Prevalence of Perimenstrual Symptoms

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Abstract: The purpose of this study was to determine the prevalence of perimenstrual symptoms (PMS) in a free-living population of US women and to determine if prevalence estimates varied with parity, contraceptive status, characteristics of the menstrual cycle, and selected demographic variables. We identified all households from a census listing for five southeastern city neighborhoods that offered variation in racial composition and socioeconomic status. We ascertained all households in which there was one nonpregnant woman between the ages of 18 and 35 years per household. Of the 241 eligible women, 179 (74 per cent) participated in the study. Trained interviewers administered the Moos Menstrual Distress Questionnaire (MDQ) and other demographic measures to women between March and July 1979. Symptoms with a prevalence greater than 30 per cent included weight gain, headache, skin disorders, cramps, anxiety, back-ache, fatigue, painful breasts, irritability, mood swings, depression, or tension. Only 2 to 8 per cent of women found most of these severe or disabling. The exceptions were severe cramps reported by 17 per cent of women and severe premenstrual and menstrual irritability by 12 per cent. Cramps, backaches, fatigue, and tension were most prevalent during the menstruum; weight gain, skin disorders, painful breasts, swelling, irritability, mood swings, and depression were more prevalent in the premenstruum. Parity, oral contraceptive use, age, employment, education, and income were negatively associated with selected PMS. Use of an IUD, having long menstrual cycles, long menstrual flow, or heavy menstrual flow, and being able to predict the next period were positively associated with selected PMS. Race had both positive and negative effects on PMS. (*Am J Public Health* 1982; 72:1257–1264.)

Perimenstrual symptoms (PMS) presumably affect many women, but studies of US women have been limited largely to student or clinical populations. Miller found that 47 per cent of 785 women entering universities and schools of nursing experienced dysmenorrhea.[1] Schukit, Daly, Herman, and Hineman asked 105 randomly selected first year college students whether they had regular occurrence of premenstrual depression, irritability, anxiety, crying spells, and mood changes. Sixty-three per cent of these women reported at least one non-severe premenstrual symptom during their first year of school, and 70 per cent reported such symptoms during their second year.[2] Table 1 summarizes a few US and European studies of the prevalence of multiple PMS among adult women. Ferguson and Vermillion studied premenstrual symptoms among 75 white women employed in a medical school or clinic, 75 Black women who were employed in or visiting a hospital, and 81 private

gynecologic and obstetric patients. They found that 92, 91 and 95 per cent, respectively, experienced symptoms.[3] Pennington's study of 1,000 women, 95 per cent of whom were high school and college students, found the most prevalent perimenstrual symptoms were dysmenorrhea, irritability, nervousness, back pain, headache, nausea, general aches, and painful breasts.[4] Moos reported the prevalence of perimenstrual symptoms in a sample of graduate students' wives.[5] When the findings from the US studies are compared, there is a great deal of variability in prevalence estimates, with the prevalence of cramps ranging from 46.6 to 92 per cent, and the prevalence of painful breasts, swelling, and irritability also varying widely. Comparing Moos' findings to results from Western European studies, however, fewer US women report menstrual cramps, backache, nausea, breast symptoms, and irritability than do the Helsinki students studied by Timonen and Procopé,[6] but more US student wives report headache, cramps, backache, irritability, depression, and tension than the Edinburgh students studied by Sheldrake and Cormack.[7] The prevalence of cramps is greater among the Norwegian women than among US women, but rates of weight gain, headache and depression are lower than for US women, as reported by Bergsjo, *et al.*[8]

There are several possible explanations for the differences in prevalence estimates. First, each of these studies employed slightly different symptom scales, and, second,

TABLE 1—Per Cent of Women with Selected Perimenstrual Symptoms in US and European Non-Clinical Populations

Symptom		Ferguson & Vermillion (1957) 75 employed White women and 75 employed Black women or Black hospital visitors		Pennington (1957) 1000 women, 95% high school and college students	Moos (1968) 839 US Graduate Student Wives, mean age 25	Timonen & Procopé (1971) 748 Helsinki University Students, median age 21.5	Bersjø, Jenssen & Vellar (1975) 234 Norwegian industrial electrical technical and textile workers, modal age 20–29	Sheldrake & Cormack (1976) 3323 University Students Edinburgh, presumably late teens, early 20s
		Whites	Blacks					
1. Weight	P[a]	6.6	0	—	33.9	30	16[c]	—
gain	M[a]	—	—		22.9	—		
9. Headache	P	23.5	50.6	30[c]	29.4	26.8	15[c]	24.0
	M	—	—		35.5	21.6		12.4
16. Cramps	P	—	—	62[c]	14.2	66[e]	61[c,d]	20.8[b]
	M	50.0	34.0		46.6	75[e]		25.4[b]
22. Backache	P	36.0	45.3	30[c]	24.4	45	—	12.1
	M	—	—		40.0	54		26.2
25. Fatigue	P	4.0	2.6	—	—	43	—	—
	M	—	—		—	—		
26. Nausea	P	6.6	5.3	27[c]	4.3	11	—	4.6
	M	—	—		6.5	18		12.3
30. Painful or	P	52.0	24.0	18[c]	34.6	47	—	—
tender breasts	M	—	—		28.4	—		
34. Swelling	P	6.6	6.6	1[c]	35.5	49	—	—
	M	—	—		35.4	—		
36. Irritability	P	48.0	38.7	47[c]	52.2	70	—	32.5
	M	—	—		48.9	—		21.6
38. Mood	P	—	—	—	44.2	—	—	—
swings	M	—	—		40.8	—		
40. Depression	P	32.0	8.0	—	42.9	43.2	21[c]	31.0
	M	—	—		32.6	—		15.4
45. Tension	P	—	—	—	41.2	—	—	11.8
	M	—	—		42.6	—		10.4

[a]P = Premenstrual, M = Menstrual; [b]reported as stomach ache; [c]cycle phase not differentiated; [d]reported as dysmenorrhea; [e]reported as pelvic pain.

the samples varied greatly in age, parity, and other demographic characteristics.

The present study sought to determine the prevalence of perimenstrual distress in a free-living population of US women, and to determine if prevalence estimates varied with parity, contraceptive status, characteristics of the menstrual cycle, and selected demographic variables.

Materials and Method

Sample

We purposefully chose a population of women residing in five neighborhoods of a large southeastern city as the sampling frame because the site afforded variation in racial composition (Black and White) as well as socioeconomic status (lower-middle class to upper-middle class). The neighborhoods contained two residential districts of single-family dwellings as well as four apartment complexes. We identified all households in each neighborhood from a census listing for the city. Less than 1 per cent of these households did not have a telephone. Trained interviewers contacted each household by telephone and determined whether one of the household residents met the criteria for inclusion in the study.

The inclusion criteria were that participants be female, 18 to 35 years of age, and not pregnant at the time of the telephone contact. These criteria optimized the likelihood of interviewing women who were currently menstruating. With the exception of four households in which there were two eligible women who were unrelated, only one woman per household was eligible for the study. In households with more than one eligible woman, both were interviewed separately. Of 650 households contacted, 241 potential participants were available, and 179 (74 per cent) agreed to participate in the study.*

Measures

We used the Moos Menstrual Disease Questionnaire (MDQ)[5] which has been used by others to document the

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*Some women chose not to participate in the study for one or more reasons: did not have time (18), not interested in study (7), moving from area (3), previous bad experience with surveys or suspicious (2), failed to keep interview appointment (3), gave no reason (35).

TABLE 2—Characteristics of the Participants (N = 179)

Characteristic	Frequency	Per Cent
Age		
18–20	10	5
21–25	53	30
26–30	59	33
31+	57	32
Marital Status		
Married	105	59
Single	57	32
Divorced	9	5
Separated	6	3
Living with a partner	2	1
Race		
White	120	67
Black	59	33
Employed		
Yes	145	82
No	31	18
Status of Non-Employed		
Students	14	45
Homemakers	17	55
Annual Family Income		
$2,000	1	1
2,000– 3,999	7	4
4,000– 6,999	5	3
7,000– 9,999	21	12
10,000–14,999	26	15
15,000–19,999	22	13
20,000–24,999	27	16
25,000–29,999	32	19
30,000–39,999	21	12
40,000+	9	5
Educational Level		
Junior high or some high school	4	2
High school graduate	17	10
Some technical school or college	50	28
College graduate	72	40
Graduate degree	35	20
Religion		
Protestant	116	65
Catholic	19	11
Jewish	4	2
Other	13	7
None	27	15
Children		
Yes	78	44
No	101	56
Pregnancy History		
Positive	88	49
Negative	91	51

presence and severity of symptoms associated with menstruation.[9–11] The MDQ contains 47 symptoms grouped into eight factors, six of which measure negative perceptions: pain, impaired concentration, behavior change, autonomic reactions, water retention, and negative affect. A seventh factor, arousal, contains positive experiences such as excitement. The eighth factor contains control symptoms that are infrequently endorsed and which reflect a general tendency to complain of a variety of symptoms. Women are asked to report their perceptions of each of the symptoms for: 1) their most recent flow; 2) the week before their most recent flow; and 3) the remainder of the cycle, using a rating scale in which responses range from 1

for "no experience of the symptom" to 6 for "acute or partially disabling."** *Cycle phase* was defined as the MDQ dictated, such that the premenstruum included the week prior to the last menstruation, the menstruum included time during the most recent menstrual flow, and the remainder of the cycle included all residual days after accounting for the premenstruum and menstruum.

Our earlier analyses revealed a substantial and statistically significant difference in the severity of symptom ratings between the menstrual and remainder and the premenstrual and remainder phases of the cycle for only 16 of the symptoms on the MDQ.[12] Because our primary concern is with symptoms that are exacerbated either during the premenstruum or the menstruum, these analyses will concentrate only on those 16 symptoms with demonstrable cycle phase differences.

Procedure

Interviewers initially contacted the women by telephone, and arranged a mutually convenient time for interviewing the women in their homes. The interviewer obtained informed consent prior to conducting the interview; interviews were completed in about one hour. During the interviews, conducted between March and July 1979, we administered the MDQ and obtained demographic information.

Data Analysis

The prevalence of each symptom was calculated by computing the ratio of those women reporting the symptom to the total number of women interviewed. We were also concerned with determining if the prevalence varied with parity, contraceptive status, characteristics of the menstrual cycle, and selected demographic characteristics. These associations were assessed with Pearson's *r* or Spearman's *rho* as appropriate. Multiple regression analysis was employed to assess the relative effects of multiple correlates.

Results

Participants

Characteristics of the participants are described in Table 2. Most participants were in their late twenties and early thirties, married, White, employed, and had an annual family income greater than $15,000. In general, they were well educated with most having more than a high school education. Although the majority were Protestant, the women represented a variety of religious denominations. Less than half had one or more children.

Prevalence of PMS—The percentage of women reporting the 16 selected PMS according to cycle phase and severity of the symptom is given in Table 3. Although 30 per cent or more women reported menstrual weight gain, headache, skin disorders, cramps, backache, fatigue, painful

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**These scales showed cycle phase differences in the sample of 839 wives of graduate students on whom the scale was normed in the mid 1960s. The scales were internally consistent (correlations = .53 to .89), and had split half reliabilities of .74 to .98 (5).

TABLE 3—Per Cent of Women with 16 Perimenstrual Symptoms According to Menstrual Cycle Phase (N = 179)

	Symptoms	Menstrual		Premenstrual		Remainder	
		M/M[b]	S/D[c]	M/M	S/D	M/M	S/D
1.[a]	Weight gain	30.7	2.2	40.2	5.6	14.0	2.8
3.	Crying	15.6	2.8	19.6	4.5	4.5	1.7
4.	Lowered work or school performance	14.5	3.9	11.7	3.4	4.6	0.6
8.	Takes naps	22.9	3.4	17.3	1.1	7.8	1.7
9.	Headache	27.4	7.3	27.4	7.3	11.7	4.5
10.	Skin disorders	30.2	3.4	32.4	6.7	17.3	1.7
16.	Cramps	36.3	16.8	24.6	6.1	10.1	3.4
21.	Anxiety	20.2	3.9	27.0	3.4	11.8	2.2
22.	Backache	25.1	6.1	16.8	5.0	10.1	1.7
25.	Fatigue	40.2	7.3	28.5	3.9	19.6	1.1
30.	Painful breasts	25.1	4.7	27.9	7.6	8.1	1.7
34.	Swelling	34.3	4.7	39.5	5.2	8.9	2.2
36.	Irritability	37.8	11.0	44.2	12.2	14.0	3.5
38.	Mood swings	43.0	3.5	46.5	4.7	22.1	1.7
40.	Depression	29.7	5.2	29.7	7.0	16.9	1.7
45.	Tension	37.8	5.8	34.3	7.6	20.3	3.5

[a]Number corresponds to item number on the MDQ.[5]
[b]Mild, moderate.
[c]Strong, disabling.

breasts, swelling, irritability, mood swings, depression, and tension, a much lower percentage rated their symptoms as severe or disabling. Nearly 17 per cent of the sample, however, had menstrual cramps that they considered severe. In the premenstruum, the most prevalent symptoms included weight gain, headache, skin disorders, cramps, anxiety, fatigue, painful breasts, swelling, irritability, mood swings, depression, and tension. A much smaller percentage of women reported that these were severe and disabling, but about 12% of the women rated their premenstrual irritability as severe.

Parity—Eight-eight (49 per cent) of the women had been pregnant at least once. Women who had been pregnant were significantly less likely to experience menstrual cramps, with only 12.5 per cent reporting this symptom, compared to 21 per cent of the nulliparas.

Oral Contraceptive Use—Forty-three women (24 per cent) were using oral contraceptives at the time of the study. The only symptoms for which there was a significant effect of OC use were premenstrual and menstrual skin disorders and menstrual cramps. In each case the effect was a diminished severity of the symptom.

Women who used OCs were asked whether they had noticed any change in the physical or psychological symptoms associated with their menstrual cycles since they began taking the pill. Thirty-four women reported a slight or large decrease in their physical symptoms, while 34 reported no change or a slight increase or slight decrease in the psychological symptoms. Because only 24 per cent of this sample was using OC, our estimates are based on small numbers and should be interpreted cautiously.

IUD Use—Twenty-two women were using an intrauterine device (IUD) at the time of the study. When these women were compared with women who were not using an IUD or OC, the only significant difference was a tendency for women using the IUD to report more cramps during the premenstruum. Women who had IUDs in place were asked whether they had noticed a change in the physical and psychological symptoms associated with their menstrual cycles since the IUD was inserted. While 21 noted either no change or a slight increase in psychological symptoms, 19 noted a slight or large increase in physical symptoms. Our findings, however, are based on a small number of IUD users and should be interpreted cautiously.

Menstrual Cycle Characteristics—Several menstrual cycle characteristics, including age at menarche, length of menstrual cycle, length and amount of menstrual flow, and ability to predict the next menses were examined for their effects on perimenstrual symptoms. The average age at menarche for the sample was 12.3 years. The average cycle lasted 28.6 days with 4.7 days of menstrual flow, with most women (55 per cent) describing their flow as medium, and 24 per cent as heavy or very heavy. Half of the women (51 per cent) were able to predict their next menstrual period.

Age at menarche was not associated with any of the perimenstrual symptoms. Women who had longer menstrual cycles reported significantly more premenstrual swelling, mood swings, depression, and crying than did their counterparts with shorter cycles. Women with longer menstrual flow were more likely to report premenstrual cramps, menstrual irritability, premenstrual and menstrual mood swings, and premenstrual depression than their counterparts with

TABLE 4—Variables Influencing the Prevalence of Perimenstrual Symptoms by Cycle Phase (p < .05) (N = 179)

		Correlates and Their Direction[1]	
	Symptom	Premenstrual Phase	Menstrual Phase
1.	Weight gain	predictability of cycle+	race+
3.	Crying	age-, race-, cycle length+	age-, race-[2]
4.	Lowered work or school performance	amount of menstrual flow+, employed-	—
8.	Takes naps	age-, married-	married-
9.	Headache	—	age-, race+,[2] education-, income-
10.	Skin disorders	oral contraceptive use—[2]	oral contraceptive use-
16.	Cramps	age-,[2] IUD use+, education-,[2] income+, days of flow+, amount of menstrual flow+	age-,[2] pregnancy history-,[2] oral contraceptive use-, race-,[2] amount of menstrual flow+
21.	Anxiety	race-, employed-	—
22.	Backache	predictability of cycle+	—
25.	Fatigue	—	race+
30.	Painful breasts	—	—
34.	Swelling	cycle length+	race+, amount of menstrual flow+
36.	Irritability	age-, education-	education-, income-, days of flow+
38.	Mood swings	cycle length+, days of flow+	days of flow+, income-
40.	Depression	education-, days of flow+, cycle length+	age-,[2] education-
45.	Tension	education-, income-	education-[2]

ªRace was coded such that Black = 1, White = 0
[1]p values for all correlates not otherwise designated = 0.05–0.01)
[2]p values = <0.01

fewer days of flow. Women with heavy menstrual flow reported significantly more premenstrual and menstrual cramping, menstrual swelling, and premenstrual impairment of performance at work or school than their counterparts with lighter menstrual flow.

Women who were able to predict their next menstrual period were significantly more likely to experience premenstrual weight gain and backache than their counterparts who were less able to predict their next menses.

Age—In general, women who were older had fewer PMS and were significantly less likely to report premenstrual and menstrual cramping than were their younger counterparts. Whereas 20 to 25 per cent of the women 18–25 years of age reported severe dysmenorrhea, only 7 per cent of the 31 to 35 age group did so. Older women also reported significantly less menstrual headache, premenstrual irritability, menstrual depression, premenstrual and menstrual crying, and premenstrual napping than the younger women.

Marital Status—In this sample marital status does not appear to influence the prevalence of multiple PMS. Married women were significantly less likely than single women to nap or stay in bed during the premenstruum and menstruum.

Race—Black women (8.6 per cent) were significantly less likely than Whites to experience menstrual cramps (20.2 per cent). Black women also reported less premenstrual and menstrual crying and premenstrual anxiety, but a greater prevalence of menstrual weight gain, headache, fatigue, and swelling than their White counterparts.

Employment—Employment status was related only to premenstrual impaired school or work performance and

anxiety; women who were employed experienced less impairment and more anxiety.

Education and Income—Women with more education had a significantly lower prevalence of several symptoms, including menstrual headache, premenstrual cramping, and both premenstrual and menstrual irritability, depression, and tension. Women with greater incomes were less likely to experience several perimenstrual symptoms, including: premenstrual weight gain, cramping, and tension, as well as menstrual headache, irritability, and mood swings. A summary of the variables influencing the prevalence of each symptom is given in Table 4.

Because many of the correlates of perimenstrual symptoms were correlated with one another, and because there were several correlates for some symptoms, multiple regression analysis was employed to determine the best set of correlates for each of the PMS.

As seen in Table 5, the prevalence of symptoms of negative affect, crying, irritability, mood swings, depression, and tension, was associated with social correlates such as race, income, and education. It should be noted, however, that cycle length was associated with both premenstrual mood swings and menstrual depression, suggesting that PMS are not mediated solely by either social or biological phenomena, but are more likely products of both influences. Pain symptoms, menstrual headache, and premenstrual and menstrual cramps were also influenced by social factors as well as factors believed to induce symptoms by means of biological mechanisms, such as IUD and oral contraceptive use.

TABLE 5—Correlates of Perimenstrual Symptoms: Results of Multiple Regression Analysis (N = 153)

Symptom	Correlates	Beta	F	p value	R^2
Crying					
Premenstrual	race	−.165	4.19	.042	.027
Menstrual	race	−.166	4.27	.040	.028
Headache					
Menstrual	education	−.203	6.81	.010	.043
	race	.169	4.58	.034	.028
Cramps					
Premenstrual	income	−.172	6.03	.015	.038
	education	−.194	4.27	.040	.027
	IUD	.183	5.35	.022	.032
Menstrual	age	−.281	13.27	.000	.081
	oral contraceptive use	−.234	10.34	.002	.059
	race	−.162	4.44	.037	.025
Swelling					
Menstrual	amount of menstrual flow	.166	4.28	.040	.028
Irritability					
Menstrual	income	−.197	6.06	.015	.039
Mood Swings					
Premenstrual	cycle length	.174	4.67	.032	.030
Menstrual	income	−.180	5.07	.026	.033
Depression					
Menstrual	cycle length	.173	4.64	.033	.023
	education	−.163	4.10	.045	.026
Premenstrual	age	−.161	4.01	.047	.026
Tension					
Premenstrual	income	−.182	5.14	.025	.033

Discussion

In sum, the prevalence of PMS in this sample of US women, who are not exclusively students or patients, was similar to that for most western European populations studied to date. In most instances, our estimates for many symptoms closely resemble those from the other US studies. When we restrict our attention to severe symptoms, as opposed to mild or moderate symptoms, our prevalence estimates are considerably lower than has been presumed to be the case.

Our findings reveal a larger prevalence of weight gain (48 per cent premenstrually, 33 per cent menstrually), headache (38 per cent premenstrually, 36 per cent menstrually), swelling (46 per cent premenstrually, 37 per cent menstrually), and tension (43 per cent premenstrually, 45 per cent menstrually) among women not using OC than was seen in the samples studied by Moos,[5] Timonen and Procopé,[6] and Bersjø, Jennssen and Vellar.[8] The estimate for cramps is similar to that found by Moos, but not as high as that reported by Timonen and Procopé, by Bersjø, Jennsen and Vellar, or Pennington.[4] Likewise our estimates of fatigue and mood swings are similar to the other studies reviewed above. Irritability and depression were less prevalent in our sample than in the Moos or Timonen/Procopé series.

As seen in other studies, women who had borne children were less likely to experience menstrual cramps.[13] We did not, however, see dramatic effects of either OC use or IUD use on symptoms. Our findings are consistent with Sheldrake and Cormack who found that there was little difference in the prevalence of menstrual symptoms among women taking oral contraceptives and those who were not.[7] Although OC users in their study were more likely to report premenstrual irritability, depression, and tension, women not taking birth control pills were more likely to report headaches; women who had taken oral contraceptives for more than two years, however, reported a markedly lower incidence of menstrual pain and tension than the others. Morris and Udry also found little difference between OC users and non-users in daily feelings of well being,[14] and Paige found that women using birth control pills did not experience a decrease in anxiety at menstruation unless they also experienced a decreased menstrual flow.[15] The suppressing influence of oral contraceptives on prostaglandin levels has been noted in clinical studies, and may be reflected in the lower incidence of menstrual cramps reported by the oral contraceptive users in this sample.[16] IUD use was associated with a greater incidence of premenstrual cramps, consistent with other findings of increased menstrual pain among IUD users.[17]

Age was negatively associated with both menstrual cramps and affective symptoms, and in the multivariate analyses is a more important influence on menstrual cramps than is parity. Kessel and Coppen also found a small negative correlation between age and menstrual pain.[13] This would be consistent with the decreasing probability of ovulatory cycles with age.[18] In contrast, Bergsjø, Jenssen, and Vellar found the prevalence of dysmenorrhea to be

constant at about 55 per cent up to age 40, and for women 40–49, the incidence was greater. In their population, headache and depression also increased with age.[8] This increase in symptoms may be a function of perimenopausal women being included in their sample.

Both oral contraceptive use and age are likely to be associated with decreased estrogen production by the follicle, and in turn with decreasing prostaglandin synthesis in the endometrium.[19] This may be responsible for the lower prevalence of menstrual cramps seen in both OC users and older women. Since parity is also associated with age, parity may simply reflect the aging process or it may act by a yet unknown mechanism induced by pregnancy.

Both the amount of menstrual flow and days of menstrual flow are mediated by estrogenic influences,[20] and both are associated with premenstrual and menstrual cramps. These associations are probably a consequence of prostaglandin synthesis stimulated by estrogens.[21] There is currently experimental evidence that inhibitors of prostaglandin synthesis can reduce menstrual blood loss[22] as well as cramps.[19]

Women who have long menstrual cycles also have a greater prevalence of premenstrual swelling. Symptoms of water retention and cramps may be mediated by a common mechanism, the renin angiotensin system, which not only stimulates prostaglandin synthesis and uterine activity, but also causes water retention.[23] Findings that mefenamic acid therapy decreases cramping and other perimenstrual symptoms, but does not seem to affect fluid retention,[24] would reinforce the notion that mechanisms other than prostaglandin synthesis are involved in PMS formation.

Women who could predict their cycles experienced more symptoms than those who found their cycles less predictable. It is likely that women who experience premenstrual symptoms as the prodroma to menstruation use the onset of symptoms to predict their cycles. Our findings are in contrast with Sheldrake and Cormack who found that women with long and regular cycles were less likely to report menstrual or premenstrual symptoms than were women with short and irregular cycles. Women with long and regular cycles did, however, report more stomach ache, backache, and lethargy.[7] Our findings are also in conflict with those of Paige, who found that cycle length and regularity were unrelated to menstrual symptoms, although the amount of flow appeared related to anxiety at menstruation.[11,15]

Other demographic variables had important effects on PMS. Black women had significantly lower rates of cramps and negative affect symptoms, inconsistent with findings by Janiger, et al, from a cross cultural comparison of Nigerian and American women,[25] but our findings of a higher prevalence of headache, swelling, and weight gain among Blacks are consistent with their results. Unlike Kessel and Coppen's finding that irritability was significantly more prevalent among married than single women,[13] we found that being married had only a slight but negative effect on PMS. Unemployed women experienced more symptoms than those who were employed. There are no other comparisons of the prevalence of PMS between employed women and women whose work is at home, but Bergsjø, Jennssen and Vellar report that the character of employment had little

effect of dysmenorrhea in their samples.[8] Effects of strenuous exercise on PMS are unclear. Menstrual low back pain was less prevalent among physical education students studied by Timonen and Procopé than among other student groups. Moreover, the PE group reported less premenstrual symptomatology, but more menstrual pelvic pain.[6] Recent Russian literature, however, does suggest an increased incidence of dysmenorrhea among women who operate heavy equipment and who are exposed to vibration.[26,27] Because women who exercise strenuously, such as ballet dancers and runners,[28,29] often develop amenorrhea, it is possible that physical exertion may also serve to diminish symptoms in women who are not amenorrheic. Women with higher education and incomes reported fewer symptoms than their counterparts, probably reflecting the protective influence of these variables on symptoms in general.***

The data from this study suggest that perimenstrual symptoms influence a significant proportion of women, with a small proportion suffering severe effects which lead to economic as well as personal hardship.[30] Moreover, several demographic and gynecologic history characteristics are associated with PMS. Because these data are limited to women from the southeast, and were collected during a single season of the year, further study is necessary to ascertain whether these prevalence rates are characteristic of other geographic and climatic zones and seasons. Nevertheless, perimenstrual symptoms constitute an important public health problem, and future work is needed to elucidate their origins.

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International Conference on Acid Raid

The Air Pollution Control Association (APCA) will conduct an international conference on "Atmospheric Deposition" November 7–10, 1982 at the Westin Hotel, Detroit, Michigan.

The central focus of the conference will be on acid rain; however, chemicals, heavy metals and other materials transported through the atmosphere will be discussed. Canadian and United States scientists will report the latest research performed in both countries.

Papers will deal with such subjects as particle formation; transport, transformation and deposition processes; monitoring; modeling; effects on ecological systems, human health and materials; economic impacts, and source-receptor relationships (linking sources with the resultant effects).

For further information and copies of the conference program contact:

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