

Factors Related to Postpartum Depressive Symptoms in Low-Income Women

Janis M. Boury, PhD
Kevin T. Larkin, PhD
Debra A. Krummel, PhD, RD

ABSTRACT. *Objective:* This study examined the relationship of depressive symptoms to psychosocial and lifestyle variables in postpartum women.

Design: The Mothers' Overweight Management Study (MOMS) was a randomized, weight-gain prevention trial. Baseline data are presented on the Beck Depression Inventory (BDI), Perceived Stress Scale, Social Support Questionnaire, smoking status, body weight, waist circumference, and step counts.

Subjects/Setting: The study was conducted at the Special Supplemental Feeding Program for Women, Infants, and Children (WIC). Women (N = 151) had to be over the age of 18 years and have a child under two years of age to participate.

Janis M. Boury, and Debra A. Krummel are affiliated with the Department of Community Medicine, and Kevin T. Larkin is affiliated with the Department of Psychology, West Virginia University.

Address correspondence to: Debra A. Krummel, PhD, RD, Associate Professor, Department of Community Medicine, West Virginia University School of Medicine, P.O. Box 9190, Morgantown, WV 26506 (E-mail: dkrummel@hsc.wvu.edu).

The authors acknowledge the study participants, WIC staff (A. MacBride, G. Coleman, R. Dorazio, S. Eavenson, B. Fisher, and D. Retton), MOMS staff (C. Morris, E. Semmens), and the students (C. Dunbar, J. Farmer, J. Jones, S. Juvva, C. Mick, A. Naoi, M. Subit, T. Shwe, and C. Speakers) who made this study possible.

This work was supported by the National Institute of Child Health and Human Development, National Institute of Health (RO1 HD 39102-01) to D. Krummel.

Results: Fifty-one percent of the women (mean age = 27 years; mean of 30 weeks postpartum) reported depressive symptoms (27% mild, 21% moderate, and 3% severe). Overall, stress scores were high (Mean = 27.2) and activity levels low (Mean steps = 5984). Mean body mass index was 30.2. Neither body weight nor steps walked were related to depressive symptoms in the bivariate or regression analyses. However, stress and social support were related to symptoms. Women without symptoms reported significantly less stress than the mild and moderate/severe symptom groups (Means = 23.4, 29.6, and 32.7, respectively, $p < .001$). Mean social support satisfaction was significantly higher for non-depressed women compared to women in the moderate/severe symptom range (Means = 5.9 and 4.7 respectively, $p < .001$). Stress and current smoking status explained 46% of the variance in depressive symptoms.

Conclusions: These data emphasize the need for stress management and other tools such as increasing activity levels to prevent or lessen depressive symptoms. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2004 by The Haworth Press, Inc. All rights reserved.]

KEYWORDS. Adult, depression, puerperium, postpartum, depressive symptoms, female, human, low income, maternal, mothers, obesity, risk factors, social support, stress, women, United States

The rate of depressive symptoms is highly prevalent in low-income postpartum women. In the immediate postpartum period (4-8 weeks after delivery), 32% of the women had some level of depressive symptoms (Neter, Collins, Lobel, & Dunkel-Schetter, 1995) and in later periods (6 months after delivery), a similar prevalence (38%) was reported (Séguin, Potvin, St. Denis, & Loiselle, 1999). Much higher rates (60%) have been reported in the Medicaid population (Walker, Timmerman, Kim, Sterling, 2002). Given these estimates, depressive symptoms appear to be related to income status. In the general postpartum population, the estimated prevalence of depression was 13% based on a meta-analysis of 59 studies (O'Hara & Swain, 1996).

Maternal depression has been recognized as a serious mental health problem for women with potentially serious effects on their children's development (Miller, 2002). Depression often interferes with the mother's enjoyment of her children (American Psychiatric Association, 2000). LeCuyer-Maus et al. (2003) reported stressful life situation, psychiatric symptoms, education, and parenting stress highly related to maternal responsiveness to toddlers in 20 mothers who were participants in the

Special Supplemental Feeding Program for Women, Infants, and Children (WIC). In a meta-analysis of 19 studies (Beck, 1995), postpartum depression was determined to have a moderate to large effect on the mother's interaction with her infant. Maternal depression also interferes with cognitive and emotional development in children (Murray & Cooper, 1997). In the National Maternal and Infant Health Survey of mothers with 28 to 50 month-old children (Peterson and Albers, 2001), maternal depression was associated with significantly lower cognitive and motor development in the children.

Using the meta-analyses method (Beck, 1996, 2001; O'Hara et al., 1996), several risk factors for postpartum depression have been identified. Risks with moderate effects include life stress, poor social support, marital discord, previous history of mental health problems (depression or anxiety), and prenatal depression or anxiety. Small but significant risk was associated with low socioeconomic status. Some studies have found a relationship between postpartum depressive symptoms and higher postpartum weight and body mass index (BMI) (Carter, Wood, Baker, & Brownell, 2000; Walker, 1997). This corresponds with similar findings for the relationship between BMI and depressive symptoms in women generally (Carpenter, Hasin, Allison, & Faith, 2000). Factors thought to influence the relationship between an increased BMI and depression included distress from constant dieting and from failure to meet societal norms for physical attractiveness. Because the prevalence of obesity is higher in low-income women, the relationship between increased weight and depressive symptoms in women may be influenced by socioeconomic status and ethnic background (Friedman, Reichmann, Costanzo, & Musante, 2002).

Few studies have examined risk factors for maternal depression in settings outside the healthcare system. The purpose of this study was to examine factors related to depressive symptoms in low-income, postpartum women enrolled in a community-based, randomized clinical trial for weight management. It was hypothesized that high rates of depressive symptoms would be found in a community sample of low-income women and that these rates would be related to body weight and physical activity levels.

MATERIALS AND METHODS

Sample

The study population consisted of postpartum women participating in the Mother's Overweight Management Study (MOMS), a random-

ized clinical trial for weight management. The purpose of MOMS was to determine if facilitated group discussions on weight management (healthy diets, physical activity, and stress management) would prevent future weight gain in mothers. MOMS' participants were recruited from the WIC program in four northern West Virginia counties. Recruitment methods included: personal invitation by WIC or MOMS' staff, mailings (WIC clients, local obstetricians, and family care providers), posters (placed in WIC offices and around the community), newspaper ads, and public service announcements on radio and television. Enrollment criteria consisted of the following: women had to be at least 18 years of age, have at least one child under the age of two years, be a WIC recipient, and be able to converse in English. Of 425 women contacted, 279 received appointments, and 151 completed baseline data collection. The data presented herein are from these baseline data.

Measures

Beck Depression Inventory. Depressive symptoms were assessed using the Beck Depression Inventory (BDI) (Beck, Ward, Mendleson, Mock, & Erbaugh, 1964). The 21 items on the BDI describe feelings, thoughts, or behaviors. For each item, respondents choose a statement that most closely matches the way they have been feeling for the past week. Answers range from a normal or non-depressed response to a severe level of distress. A summary score is calculated and levels derived based on the following score ranges: normal 0-9, mild 10-16, moderate 17-29, and severe 30 or greater. The BDI has been previously used in research with postpartum women (Beck, 1996, 2001; O'Hara & Swain, 1996). Scores on the BDI were grouped into depressive symptom levels (none, mild symptoms, and moderate/severe symptoms). The moderate and severe levels of depressive symptoms were combined because of the low number of women in the severe group ($N = 4$).

Perceived Stress Scale. Subjective ratings of life stress were measured by an expanded version of the Perceived Stress Scale (Brunner, 1997; Cohen, Kamarck, & Mermelstein, 1983). The Perceived Stress Scale contains 14 items including negative items, for example, feeling angry because of "lack of control," or "inability to cope with expected tasks." It also contains positive items such as "confidence in ability to handle problems," or "feeling success in coping with life changes." These items are rated on a 5-point scale from "never" to "very often." An additional four items with two items specifically addressing financial issues such as "feeling bills piling up too fast" were developed by

the RENO Diet-Heart study (Brunner, 1997). Because the participants were WIC participants and thus had low incomes, the two financial items were included in this study. Separate summary scores were calculated for the Perceived Stress Scale and the financial stress items. Two subjects did not have complete data.

Social Support Questionnaire. Social support was assessed using the Social Support Questionnaire (Sarason, Sarason, Shearin, & Pierce, 1997) which contains six items such as “Who accepts you totally, including both your worst and best points.” The items evaluate both the number of people listed as providing support and the participant’s satisfaction level with this support. A seven-point scale provided ratings from “very dissatisfied” to “very satisfied” with higher scores indicating greater satisfaction. Mean scores were computed for the number of persons listed as supports and for the satisfaction rating with the support.

Demographic and General Health Factors. The general survey contained several items addressing demographics (e.g., age, ethnicity, education, and employment) and general health issues (e.g., primipara age, weight gain during pregnancy, delivery date, smoking status and current medications). The smoking question used for this analysis was “Have you smoked a cigarette, even a puff, in the last seven days?”

Anthropometric Measures. Height and weight were measured in women without shoes and wearing light clothing. Height to the nearest tenth of a centimeter was measured with a portable stadiometer. Weight to the nearest tenth of a pound was measured with a digital scale (Health-o-meter, Model HDL904-01). Body Mass Index (BMI) was computed as $(\text{Weight}_{\text{kg}}/\text{Height}_{\text{m}}^2)$. Waist circumference was measured to the nearest quarter inch. The standard non-stretchable tape measure was placed at the narrowest part of the waist or approximately two inches below the ribs for women without an observable waist (National Heart, Lung, and Blood Institute, 2000).

Walking Activity. Because walking is the prevalent activity of women (Krummel et al., 1992; US Department Health Human Services, 1996) we chose the pedometer to measure walking activity. The Yamax Digi-Walker (SW-701) pedometer is valid and reliable for assessing step counts (Bassett & Swain, 1996; Schneider, Crouter, Lukajic, & Bassett, 2003). Women wore the pedometer for one week, recorded their daily steps in an activity log, and then mean steps were calculated. Ninety-two subjects returned the activity log; only one had missing pedometer readings. Because pedometers can be less accurate in very obese persons (Shepherd, Toloza, McClung, & Schmalzreid, 1999), we

omitted another case. This subject had very high mean steps (over 18,000 steps daily), high waist circumference (over 35 inches), and low activity levels reported in the weekly activity log. The remaining 90 were included in the analysis.

Data Analysis

Because of multiple comparisons, we chose $p = .01$ for statistical significance. Basic comparisons of predictor variables and depression scores were made by Pearson correlation. Interval predictor variables and depression levels were compared by one-way ANOVA. Finally, a stepwise regression for the significant variables was conducted.

RESULTS

Participants ($N = 151$) were an average of 27.0 years of age ($SD \pm 5.4$, range 18 to 41 years), with most in the 25 to 35 year range (52%), less in the 18 to 24 years of age group (38%), and even fewer over 35 years of age (10%). Over half of the participants (55%) were 6 months or less postpartum, 31% were between 6-12 months postpartum, and 14% were greater than one year postpartum with the average for the sample at 30.0 ($SD \pm 23.6$) weeks postpartum. Reflective of the county populations, most women were Caucasian (91% vs. 7% African-American, 1% Asian, and 1% Native American). Fifty-six percent of the MOMS women had a 12th grade educational level or less which is similar to rates for women in other WIC populations (USDA, 2002). Forty-one percent were primipara. The women reported an average primipara age of 23.3 ($SD \pm 4.8$) years and had an average of 2.0 ($SD \pm 1.1$) children living with them similar to other WIC households (USDA, 2002).

The mean score on the BDI was 11.64 ($SD \pm 8.1$). Fifty-one percent of the sample had some level of depressive symptoms (27% mild, 21% moderate, and 3% severe). The mean perceived stress score was 27.2 ($SD \pm 6.5$). The average number of people who were listed on the social support questionnaire was ~2.6 for most items and the level of satisfaction with these people ranged from 5.3 to 5.8 (7 is very satisfied).

The prevalence of overweight (29%) or obese (47%) women was higher than the prevalence of normal body weight (20%) or underweight (4%). The average BMI was 30.2 ($SD \pm 6.9$) and waist circumference was 35.5 ($SD \pm 5.2$). Consistent with BMI data, mean step

counts were low (5984.9 ± 2708). Most participants (66.9%) did not smoke. For the participants who reported smoking, the mean number of daily cigarettes was 10.0 ($SD \pm 7.5$).

In demographic variables, primipara age had a significant weak negative association with depressive symptoms (Table 1). Weeks postpartum were not related to depressive symptom levels. The following psychosocial variables were significantly related to higher depressive symptom scores: higher perceived stress, higher financial stress, lower social support “numbers” and “satisfaction” levels. For health factors, positive smoking status was associated with higher depression symptom scores. BMI, waist circumference, steps, and current antidepressant use were not related to depressive levels in the bivariate analysis.

The one-way ANOVAS for demographic factors indicated the non-depressed group had significantly higher primipara age and lower number of children in the household than the moderate/severe depressive symptom group. For psychosocial factors, a significant relationship was found between depressive symptom levels (none, mild, moderate/severe) and global perceived stress score, financial stress, and social support satisfaction (Table 2). The Scheffé test for between group differences indicated the non-depressed group reported significantly less stress than either the mild or the moderate/severe depressive symptom groups. The

TABLE 1. Correlations of Psychosocial and Health Factors with Depression Symptom Scores

Measure	r^a	p
<u>Demographic Factors</u>		
Primipara age	-.26	.002
Children in household	.18	n.s.
Weeks postpartum	.01	n.s.
<u>Psychosocial Measures</u>		
Perceived stress scale	.65	< .001
Financial stress	.37	< .001
Social support number	-.29	< .001
Social support satisfaction	-.33	< .001
<u>Personal Health Factors</u>		
Smoking cigarettes	.26	.001
BMI	.02	n.s.
Waist circumference	.05	n.s.
Mean daily steps (N = 90)	.00	n.s.
Current antidepressant medication	.04	n.s.

^a r values are for Pearson correlations

TABLE 2. Comparison of Psychosocial and Health Factors to Depression Symptom Levels (BDI)

Measures	N	F	p ^b	BDI Groups ^{a,c}		
				None	Mild	Mod/sev
Demographic						
Primipara age	151	4.9	.008	24.5 ^h	22.2	22.0 ^h
Children in home	150	4.7	.01	1.8 ⁱ	2.0	2.5 ⁱ
Weeks postpartum	151	.4	n.s.	29.0	29.0	33.3
Psychosocial						
Perceived stress	149	45.9	< .001	23.4 ^{d,e}	29.6 ^d	32.7 ^e
Financial stress	151	9.0	< .001	3.3 ^f	4.0	4.7 ^f
Social support satisfaction	151	8.2	< .001	5.9 ^g	5.5	4.7 ^g
Personal Health						
BMI	151	.9	n.s.	30.6	29.0	30.7
Waist circumference	151	.5	n.s.	35.7	34.9	36.0
Mean daily steps	90	.6	n.s.	5610	6307	5801

^a BDI levels: normal 0-9, mild 10-16, moderate/severe 17+

^b p level based on one-way analysis of variance, $p \leq .01$

^c p level based on Scheffé test of between group differences, $p \leq .01$

^{d-i} groups with same superscripts are significantly different

non-depressed group also scored financial stress significantly lower than the moderate/severe depressive symptom group. Similarly, the non-depressed group rated social support satisfaction significantly higher than the moderate/severe depressive symptom group.

Factors predictive of depressive symptom levels were analyzed by stepwise regression using a predictor entry $p \leq .01$. This procedure yielded a two-factor model retaining stress score and smoking status as significant predictors (Table 3). The stress score accounted for 42% of the variance and smoking status contributed an additional 4% of the variance for a total of 46% of the variance accounted for by the model. Both were positive predictors of depressive symptoms. Body weight, steps, social support satisfaction or number, or primipara age were not significant predictors of depressive symptoms.

DISCUSSION

This study extends the findings of previous research regarding depressive symptoms in postpartum women from maternity clinic settings to a community sample of low-income women. Prevalence estimates of

TABLE 3. Stepwise Linear Regression Predicting Depressive Symptom Scores

<i>Predictor</i>	ΔR^2	<i>F</i>	β	<i>P</i>
Perceived stress scale (PSS)	.42	105.76	.63	.000
Smoking cigarettes (N = 47)	.04	61.51	.20	.002

ΔR^2 = R^2 change in regression model
 β = Standardized Regression Coefficient

depressive symptoms could be affected by the time period considered “the postpartum period.” In MOMS, we included women up to two years postpartum and found a higher rate of depressive symptoms than previously reported rates in a meta-analytic study of the general postpartum population (O’Hara & Swain, 1996). This meta-analysis also found a small positive relationship between weeks postpartum (6 weeks) and depression. With our broader definition of the postpartum period, weeks postpartum was not related to the prevalence of depressive symptoms in MOMS.

A second factor which affects the prevalence is income status. One community hospital study of low-income women at six-weeks postpartum found prevalence rates for depression similar to the rates found in the current study (Walker et al., 2002). Other studies (Hobfoll et al., 1995; Neter et al., 1995; Séguin et al., 1999) of socioeconomically disadvantaged women found a higher prevalence for depression than the meta-analysis reported, but the prevalence rates were not as high as MOMS. In a pilot study of 20 WIC mothers (LeCuyer-Maus, 2003) recruited for a child interaction study, the degree of distress was similar to our findings for the WIC mothers in this study. Postpartum depression studies have typically recruited participants from medical centers and health clinics involved in maternity care. In contrast, this study involved women from the community with a primary interest in weight management following a pregnancy. The high prevalence of depressive symptoms reported by this sample indicates the problem of postpartum depressive symptoms continues to be unrecognized when the new mother is no longer receiving routine postpartum healthcare (after the 6-week check-up). This remains a particular problem for low-income women with fewer resources at their disposal. The prevalence of depressive symptoms was high in our sample, but the severity of symptoms was low with only four women falling into the range for severe symptoms. Persons with severe depressive symptoms may have diffi-

culty directing their energy to a voluntary program designed to improve weight management.

As reported by others (Beck, 1996, 2001; O'Hara & Swain, 1996), we found a strong positive relationship between stress and depressive symptoms. The high rate of perceived stress reported by our sample partially accounts for the corresponding high prevalence rate for depressive symptoms. The interaction between perceived stress, depressive symptoms, and low income is likely to involve complex and multi-directional issues including: financial stress, lack of employment opportunities, possible social isolation, transportation problems, limited opportunity for recreational or exercise activities, and lack of relief for the constant demands of raising small children. High ratings for perceived stress may also indicate poor coping skills resulting in increased experience of failure as a predisposing factor for developing depression.

Several studies reported a significant inverse association between social support and depressive symptoms (Beck, 1996, 2001; O'Hara & Swain, 1996). Although studies included in these meta-analyses reported inconsistent findings in the relationship between the "number" of social supports and depression, postpartum women's "satisfaction" with social support remains a constant factor in the association with depressive symptoms. Furthermore, research has found social support (Logsdon & Usui, 2001; O'Hara, Zekoski, Philipps, & Wright, 1990), or stress and social support (Neter et al., 1995; Ritter, Hobfoll, Lavin, Cameron, & Hulsizer, 2000; Séguin et al., 1999) coexist in the relationship with depressive symptoms. Similarly, our study found both social support "number" and "satisfaction" were significantly related to depressive symptoms but did not account for unique variance in predicting depressive symptoms. Therefore, the relationship between social support and depression observed in this study was embedded within the stress-depression relationship. A lack of social support may have led to increased stress among study participants, and indirectly influenced depressive symptoms.

Current research has not addressed the association of smoking and depression in postpartum women. Several studies reported a relationship between depression and smoking in broader samples (Breslau, 1995; Borrelli, Marcus, Clark, Bock, King, & Roberts, 1999; Dierker, Avenevoli, Stolar, & Merikangas, 2002). Our study found a small but significant relationship between current smoking status and depressive symptoms. These results suggest postpartum women may use smoking to regulate depressive symptoms such as lack of energy.

The weight status of the women in this study may have some bearing on the high prevalence rates of depressive symptoms. Previous research in a general population demonstrated a positive association between obesity and depressive symptoms for women (Carpenter et al., 2000). Several studies (Carter et al., 2000; Jenkin & Tiggemann, 1997; Walker, 1997) have found a relationship between depressive symptoms and obesity during the postpartum period. Although there was no significant relationship between any of the weight variables (BMI, waist circumference, weight gain during pregnancy) and depressive symptoms in our population, most of the women in this study were overweight or obese (76%). The study area does have a high prevalence of overweight and obesity with 51% overweight or obese women for the state generally and 60% for persons with incomes below \$15,000 (CDC, 2000). Nationally, 56% of postpartum women on WIC have a “high weight to height” risk factor with a BMI ≥ 26.1 (USDA, 2002). The high overweight levels in the area may lessen the negative social consequences for overweight persons. We can only speculate on the lack of an association between depressive symptoms and body weight status in our sample as we did not assess size acceptance or duration of weight status.

Consistent with a previous meta-analysis (O’Hara & Swain, 1996), mother’s primipara age was not a predictor of depressive symptoms. While we know that high rates of depression have been observed in women who become mothers during adolescence (Jaffee, 2002; Kalil & Kunz, 2002; Mirowsky & Ross, 2002), it probably was not a predictor of depressive symptoms in our sample because a very small percentage of women in our sample (6%) had their first child before the age of 18 years.

The short-term benefits of exercise for relieving depressive symptoms and increasing subjective energy levels in postpartum women have been confirmed (Koltyn & Schultes, 1997). This study found no relationship between pedometer-measured walking and depressive symptoms. However, the mean level of walking was well-below the current recommendations for 10,000 daily steps for weight maintenance. This finding is not surprising in a state where 84% of women report low physical activity levels (CDC, 2000). The generally low activity levels may have been a factor in the higher level of depressive symptoms reported by the women. However, it is difficult to know which came first, the depression or the low activity levels. Certainly, the low activity levels were related to the high rate of obesity observed in this group.

Current antidepressant use was not associated with depressive symptoms (data not shown). A small number of women in each depressive

symptom group (none $N = 5$, mild $N = 4$, moderate/severe $N = 5$) reported taking antidepressant medications. However, we did not assess the duration or previous history of antidepressant medications. The lack of significant association between antidepressant usage and depressive symptoms may reflect the varying period of time necessary for stabilization on antidepressant medication (Kaplan & Sadock, 1998).

Despite increasing calls for assessing postpartum women for depression, this study suggests many women have symptoms and thus need diagnosis and treatment as warranted. Anecdotally, some study participants reported losing their Medicaid coverage soon after their child was born. Lack of medical coverage may further interfere with seeking treatment for depression. Only 14% of the women in the moderate to severe range of depressive symptoms were taking an antidepressant medication. The advantages of identifying and treating women at risk for postpartum depression include a healthier outcome for the mother and for her child. Interventions directed to reduce stress and enhance social support are indicated by these findings. It is recommended that women receive evaluations for depressive symptoms, stress, and social support during the prenatal period and through a significant postpartum period of at least six months.

Limitations

There are several limitations in this study. The cross-sectional nature of the design precludes an examination into the causal relationship among these risk factors. Whether perceived stress is a risk factor for depressive symptoms or depression is a risk factor for elevated perception of stress is unknown. This problem exists in many of the studies currently used for evaluating postpartum depression (Beck, 1996, 2001; O'Hara & Swain, 1996). Self-report surveys, including the BDI, measure depressive symptoms but do not lead to a conclusive diagnosis of clinical depression. As noted in the O'Hara meta-analysis, self-report measures tend to find a slightly higher prevalence rate for depressive symptoms than interview methods. Some studies have found a relationship between postpartum depressive scores for the last seven items of the BDI (Ritter et al., 2000; Troutman & Cutrona, 1990). The last seven BDI items reflect the somatic symptoms of depression and include items that could be influenced by changes in the body during and after pregnancy and by changes associated with parenting a new infant such as lack of sleep. However, in this study, there was no relationship between the last seven items and the general BDI cutoff score indicating

depression (data not shown). Perhaps the question of including somatic items on the BDI can be addressed by using a self-report measure specifically designed for pregnancy and postpartum period. Newer scales such as the Postpartum Depression Screening Scale have recently been developed to address the problems with existing self-report measures for depressive symptoms (Beck & Gable, 2000).

Another limitation could be if women who did not turn in pedometer data were different, perhaps more active, than the participants. We made numerous contacts to remind the women to complete their logs and do not have any reason to believe they were more or less active than the women who completed the logs.

CONCLUSIONS

Low-income postpartum women interested in a weight management program exhibited high rates of depressive symptoms. Most of these women with depressive symptoms were not receiving treatment. This lack of treatment may have severe consequences for the development of their children. Similar to other studies (Beck, 1996, 2001; O'Hara & Swain, 1996), women with depressive symptoms in this study had a high level of perceived stress and lack of social support. Further research is indicated to examine interactions among these risk factors and possible treatment approaches for low-income women, and these future studies would benefit by utilizing a longitudinal approach beginning in the prepartum period.

Weight status did not relate to depression symptoms in this study. Physical activity levels were generally low and did not contribute to findings on depressive symptoms. Increasing physical activity in women could help lessen perceived stress and depressive symptoms. Intervention efforts should be designed that address limited resources and irregular work schedules.

REFERENCES

- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders, 4th ed. (text revision)*. Washington, DC: American Psychiatric Press.
- Bassett, D. R., Ainsworth, B. E., Leggett, S. R., Mathien, C. A., Main, J. A., Hunter, D. C., & Duncan, G. E. (1996). *Medicine & Science in Sports & Exercise*, 28, 1071-1077.

- Beck, A.T., Ward, C.H., Mendleson, M., Mock, J., & Erbaugh, J. (1964). An inventory for measuring depression. *Archives of General Psychiatry*, 4, 53-64.
- Beck, C.T. (1995). The effects of postpartum depression on maternal-infant interaction: A meta-analysis. *Nursing Research*, 44, 298-304.
- Beck, C.T. (1996). A meta-analysis of predictors of postpartum depression. *Nursing Research*, 45, 297-303.
- Beck, C.T., & Gable, R.K. (2000). Postpartum Depression Screening Scale: development and psychometric testing. *Nursing Research*, 49, 272-282.
- Beck, C.T. (2001). Predictors of postpartum depression: an update. *Nursing Research*, 50, 275-285.
- Borrelli, B., Marcus, B.H., Clark, M.M., Bock, B.C., King, T.K., & Roberts, M. (1999). History of depression and subsyndromal depression in women smokers. *Addictive Behaviors*, 24, 781-794.
- Breslau, N. (1995). Psychiatric comorbidity of smoking and nicotine dependence. *Behavior Genetics*, 25, 95-101.
- Brunner, R.L. (1997). The Perceived Stress Scale. In S.T. St. Jeor (Ed.), *Obesity Assessment: Tools, Methods, Interpretations* (pp. 471-478, 864-866). New York, NY: Chapman & Hall.
- Carpenter, K.M., Hasin, D.S., Allison, D.B., & Faith, M.S. (2000). Relationship between obesity and DSM-IV major depressive disorder, suicide ideation, and suicide attempts: Results from a general population study. *American Journal of Public Health*, 90, 251-257.
- Carter, A.S., Wood Baker, C., & Brownell, K.D. (2000). Body mass index, eating attitudes, and symptoms of depression and anxiety in pregnancy and postpartum period. *Psychosomatic Medicine*, 62, 264-270.
- Centers for Disease Control and Prevention (CDC, 2000). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health & Social Behavior*, 24, 385-396.
- Dierker, L.C., Avenevoli, S., Stolar, M., & Merikangas, K.R. (2002) Smoking and depression: An examination of mechanisms of comorbidity. *American Journal of Psychiatry*, 159, 947-953.
- Friedman, K.E., Reichmann, S.K., Costanzo, P.R., & Musante, G.J. (2002). Body image partially mediates the relationship between obesity and psychological distress. *Obesity Research*, 10, 33-40.
- Hobfoll, S.E., Ritter, C., Lavin, J., Hulsizer, M.R., & Cameron, R.P. (1995). Depression prevalence and incidence among inner-city pregnant and postpartum women. *Journal of Consulting and Clinical Psychology*, 63, 445-453.
- Jaffe, S.R. (2002). Pathways to adversity in young adulthood among early childbearers. *Journal of Family Psychology*, 16, 38-49.
- Jenkin, W., & Tiggemann, M. (1997). Psychological effects of weight retained after pregnancy. *Women & Health*, 25, 89-98.
- Kalil, A., & Kunz, J. (2002). Teenage childbearing, marital status, and depressive symptoms later in life. *Child Development*, 73, 1748-1760.

- Kaplan, H. I., & Sadock, B. J. (1998). *Synopsis of Psychiatry* (8th edition). Baltimore: Williams & Wilkins.
- Koltyn, K.F., & Schultes, S.S. (1997). Psychological effects of an aerobic exercise session and a rest session following pregnancy. *Journal of Sports Medicine and Physical Fitness, 37*, 287-291.
- Krummel, D.A., Mashaly, M.M., & Kris-Etherton, P.M. (1992) Prediction of plasma lipids in young women. *Journal of the American Dietetic Association, 92*, 942-948.
- LeCuyer-Maus, E.A. (2003). Stress and coping in high-risk mothers: Difficult life circumstances, psychiatric-mental health symptoms, education, and experiences in their families of origins. *Public Health Nursing, 20*, 132-145.
- Logsdon, M.C., & Usui, W. (2001). Psychosocial predictors of postpartum depression in diverse groups of women. *Western Journal of Nursing Research, 23*, 563-574.
- Miller, L.J. (2002). Postpartum depression. *Journal of the American Medical Association, 287*, 762-765.
- Mirowsky, J., & Ross, C. E. (2002). Depression, parenthood, and age at first birth. *Social Science & Medicine, 54*, 1281-1298.
- Murray, L., & Cooper, P. Effects of postnatal depression on infant development. (1997). *Archives of Disease in Childhood, 77*, 99-101.
- National Heart, Lung, and Blood Institute. (2000). *The Practical Guide: Identification, Evaluation, and Treatment of Overweight and Obesity in Adults*. Washington, DC: US Department of Health and Human Services. National Institutes of Health. North American Association for the Study of Obesity. Publication NIH 00-4084.
- Neter, E., Collins, N.L., Lobel, M., & Dunkel-Schetter, C. (1995). Psychosocial predictors of postpartum depressed mood in socioeconomically disadvantaged women. *Women's Health: Research on Gender, Behavior, and Policy, 1*, 51-75.
- O'Hara, M.W., Zekoski, E.M., Philipps, L.H., & Wright, E.J. (1990). Controlled prospective study of postpartum mood disorders: comparison of childbearing and nonchildbearing women. *Journal of Abnormal Psychology, 99*, 3-15.
- O'Hara, M.W., & Swain, A.M. (1996). Rates and risk of postpartum depression—a meta-analysis. *International Review of Psychiatry, 8*, 37-54.
- Peterson, S.M., & Albers, A. B. (2001). Effects of poverty and maternal depression on early childhood development. *Child Development, 72*, 1794-1813.
- Ritter, C., Hobfoll, S.E., Lavin, J., Cameron, R.P., & Hulsizer, M.R. (2000). Stress, psychosocial resources, and depressive symptomatology during pregnancy in low-income, inner-city women. *Health Psychology, 19*, 576-585.
- Sarason, I.G., Sarason, B.R., Shearin, E.N., & Pierce, G.R. (1997). A brief measure of social support: Practical and theoretical implications. *Journal of Social and Personal Relationships, 4*, 497-510.
- Schneider, P. L., Crouter, S.E., Lukajic, O., & Bassett, D.R. (2003). Accuracy and reliability of 10 pedometers for measuring steps over a 400-m walk. *Medicine & Science in Sports & Exercise, 35*, 1779-1784.
- Séguin, L., Potvin, L., St. Denis, M., & Loiselle, J. (1999). Depressive symptoms in the late postpartum among low socioeconomic status women. *Birth, 26*, 157-163.
- Shepherd, E.F., Toloza, E., McClung, C.D., & Schmalzreid, T.P. (1999). Step activity monitor: Increased accuracy in quantifying ambulatory activity. *Journal of Orthopaedic Research, 17*, 703-708.

- Troutman, B.R., & Cutrona, C.E. (1990). Nonpsychotic postpartum depression among adolescent mothers. *Journal of Abnormal Psychology, 99*, 69-78.
- United States Department of Agriculture. (USDA, 2001). *National Survey of WIC Participants, 2001 Final Report*. by Cole, N., Hoaglin, D., & Kirlin, J. Alexandria: VA. United States Department of Agriculture, Food and Nutrition Service. Report No. WIC-01-NSWP.
- United States Department of Agriculture. (USDA, 2002). *WIC Participant and Program Characteristics 2000*. Washington: DC. United States Department of Agriculture, Food and Nutrition Service. Report No. WIC-02-PC.
- United States Department of Health and Human Services. (1996). *Physical Activity and Health: A Report of the Surgeon General*. Atlanta: GA. US Department of Health and Human Services, Centers for Disease Control and Prevention.
- Walker, L.O. (1997). Weight and weight-related distress after childbirth: relationships to stress, social support, and depressive symptoms. *Journal of Holistic Nursing, 15*, 389-405.
- Walker, L., Timmerman, G. M., Kim, M., & Sterling, B. (2002). Relationships between body image and depressive symptoms during postpartum in ethnically diverse, low-income women. *Women & Health, 36*, 101-121.



For FACULTY/PROFESSIONALS with journal subscription recommendation authority for their institutional library . . .

If you have read a reprint or photocopy of this article, would you like to make sure that your library also subscribes to this journal? If you have the authority to recommend subscriptions to your library, we will send you a free complete (print edition) sample copy for review with your librarian.

1. Fill out the form below and make sure that you type or write out clearly both the name of the journal and your own name and address. Or send your request via e-mail to doddelivery@haworthpress.com including in the subject line "Sample Copy Request" and the title of this journal.
2. Make sure to include your name and complete postal mailing address as well as your institutional/agency library name in the text of your e-mail.

[Please note: we cannot mail specific journal samples, such as the issue in which a specific article appears. Sample issues are provided with the hope that you might review a possible subscription/e-subscription with your institution's librarian. There is no charge for an institution/campus-wide electronic subscription concurrent with the archival print edition subscription.]

YES! Please send me a complimentary sample of this journal:

(please write complete journal title here—do not leave blank)

I will show this journal to our institutional or agency library for a possible subscription.

Institution/Agency Library: _____

Name: _____

Institution: _____

Address: _____

City: _____ State: _____ Zip: _____

Return to: Sample Copy Department, The Haworth Press, Inc.,
10 Alice Street, Binghamton, NY 13904-1580