

Psychologic Distress and Natural Menopause: A Multiethnic Community Study

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Studies of middle-aged, primarily White women have yielded contradictory findings about the prevalence of psychologic symptoms and distress during menopause.^{1–4} It is unclear whether psychologic symptoms increase during the menopause transition or postmenopause. Misconceptions and limited knowledge about the relationship of alterations in menstrual bleeding patterns and reproductive hormone levels with mood symptoms have hampered our ability to prevent the development of or effectively treat mood disturbances in women during midlife.

Before the cessation of menses, the pattern of menstrual cycles, including duration, frequency, and amount of bleeding, becomes less predictable.^{5,6} The perimenopausal transition from regular cycling to complete cessation ranges from 3 to 9 years in length.^{7,8} Fluctuations in a changing hormonal milieu are probably the cause of this variability in and unpredictability of menstrual cycle bleeding.⁹

The biological link between menopause and mood has focused on the hypothesis that low levels of estrogen are associated with negative mood. If this is the case, postmenopause, when ovarian estrogen production is very low and stable, would be expected to correlate with increased psychologic symptoms. With a few exceptions,^{10–12} however, studies of menopause show either no relationship between psychologic symptoms and menopausal status^{13–15} or higher symptom levels in perimenopausal women^{16–18} when gonadal hormone levels are fluctuating.⁹

Taken together, epidemiologic and clinical studies do not support an estrogen deficiency model. Instead, they suggest an association between changing patterns of mood and hormone production for which altered bleeding patterns have served as a marker. Given the dynamic nature of the menopause transition and the epidemiologic data suggesting greater psychologic symptoms during this

Objectives. This study examined the association between psychologic distress and natural menopause in a community sample of African American, White, Chinese, Hispanic, and Japanese women participating in a national women's health study.

Methods. A cohort of 16 065 women aged 40 to 55 years provided information on menstrual regularity in the previous year, psychosocial factors, health, and somatic–psychologic symptoms. Psychologic distress was defined as feeling tense, depressed, and irritable in the previous 2 weeks.

Results. Rates of psychologic distress were highest in early perimenopause (28.9%) and lowest in premenopause (20.9%) and postmenopause (22%). In comparison with premenopausal women, early perimenopausal women were at a greater risk of distress, with and without adjustment for vasomotor and sleep symptoms and covariates. Odds of distress were significantly higher for Whites than for the other racial/ethnic groups.

Conclusions. Psychologic distress is associated with irregular menses in midlife. It is important to determine whether distress is linked to alterations in hormone levels and to what extent a mood–hormone relationship may be influenced by socioeconomic and cultural factors. (*Am J Public Health.* 2001;91:1435–1442)

stage, we expect that women will be more likely to report psychologic distress during perimenopause than during premenopause or postmenopause.

Vasomotor symptoms, such as hot flashes and night sweats, increase during the transition and postmenopause^{7,15} and are correlated with negative mood.^{19–21} Given the unpleasant and disruptive nature of these symptoms, it is likely that they would make a woman irritable, tense, or depressed, suggesting that an association between perimenopause or postmenopause and psychologic distress is mediated by vasomotor symptoms. A few studies have shown that when vasomotor symptoms are included in cross-sectional analyses, the relationship between psychologic symptoms and menopausal status is not significant.²⁰

An important concomitant of vasomotor symptoms is disrupted sleep,^{19,22} which has also been shown to be more prevalent during perimenopause (H. Kravitz, unpublished data, 2000).^{3,23} Disturbed sleep is correlated with tension, anxiety, and depressive symptoms.^{23,24} Therefore, we examined the associ-

ations between menopausal status and psychologic distress, adjusting for the effects of vasomotor and sleep problems.

In estimating the influence of menstrual changes in midlife on mood, it is important to control for the covariation with mood of psychosocial and health factors such as education, quality of perceived health, financial stress, employment status, and perceived social support in multivariate analyses. A few studies suggest that midlife stresses influence mood more than does menopausal status.^{13,25,26}

Previous research on midlife and menopause has primarily involved White women. Limited data suggest that symptom reporting may vary among cultures. For example, a study of Japanese women aged 45 to 55 years indicated that only small percentages experienced depressive symptoms (2.3%–6.9%) and irritability (10.8%–12.2%), with little variation according to menopausal status.²⁷ Another study showed that rates of depressive symptoms and hot flushes or sweats were significantly lower among Japanese women than among their American and Canadian counterparts.²⁸ Such variations across cultures may

reflect differences in (1) beliefs and expectations regarding menopause, aging, and the status and roles of women; (2) sensitivity to specific symptoms; and (3) biology, diet, and health behaviors.^{27–29}

The Study of Women's Health Across the Nation (SWAN) provided an opportunity to examine the association of psychologic distress with self-reported menstrual patterns indicative of hormonal changes. This cross-sectional, longitudinal investigation of middle-aged women's health involved a multiethnic cohort of 16 065 women from 7 geographic regions of the United States. Our goals were to assess (1) whether psychologic distress is reported more frequently by perimenopausal and postmenopausal women than by premenopausal women, (2) the degree to which prevalence of psychologic distress varies by race/ethnicity, and (3) whether the observed relationships between menopausal status and race/ethnicity and psychologic distress remain after adjustment for various psychosocial and health correlates and potential confounders, vasomotor symptoms, and sleep problems.

METHODS

Study Subjects

SWAN is a community-based study comprising 2 stages: a cross-sectional survey conducted between November 1995 and October 1997 and a longitudinal investigation to track changes in women's physical and mental health as they age and experience menopause. In addition to White women, each site recruited a minority group sample (African Americans in Pittsburgh, Boston, Detroit, and Chicago; Japanese Americans in Los Angeles; Chinese Americans in the San Francisco East Bay region; and Hispanic Americans in Newark, NJ). The women were randomly selected from a variety of lists (e.g., a large managed health care plan, community censuses, registered voter lists) or selected through random-digit dialing.³⁰ Snowball sampling, which involved asking enrolled participants for names of potentially eligible women, was used as a supplement to random-digit dialing in Newark and Los Angeles to increase the Hispanic and Japanese sample sizes, respectively.

As part of screening for the longitudinal component of SWAN, 16 065 women aged 40 to 55 years completed a 15-minute survey regarding their health either by telephone or in person. This report is based on the data collected from a subset of 10 374 women who were experiencing natural premenopause, perimenopause, or postmenopause and who identified with 1 of the 5 racial/ethnic groups. We excluded 5123 women from these analyses who (1) reported using exogenous reproductive hormones in the 3 months preceding the interview (because their menses may have been due either to the hormone use or to natural bleeding patterns), (2) were pregnant, (3) had undergone a hysterectomy, or (4) had not menstruated for the past 12 months as a result of pregnancy, breast-feeding, medication, severe weight loss, or illness (because these conditions could mask their menopausal status). The 568 women whose race/ethnicity was unknown or who did not belong to 1 of the 2 target racial/ethnic groups at the site were also excluded. The study was approved by each site's institutional review board, and all women provided informed consent.

Measures

The survey included a 12-item symptom questionnaire and gathered data on socio-demographic, menstrual–gynecologic, health, lifestyle, and attitudes variables. The symptom questionnaire addressed physical and psychologic symptoms commonly assessed in research on menopause because of their purported association with it.^{4,16} Women were asked whether they had experienced each of the 12 symptoms in the previous 2 weeks. The interviews were conducted in Cantonese, Japanese, or Spanish according to the preference of the participant.

Psychologic distress. The questionnaire included items addressing 3 psychologic symptoms: feeling tense or nervous, feeling blue or depressed, and feeling irritable or grouchy. These symptoms, along with others, were selected from checklists used in earlier studies of middle-aged women.^{15,16,22} For purposes of identifying a group of women with a cluster of psychologic symptoms that could have a greater impact on health than any single symptom alone, we defined psychologic dis-

tress as the presence of all 3 symptoms in the previous 2 weeks. Thus, psychologic distress was either present or absent. This is not a standardized measure of distress; however, as expected, it was consistently correlated with variables such as perceived health and financial strain, demonstrating reasonable construct validity. In a principal-components analysis of all 12 symptoms in our data, the 3 psychologic symptoms loaded above 0.60 on 1 factor.³¹ The pattern of loadings for these 3 symptoms was the same in analyses conducted on the total sample and on each racial/ethnic group separately.

Menopausal status. Menopausal status was defined, according to bleeding patterns, as follows: premenopause (menstrual period in the past 3 months and no decreased predictability), early perimenopause (menstrual period in the past 3 months but less predictability in the preceding 12 months), late perimenopause (menstrual bleeding in the past 12 months but not in the past 3), and postmenopause (amenorrhic for the past 12 months and no hysterectomy). An important goal of SWAN is to distinguish clinically between the early and later stages of the transition in order to determine whether they involve differences in hormonal profiles.

Race/ethnicity was determined by self-identification and categorized as African American, Caucasian (i.e., White), Chinese, Japanese, or Hispanic. (Puerto Rican, Dominican, Central American, Cuban or Cuban American, and South American/Spanish/other Hispanic were combined because none of these groups alone constituted a sample size sufficient for the present analyses.)

Covariates. To evaluate the independent effect of menopausal status, we included as covariates 4 domains of variables (sociodemographic, psychosocial, health and behavior, and vasomotor symptoms and difficulty sleeping) that, previous research suggests, are associated with psychologic symptoms or may mediate the relationship between menopausal status and mood symptoms. Three sociodemographic variables were included: age in years, marital status (single/never married, married/living as married, separated/widowed/divorced), and educational level (high school or less, some college, college degree, graduate studies).

In terms of psychosocial variables, financial strain was assessed with a single item that asked each woman how difficult it was for her to pay for her basic needs (very, somewhat, or not very difficult). Presence of financial strain was defined as a response of “very difficult” or “somewhat difficult.” Perceived social support was measured by asking how often (none, a little, some, most, or all of the time) help was available, in the form of either someone to talk to or someone to help with daily chores, and by the number of close friends and relatives reported (none, 1 or 2, 3–5, more than 5). Both items were taken from the Medical Outcomes Study Social Support Survey.³²

Self-rated general health was measured with a single 5-category scale (excellent, very good, good, fair, poor).³³ Women were screened for 7 medical conditions (high blood pressure, diabetes, heart attack or angina, arthritis, osteoporosis, fibroids, and cancer other than cancer of the skin). A condition was considered present if the woman had ever been told by a health care provider that she had it, and the number of conditions reported was totaled. Smoking status was categorized as never, past, or current. Presence or absence of limitations due to health was based on a question asking women whether they were limited in any way in their activities because of any impairments or health problems.

Women were asked whether they had experienced hot flushes/flashes, night sweats, or difficulty sleeping in the previous 2 weeks. Vasomotor symptoms were defined as present if the participant reported either hot flushes/flashes or night sweats.

Statistical Analyses

We identified potential correlates of psychological distress by conducting a series of univariate comparisons with psychological distress (yes or no) as the outcome, using *t* tests for continuous variables and χ^2 tests of association for categorical variables; those having a significance level of 5% or less were retained as candidates for multivariate analyses. We examined Pearson residuals to determine whether there was evidence of clustering within racial/ethnic subgroups across sites, which could produce underestimates of vari-

ability. Analysis of variance showed no differences in mean residuals, and standard deviations varied from 0.94 to 1.10 for African Americans and Whites, indicating little underestimation of variability resulting from differences in multisite sampling approaches.

Initial multivariate models were constructed via logistic regression with psychological distress (yes or no) as the outcome but without race/ethnicity and menopausal status. A backward stepwise procedure based on the likelihood ratio test was used. In this procedure, *P* values for multivariate analyses are based on the likelihood ratio statistic for removal of a predictor when the other predictors are present in the model. Variables that were significant at 5% were retained, and only significant predictors were used in fitting the final model. After all other significant predictors had been included, race/ethnicity and, subsequently, menopausal status were added and tested for significance.

Variables retained in the multivariate model are reported via adjusted odds ratios representing, for the continuous variable age, increases in the scale and, for categorical variables, a conceptually valid referent set to 1.0 against which the odds for other levels of the variable were compared. Adjusted odds ratios thus represent the odds of psychological distress for specific variables after adjustment for all other variables in the model. They are accompanied by 95% confidence intervals (CIs) to show the range of possible adjusted odds ratios that would be consistent with our data. Analyses were performed with S-Plus 4.5 (Mathsoft, Seattle, Wash) and SPSS 7.5 (SPSS, Inc, Chicago, Ill).

RESULTS

Description of the Sample

As mentioned earlier, the sample consisted of 10 374 women: 5109 (49.2%) Whites, 2672 (25.8%) African Americans, 1403 (13.5%) Hispanic Americans, 532 (5%) Chinese Americans, and 658 (6.3%) Japanese Americans. Table 1 shows the characteristics of the total sample and of each racial/ethnic group. There was some variation across the racial/ethnic groups with respect to psychosocial characteristics: the Hispanic and African American women reported the greatest finan-

cial strain, the Hispanics reported the poorest health and the least amount of support, and the Japanese reported the most social support. The Japanese and Chinese groups included the highest percentages of women who were still premenopausal and the lowest percentages of women with vasomotor symptoms. The mean ages of those with and without psychological distress were similar (45.9 and 46.4 years, respectively).

Psychologic Distress

Psychologic distress was reported by 2500 (24.1%) women. All independent variables were significantly associated with distress in univariate analyses (Table 2). Most associations were in the expected direction, with increasing rates of distress in variables involving more than 2 categories (Table 2). The relationship between sleep problems and distress was striking; 39.7% of women with sleep problems, vs only 15.4% of women without such problems, reported distress. A similar pattern was evident for women experiencing vasomotor symptoms (36.6% vs 18%).

Whites, Hispanics, and African Americans reported the highest rates of distress, followed by Chinese and Japanese women. Subgroup analyses showed that rates of psychological distress were different, but not significantly so, between Japanese women educated in the United States and those educated elsewhere (12.8% vs 8.2%; $\chi^2_1 = 3.17$, 2-sided *P* = .075) and between those who completed the interview in English and those who completed it in Japanese (11.9% vs 8.8%; $\chi^2_1 = 1.41$, 2-sided *P* = .24). The rates for Chinese women were similar whether the women were educated in the United States or elsewhere or completed the interview in English or Cantonese (18%–19%). Among Hispanic women, rates of distress were also similar whether they were educated in the United States or elsewhere (25%) or completed the interview in English or Spanish (22.4% vs 26.7%; $\chi^2_1 = 2.32$, 2-sided *P* = .13).

Menopausal status was significantly related to psychological distress. Rates of distress were 20.9% among women in premenopause, 28.9% among women in early perimenopause, 25.6% among women in late

TABLE 1—Characteristics of Total Sample and of Each Ethnic Group: Study of Women's Health Across the Nation, 1995–1997

Characteristics	Total Sample (n = 10,374), No. (%)	White (n = 5,109), No. (%)	African American (n = 2,672), No. (%)	Hispanic (n = 1,403), No. (%)	Chinese (n = 532), No. (%)	Japanese (n = 658), No. (%)
Psychologic distress						
No	7874 (75.9)	3787 (74.1)	2020 (75.6)	1044 (74.4)	434 (81.6)	589 (89.5)
Yes	2500 (24.1)	1322 (25.9)	652 (24.4)	359 (25.6)	98 (18.4)	69 (10.5)
Menopause status						
Premenopause	4483 (43.2)	2183 (42.7)	1016 (38.0)	620 (44.1)	294 (55.6)	370 (56.2)
Early perimenopause	3534 (34.0)	1806 (35.3)	1005 (37.6)	383 (27.2)	157 (29.5)	183 (27.8)
Late perimenopause	609 (5.8)	317 (6.2)	167 (6.2)	76 (5.4)	19 (3.5)	30 (4.5)
Postmenopause	1748 (16.8)	803 (15.7)	484 (18.1)	324 (23.0)	62 (11.6)	75 (11.3)
Education						
High school or less	3717 (35.8)	1543 (30.2)	969 (36.2)	881 (62.7)	192 (36.0)	132 (20.0)
Some college	3175 (30.6)	1464 (28.6)	1040 (38.9)	314 (22.3)	119 (22.3)	238 (36.1)
College	1779 (17.1)	986 (19.2)	312 (11.6)	148 (10.5)	133 (25.0)	200 (30.3)
Graduate studies	1654 (15.9)	1102 (12.2)	320 (11.9)	57 (4.06)	88 (16.5)	87 (13.2)
Marital status						
Married/living as married	6576 (63.3)	3489 (68.2)	1172 (43.8)	925 (65.9)	438 (82.3)	552 (83.8)
Separated/widowed/divorced	2387 (23.0)	984 (19.2)	907 (33.9)	369 (26.3)	56 (10.5)	71 (10.7)
Single	1390 (13.3)	625 (12.5)	588 (22.0)	104 (7.4)	38 (7.1)	35 (5.3)
Smoking						
Never	5568 (53.6)	2417 (47.3)	1320 (49.4)	920 (65.5)	452 (84.9)	459 (69.7)
Past	2396 (23.0)	1452 (28.4)	566 (21.1)	237 (16.8)	15 (2.8)	126 (19.1)
Current	2338 (22.5)	1235 (24.1)	782 (29.2)	240 (17.1)	10 (1.8)	71 (10.7)
Availability of perceived social support						
None of the time	638 (6.1)	199 (3.8)	165 (6.1)	233 (16.6)	30 (5.6)	11 (1.6)
A little of the time	1026 (9.8)	504 (9.8)	219 (8.1)	214 (15.2)	54 (10.1)	35 (5.3)
Some of the time	2192 (21.1)	1017 (19.9)	547 (20.4)	366 (26.0)	158 (29.6)	104 (15.8)
Most of the time	3637 (35.0)	2040 (39.9)	885 (33.1)	240 (17.1)	174 (32.7)	298 (45.2)
All of the time	2837 (27.3)	1327 (25.9)	847 (31.6)	345 (24.5)	110 (20.6)	208 (31.6)
Close friends/relatives						
0	240 (2.3)	76 (1.48)	57 (2.1)	77 (5.4)	24 (4.5)	6 (.9)
1–2	1659 (15.9)	541 (10.5)	488 (18.2)	407 (29.0)	124 (23.3)	99 (15.0)
3–5	4452 (42.9)	2239 (43.8)	1116 (41.7)	498 (35.4)	238 (44.7)	361 (54.8)
>5	3907 (37.6)	2223 (43.5)	999 (37.3)	349 (24.8)	145 (27.2)	191 (29.0)
Paying for basics						
Not very hard at all	5593 (53.9)	3173 (62.1)	1303 (48.7)	315 (22.4)	349 (65.6)	453 (68.8)
Somewhat hard	3500 (33.7)	1513 (29.6)	994 (37.2)	670 (47.7)	144 (27.0)	179 (27.2)
Very hard	1236 (11.9)	405 (7.9)	362 (13.5)	412 (29.3)	34 (6.3)	23 (3.4)
Perceived health						
Excellent	2068 (19.9)	1371 (26.8)	357 (13.3)	136 (9.6)	80 (15.0)	124 (18.8)
Very good	3382 (32.6)	2044 (40.0)	745 (27.8)	240 (17.1)	150 (28.1)	203 (30.8)
Good	3151 (30.3)	1244 (24.3)	992 (37.1)	559 (39.8)	173 (32.5)	183 (27.8)
Fair	1476 (14.2)	360 (7.0)	481 (18.0)	390 (27.7)	117 (21.9)	128 (19.4)
Poor	289 (2.7)	89 (1.7)	93 (3.4)	75 (5.3)	12 (2.2)	20 (3.0)
Health limitations						
No	8595 (82.8)	4108 (80.4)	2156 (80.6)	1234 (87.9)	456 (85.7)	569 (86.4)
Yes	1761 (16.9)	922 (18.0)	511 (19.1)	165 (11.7)	75 (14.0)	88 (13.3)

Continued

TABLE 1—Continued

Difficulty sleeping						
No	6508 (62.7)	3086 (60.4)	1783 (66.7)	883 (62.9)	362 (68.0)	394 (59.8)
Yes	3746 (36.1)	2021 (39.5)	886 (33.1)	518 (36.9)	170 (31.9)	151 (22.9)
Vasomotor symptoms						
No	6951 (67.0)	3559 (69.6)	1504 (56.2)	921 (65.6)	420 (78.9)	547 (83.1)
Yes	3373 (32.5)	1527 (29.8)	1155 (43.2)	475 (33.8)	107 (20.1)	109 (16.5)

Note. The amount of missing data varied, by characteristic, from 1% to 1.5%.

perimenopause, and 22% among women in postmenopause.

Multivariate Association of Psychologic Distress With Menopausal Status

In the initial multiple logistic regression analysis, 5 variables failed to remain significant: marital status, employment status, site, physical activity, and number of reported medical conditions. Results of the second regression analysis excluding these nonsignificant variables showed that in comparison with Whites, all other groups were at a significantly reduced risk of reporting psychologic distress independent of age, education, history of smoking, number of close friends, perceived tangible or emotional support, financial strain, perceived health, health limitations, vasomotor symptoms, and difficulty sleeping. Relative to Whites, the odds of psychologic distress were 0.73 (95% CI=0.65, 0.83) for African Americans, 0.64 (95% CI=0.54, 0.76) for Hispanics, 0.61 (95% CI=0.47, 0.80) for Chinese, and 0.43 (95% CI=0.32, 0.57) for Japanese.

The final multiple logistic regression analysis was conducted to determine the independent association of menopause with psychologic distress (Table 3). Specifically, we used this model to test whether the odds of distress were significantly higher during or after the menopause transition than during premenopause, controlling for the effects of covariates and possible confounders. There were no significant race/ethnicity×menopausal status or race/ethnicity×site interactions; therefore, the analysis included only main effects.

Menopausal status was significantly associated with risk of psychologic distress independent of all covariates and race/ethnicity. In comparison with women who were pre-

menopausal, the odds of reporting distress in the 2 weeks preceding the interview were 20% higher among women in early perimenopause. Although postmenopause levels of distress were not significantly lower than premenopause levels, they do reflect significantly lower odds relative to those of the early perimenopause peak. All minority groups had significantly lower odds of distress than did Whites.

DISCUSSION

We have presented data from interviews with 10 374 women aged 40 to 55 years that constituted the first phase of a large multiethnic national study of menopause and aging. Twenty-four percent of the women reported psychologic distress in the previous 2 weeks, with Japanese and Chinese women having the lowest rates. We examined to what extent the lower levels of distress among the Chinese and Japanese women might be explained by cultural attitudes, perceptions, or interpretations of symptoms. Within the Chinese and Japanese groups, we found no significant differences in rates of distress between those educated in the United States and those educated elsewhere or between those completing the interview in English and those completing the interview in another language.

These data, despite the limitations of using language and country of education as markers of racial/ethnic culture, suggest that there are unlikely to be large cultural effects on rates of distress. Also, studies of middle-aged Japanese women have reported rates of depressive symptoms and irritability similar to those found in our sample.^{27,28} On the other hand, a recent investigation of 2992 women

aged 40 to 60 years who resided in 7 Southeast Asian countries showed that there were large differences in rates of psychologic symptoms across countries.³⁴

The group of early perimenopausal women exhibited the highest rate of psychologic distress. In comparison with premenopausal women, early-perimenopausal women had higher odds of reporting distress, and postmenopausal women had lower odds. The increase in the odds ratio among early-perimenopausal women, though relatively small, is meaningful given its significance even after adjustment for the effects of vasomotor symptoms, sleep difficulty, and a variety of important covariates such as financial stress and poor health. Consistent with the literature,^{19,20,35,36} vasomotor symptoms (e.g., hot flashes) and sleep difficulties were each strongly associated with psychologic distress in our study.

Most important, despite the strength of the associations, including vasomotor symptoms and sleep difficulties in the multivariate analysis did not eliminate the relationship between menopausal status and distress. This suggests that vasomotor and sleep problems do not fully explain this relationship and that menopausal status is an independent contributor to psychologic distress. The absence of a significant interaction between race/ethnicity and menopausal status indicates that, for all groups of women, the probability of distress is greater at the start of the transition than before and is likely to decrease over time.

Our findings are consistent with those of several studies reporting on psychologic symptom prevalence rates. O'Connor et al.² reported higher mean psychologic symptom scores during perimenopause among 600

TABLE 2—Relationship of Menopause Status and Demographic, Psychosocial, and Health Characteristics to Psychologic Distress: Study of Women's Health Across the Nation, 1995–1997

Characteristic	Rate of Psychologic Distress, %
Menopause status	
Premenopause	20.9
Early perimenopause	28.9
Late perimenopause	25.6
Postmenopause	22.0
Race/ethnicity	
White	25.9
African American	24.4
Hispanic	25.6
Chinese	18.4
Japanese	10.5
Education	
High school or less	26.8
Some college	23.6
College	21.5
Graduate studies	22.0
Marital status	
Married/living as married	22.5
Separated/widowed/divorced	27.9
Single	25.5
Smoking	
Never	21.2
Past	24.5
Current	30.9
Availability of perceived social support	
None of the time	32.1
A little of the time	35.3
Some of the time	29.1
Most of the time	20.8
All of the time	18.5
Close friends/relatives	
0	38.8
1–2	32.9
3–5	25.0
>5	18.7
Paying for basics	
Not very hard at all	18.8
Somewhat hard	26.8
Very hard	40.4
Perceived health	
Excellent	14.0
Very good	20.3
Good	26.2
Fair	36.4
Poor	54.0

*Continued***TABLE 2—Continued**

Health limitations	
No	21.5
Yes	36.6
Difficulty sleeping	
No	15.4
Yes	39.7
Vasomotor symptoms	
No	18.0
Yes	36.6

Note. For all characteristics, $P < .001$. Mean ages of women with and without psychologic distress were 45.9 years (SD = 4.0) and 46.4 years (SD = 4.2), respectively.

Australian women aged 45 to 54 years. A longitudinal study of more than 2500 middle-aged women showed that among premenopausal women with scores of 16 or higher on the Center for Epidemiologic Studies Depression Scale at baseline, rates of such scores 2 years later were higher in those who became perimenopausal than in those who remained premenopausal.²⁰ Our data, along with the results of these studies and clinical reports, suggest that there is an increase in psychologic distress during the transition that is probably transient for most women but may be more severe and enduring for a subset of women.

As pointed out by Nicol-Smith,³⁷ it is important to control for potential confounding factors when assessing the impact of menopausal status on mood. Furthermore, it is important to examine the menopause experience in a diverse group of women. However, whereas in the univariate analysis the odds of distress in African American and Hispanic women were equal to the odds for Whites (0.92 and 0.98, respectively; see rates in Table 2), in the multivariate analysis the odds were significantly lower in the 2 minority groups. The substantial decrease in the odds of distress among African American and Hispanic women relative to White women in the multiple logistic regression analysis suggests that psychosocial factors account for most of the variance in distress and may be more important than race/ethnicity per se. For example, the Hispanic group was lowest in terms of socioeconomic status. In comparison with the other 4 racial/ethnic groups, there were

higher percentages of Hispanic women with fair or poor health (34.6%), significant financial difficulties (30.1%), and a high school education or less (62%).

Our data suggest that, overall, perimenopause carries an increased risk for psychologic distress, but other psychosocial aspects of women's lives, many of which may be associated with their race/ethnicity, also contribute to distress. Future research will examine in more detail the role played by race/ethnicity and the correlates of psychologic distress alone and in interaction with menopausal status.

Our findings are limited in that the mechanisms explaining an increase in psychologic distress in the early stages of the menopause transition were not directly addressed. We did not have hormone data available to validate our menopause stages or to link with mood. The checklist from which our measure of psychologic distress was obtained is not a standardized instrument and was based on the presence or absence of 3 symptoms during a 2-week period. However, similar checklists have been used in numerous studies of middle-aged women.^{15–17,38} As noted earlier, the distress outcome demonstrated reasonable construct validity in our sample. Although we did not include measures of serious life events, we did have data on financial strain, which is a significant stressor. Because the menopause transition is a dynamic, time-related process, cross-sectional data cannot be used to examine the effect of becoming menopausal or of premenopausal mood disorders on psychologic symptoms during the transition.²⁰ Nonetheless, we have been able to confirm, in a multiethnic sample of women, findings of earlier studies largely involving White women.

This study has contributed uniquely and significantly to our understanding of psychologic symptoms during the early and later phases of a frequently lengthy transition to postmenopause^{7,8} by including women from 5 racial/ethnic groups and diverse socioeconomic circumstances. The large sample size permitted us to assess the independent contributions of sociodemographic, health, and potentially modifiable lifestyle factors while simultaneously controlling for other factors.

TABLE 3—Adjusted Odds of Psychologic Distress for 9881 Women by Menopausal Status and Demographic, Psychosocial, and Health Characteristics: Multiple Logistic Regression

	Odds Ratio	95% Confidence Interval	P
Menopausal status			.0001
(reference: premenopause)	1.00		
Early perimenopause	1.20	1.07, 1.35	
Late perimenopause	0.94	0.75, 1.18	
Postmenopause	0.84	0.70, 1.01	
Race/ethnicity			<.0001
(reference: White)	1.00		
African American	0.73	0.64, 0.83	
Hispanic	0.65	0.54, 0.77	
Chinese	0.61	0.47, 0.80	
Japanese	0.43	0.32, 0.57	
Education			.02
(reference: high school or less)	1.00		
Some college	0.97	0.85, 1.10	
College	1.14	0.97, 1.33	
Graduate studies	1.22	1.04, 1.44	
Smoking			.002
(reference: never)	1.00		
Past	1.08	0.95, 1.23	
Current	1.26	1.11, 1.43	
Availability of perceived social support			<.0001
(reference: none of the time)	1.00		
A little of the time	1.16	0.91, 1.47	
Some of the time	1.04	0.83, 1.30	
Most of the time	0.79	0.63, 0.98	
All of the time	0.72	0.58, 0.91	
Close friends/family			<.0001
(reference: none)	1.00		
1 to 2	1.08	0.79, 1.49	
3 to 5	0.92	0.67, 1.26	
5 or more	0.66	0.48, 0.92	
Paying for basics			<.0001
(reference: not very hard at all)	1.00		
Very hard	1.75	1.49, 2.06	
Somewhat hard	1.31	1.16, 1.47	
Perceived health			<.0001
(reference: excellent)	1.00		
Very good	1.33	1.13, 1.56	
Good	1.65	1.40, 1.94	
Fair	2.29	1.88, 2.79	
Poor	2.95	2.16, 4.04	
Health limitations	1.22	1.07, 1.39	.004
Difficulty sleeping	2.55	2.30, 2.83	<.0001
Vasomotor symptoms	1.93	1.73, 2.15	<.0001
Age, y	0.96	0.95, 0.97	<.0001

Note. The sample size is reduced because of missing data for 493 participants. The odds ratio for each variable is adjusted for the effects of all other variables in the model displayed. Results were similar with and without site in the model.

*Significance determined with likelihood ratio test for removal of predictors ($df=1-4$).

The current findings identify a discrete period of time during which women may be more likely to experience (and report) distressed states. Interventions can be developed and targeted to this phase of women's lives and to the specific risk factors that are associated with different racial/ethnic, cultural, and socioeconomic groups. In a recent editorial, Neugebauer³⁹ wrote that "forms of psychologic distress or behavioral disturbance that do not meet clinical criteria for a psychiatric diagnosis still warrant public health notice and action." Subsyndromal depression and anxiety are associated with functional impairment (e.g., disability and lost workdays)^{40,41} and with an increased risk of subsequent clinical episodes.⁴¹ Among a community sample of late middle-aged and older individuals, the contribution of depressive symptoms to functioning was shown to be greater than that of 14 of 18 medical conditions.⁴² Subclinical symptoms may be relieved by treatment, preventing the escalation of such symptoms into a major depressive episode.

The second phase of SWAN is a prospective investigation that includes annual collections of endocrine and symptom data and more extensive measures of mood and psychosocial factors. These data will help us characterize the entire menopause transition and disentangle the relationship between hormones and mood in midlife. We do not know why there might be an increase in symptoms in early perimenopause and then a decrease during the remainder of the transition among women who experience a natural menopause. Is this pattern due to alterations in the hormonal milieu that directly influence mood, or do unpredictable changes in the timing, duration, and amount of bleeding create tension, irritability, and depressed mood? ■

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