not seem that menstrual cycle effects are sufficient to handicap significantly the examination performance of the majority of female students.

(*Arch Gen Psychiatry* 38:219-221, 1981)

The concept that mood and behavior change during the menstrual cycle has been generally accepted for many centuries, but the clinical syndromes of menstrual and premenstrual distress were not delineated until the 1930s.¹ Although there is considerable difference of opinion concerning their prevalence, these syndromes have been identified in all cultures studied to date, though the incidence and severity of specific symptoms seem to show considerable cross-cultural variation.² In Western society, the prevalence of these syndromes has been variously estimated

between extremes of 25% and 100%, depending on the symptomatic severity considered diagnostic and the diligence with which symptoms were sought.^{3,4} However the clinical syndromes are defined, it is evident that a large proportion of women experience recurrent cyclical feelings of reduced well-being and performance.

Accompanying and underlying these feelings is a wide range of affective, physiological, and behavioral changes. During the paramenstruum (that phase of the cycle during menstruation or within four days on either side of it), affective changes include an increase in anxiety, depression, and aggression and a reduction in sexual drive.^{5,6} Physiologically, the range of variables extends from the amount of motor activity,⁷ through autonomic reactivity and balance,^{8,9} hormonal and other blood constituent levels,^{10,11} sensory thresholds,^{12,13} and CNS electrical activity.^{14,15} Behaviorally, the paramenstrual concomitants identified to date range from alterations in dream content to an increased incidence of antisocial activity, accident proneness, and suicide.^{16,17}

Perhaps because of the wide-ranging nature of these changes, the complaint voiced by some women that the paramenstruum represents a significant intellectual and examination handicap has been widely and uncritically accepted. However, empirical investigation and support of this contention is almost nonexistent. The only congruent reports are the widely cited studies of Dalton.^{18,19} She reported impaired academic performance in school girls during both the menstrual and premenstrual phases, with most effect in those girls with prolonged cycles or prolonged menses, or both. Unfortunately, a number of methodological and statistical problems, including the lack of standardizing scores and statistical analyses, render these conclusions questionable. Indeed our close examination of her data suggests little or no effect. Furthermore, the only other study in this area²⁰ failed to detect cycle effects on either examination performance or the Watson-Glaser

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Correlation Matrix

Parameter	2	3	4	5	6	7	8	9	10
Marital status	0.34*	-0.10	-0.03	-0.15	-0.12	-0.09	0.04	-0.03	-0.11
Age	...	-0.11	-0.04	-0.06	-0.07	-0.12	-0.02	-0.01	0.02
Neuroticism score	-0.01	-0.03	0.05	0.01	0.14	0.25†	-0.01
Extraversion score	0.02	0.01	0.10	-0.08	-0.02	0.11
Cycle length	0.15	0.05	0.05	-0.03	-0.10
Cycle length variability	0.08	0.11	0.06	-0.08
Duration of menses	0.09	0.07	-0.03
Premenstrual well-being	0.24†	0.00
Menstrual well-being	0.01
Academic rating

* $P < .01$.
† $P < .02$.

Critical Thinking Appraisal test in university students.

Unfortunately, while methodologically sound, Sommer's study²⁰ examined only an unselected sample of students and therefore did not test the possibility that certain women who are particularly susceptible to cycle effects may indeed labor under an examination handicap. One might expect that the most vulnerable groups would consist of women who exhibit severe premenstrual symptomatology or possess extreme personality characteristics known to be associated with a proclivity to psychosomatic dysfunction, eg, high levels of neuroticism. The present study, therefore, aimed at both replicating previous studies and at extending them to include an investigation of those women deemed most vulnerable.

SUBJECTS AND METHODS

A total of 244 female medical (147) and paramedical (97) students, ranging in age from 17 to 27 years, and who were not taking hormones, were studied. At the completion of their final annual examinations, they were given an introductory letter and asked to complete a menstrual cycle questionnaire and the Eysenck Personality Inventory (EPI). The questionnaire sought information on the most recent cycle, as well as average values for previous cycles. Questions related to the duration and variability of both the cycle and the menstrual phase, menstrual and premenstrual well-being, and amount of menstrual blood loss. The EPI measures the dimensions of extraversion-introversion and neuroticism. No attempt was made to standardize the phase of the cycle in which the EPI was administered, since previous research at the University of Queensland²¹ and elsewhere²² has indicated that, in contrast to mood states, basic personality traits such as these do not seem to have significant cyclical variation.

The cycle was divided into four phases: menstrual, premenstrual, midfollicular, and luteal (time of ovulation). To maximize the sensitivity of interphase comparisons, critical days at the midpoint of each phase were identified. These corresponded to day two of menses (menstrual), five days before (premenstrual), 15 days before (luteal), and midway between the menstrual and luteal (midfollicular). Only examinations taken on or within one day of these points were considered as falling within the critical periods. Subjects sat for a number of examinations throughout the year and for a series of examinations during the final two weeks. The results obtained by each student for each examination were standardized, a precaution that has not been taken in previous research,^{21,22} but which is essential for valid comparison across different examinations. Final examinations falling during critical periods were identified, and for each student the difference between these scores and the average for all her other examinations was computed. Each student's academic rating within her peer group was also calculated.

Several forms of statistical analysis were performed. Normative data (means and standard deviations) were obtained on the

variables under investigation, and interrelationships between them were examined by drawing up a correlation matrix between marital status, age, extraversion and neuroticism scores, cycle duration and variability, duration of menses, menstrual and premenstrual well-being, and academic rating. The effects of the cycle on examination performance were examined by performing one-way analyses of variance, using cycle phase as the independent variable and the previously calculated difference between examination performance at a critical period and the average for all other examinations as the dependent variable. Six such analyses were performed; first for all students, then for high and low scorers on the two EPI personality dimensions, and finally for those subjects with prolonged (\geq six days) menses. In addition, those students were selected who sat for a final examination on a menstrual day on which they experienced most discomfort and who rated their discomfort as severe. The result obtained on this examination was compared by a paired test, with the average results obtained in all other examinations throughout the year.

RESULTS

The normative analyses on cycle and personality characteristics showed values close to the previously published norms. Mean cycle length was 26.8 ± 7.6 days, while the mean variability in cycle length reported by students was 2.1 ± 1.0 days and the duration of menses averaged 5.0 ± 1.0 days. These values, and those for average menstrual and premenstrual well-being, did not differ significantly from those reported by subjects for their most recent (final examination) cycle, which suggests that examination stress exerted little effect on the cycles of these women. Mean extraversion and neuroticism scores were 11.6 ± 4.0 and 10.7 ± 4.3 days, respectively; scores that are very similar to those of the general university population from which these students were drawn.²⁰ The correlation matrix revealed significant relationships between age and marital status ($r = .34$; $P < .01$), menstrual and premenstrual well-being ($r = .24$; $P < .02$), and menstrual well-being and neuroticism ($r = .25$; $P < .02$) (Table).

None of the analyses of variance, either for all students taken together ($F = 1.07$; $df = 3,240$), or of the various subgroups of medical students, paramedical students, high ($F = 1.56$; $df = 3,25$) and low ($F = 2.63$; $df = 3,29$) extraversion scorers, high ($F = 2.63$; $df = 3,30$) and low ($F = 1.07$; $df = 3,45$) neuroticism scorers, and those subjects with prolonged menstrual phases ($F = 0.07$, $df = 3,41$), exhibited significant effects. Neither were the performances of those students who sat an examination during severe menstrual discomfort significantly affected ($t = 0.39$; not significant). Thus, none of these analyses

showed significant menstrual cycle effects on examination performance.

COMMENT

The present study fails to find any support for the widespread belief that the menstrual cycle exerts significant effects on intellectual functioning in general and examination performance in particular. Even those women whom by virtue of severe symptomatology or personality predisposition one might expect to be most vulnerable were not significantly affected. The fact that the values obtained for personality and menstrual cycle characteristics and well-being are similar to those previously reported,^{1,20-22,27} that neither medical nor paramedical students were affected, and that examination stress did not seem to alter menstrual symptomatology, support the generalizability of the implications of this study to other normal populations. Of course, it remains possible that there exists a small group of women suffering from extremes of menstrual and personality dysfunction who do suffer intellectual impairment. Although there is no "menstrual psychosis," rare cases of manic-depressive illness and periodic catatonia whose periodicity is linked to the menstrual cycle have been reported,²³ and one would certainly expect intellectual impairment in cases such as these. Although the choice of the EPI in the present study was supported by the finding of a significant correlation

between neuroticism and menstrual symptomatology both here and in previous studies,^{1,23} it may be that in more disturbed populations clinical profiles, eg. the Minnesota Multiphasic Personality Inventory, aimed at detecting more severe psychopathology may be more appropriate for the identification of high-risk subjects.

In view of the wide-ranging behavioral and physiological effects of the menstrual cycle, it may be somewhat surprising at first sight that no effects were detected in a highly competitive situation, such as examinations. There seems to be no comparable studies of other competitive areas apart from Bausenswein's²⁴ observation that many a female athlete's best performance has been achieved during menstruation, even to the extent that records have been established and Olympic medals won. Perhaps the reason for this apparent lack of influence is to be sought in the overdetermined nature of competitive success. So many factors, including basic abilities and training, are influential in determining competitive outcome that any one additional variable, such as a biorhythm, cannot be expected to contribute more than a very small proportion of the variance, and hence its influence may remain undetected.

In summary, although its effects are manifold and sufficient to cause both mental and physical distress in a large proportion of women, it seems that the menstrual cycle does not represent a significant examination handicap to the majority of female students.

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