

Original contribution

Stability and change in depressive symptoms from pregnancy to two months postpartum in childbearing immigrant women

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Summary

The present study explored changes in mental health and functional status from pregnancy to 2 months postpartum in a sample of 106 childbearing immigrant women. Three sets of variables were examined in relation to postpartum depressive symptomatology: (1) prenatal depression, worries, and somatic symptoms; (2) social relationships (marital quality and social support), and (3) factors related to migration (premigration stress and length of stay in the host country). We found that 37.7% of the women in this community sample scored above the cutpoint of 12 on the Edinburgh Postnatal Depression Scale; prenatal depressive and somatic symptoms, as well as marital quality, were the best predictors of postpartum depressive symptomatology. An examination of differing trajectories from pregnancy to the postpartum period suggests that women with relatively few somatic complaints, low levels of perinatal stress, and satisfactory marital relations were less likely to exhibit mental health problems during pregnancy and postpartum. Women who were not depressed prenatally but reported postpartum depressive symptomatology exhibited several predisposing risk factors during pregnancy: many somatic complaints, high perinatal anxiety, and premigration stress. Women who were depressed during pregnancy but not postpartum reported improved physical function after childbirth. The implications of these findings for screening childbearing immigrant women are discussed.

Keywords: Postpartum depression; immigrants; childbearing; functional status; perinatal anxiety

Introduction

A growing body of research has identified immigrant status as a risk factor for depression during pregnancy and in the postpartum period (Glasser et al. 1998; Dankner et al. 2000; Onozawa et al. 2003; Small et al. 2003; Rubertsson et al. 2005; Goyal et al. 2006). In a community sample of pregnant immigrant women in Montreal, Zelkowitz et al. (2004) found that 42% scored above the cutpoint for depression on the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al. 1987), a screening measure that has been validated in many countries in North America, Europe, Africa, and Asia (Cox and Holden 1994). Women who had resided in Canada for less than 5 years were at greater risk for depression during pregnancy. Sword et al. (2006) assessed a sample of 1250 women who delivered at 5 Ontario hospitals, about a third of whom had been born outside of Canada. They found that 15% of immigrants scored above the cutpoint on the EPDS, as compared with 7% of native-born Canadian women. Using language spoken in the home as an index of acculturation, a Quebec community study found that women who spoke neither English nor French at home were at twice the risk for postpartum depression compared with women who spoke English or French at home (Zelkowitz and Milet 1995). In a community sample of childbearing women in Vancouver,

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women who were born outside of Canada and/or had resided in Canada for less than 5 years were at greatest risk of persistent postpartum depression from 1 to 8 weeks after delivery (Dennis and Ross 2006).

Several factors may predispose immigrant women to suffer from mental health problems. Stressors associated with migration include social isolation and separation from the extended family, financial difficulties due to nonrecognition of foreign education and credentials, experiences of discrimination, and a lack of familiarity with health care practices in the host country (Mulvihill et al. 2001). Separation from children who remain behind in the country of origin has been related to depression in immigrant women (Miranda et al. 2005). Exposure to violence or trauma in the country of origin, prior to migration, may also contribute to psychological distress in immigrant women. Women who migrate under the sponsorship of their spouses may be faced with a lack of independence that may be linked to marital strain and even domestic violence (Mulvihill et al. 2001).

While there has been considerable research on risk factors for postpartum depression in the general population, research on specific risk factors for postpartum depression among immigrant women has been limited. Among the risk factors that have been identified primarily in small-scale qualitative studies are stressful life events, lack of social support, physical health problems, inability to speak the language of the host country, and the demands of multiple roles (Small et al. 2003; Parvin et al. 2004; Edge and Rogers 2005). In their study of pregnant immigrant women, Zelkowitz et al. (2004) found that the risk factors associated with depressive symptoms include those found in community studies of native-born women, such as life stress, marital problems, and lack of social support, as well as those more specifically related to immigration, such as the experience of discrimination in the host country. There have been no studies that followed childbearing immigrant women from pregnancy to the postpartum period, examining their mental health trajectories. In addition, the extent to which there might be different risk factors associated with depression during pregnancy and depression postpartum has not been investigated.

There are several methodological challenges to studying the mental health of childbearing immigrant women. Studies vary greatly in their definitions of immigrant status, with some studies utilizing native language or language spoken in the home, and others employing country of origin. Length of residence in the host country is an important factor to be considered in assessing

risk, though the research findings concerning its impact have been inconsistent: some studies found that more recent immigrants were at greater risk (Small et al. 2003; Zelkowitz et al. 2004; Dennis and Ross 2006), while others indicated that those who migrated in childhood were at greater risk (Heilemann et al. 2004). With regard to the assessment of depression, the EPDS is the most widely used screening measure in cross-cultural work (Eberhard-Gran et al. 2001). This instrument includes questions that inquire about the mother's mood and cognitions in the previous 7 days. In the development of this questionnaire, somatic symptoms were deliberately excluded, to minimize false positives based on physical symptoms that may be normative in the postpartum period, such as sleep and appetite disturbances. However, the lack of somatic symptoms may be a disadvantage in studying immigrant groups, since distress may be expressed through physical symptoms (Bashiri and Spielvogel 1999). Therefore, it is important to incorporate an assessment of somatic symptoms in studying the mental health of immigrant women.

In the present study we followed a sample of childbearing immigrant women who had been assessed during pregnancy to evaluate depressive symptomatology and functional status at two months postpartum. The purpose of the study was to investigate three sets of variables in relation to postpartum depressive symptomatology: (1) prenatal depression, worries, and somatic symptoms; (2) social relationships (marital quality and social support); and (3) factors related to migration (premigration stress and length of stay in the host country).

Sample and methods

This project was designed as a longitudinal study, to assess childbearing immigrant women during pregnancy and at 2 months postpartum. This study was approved by the Research Ethics committees of the two hospitals where recruitment took place. Written informed consent was obtained from all participants prior to data collection.

Participants

A community sample of 119 pregnant immigrant women had been recruited through obstetrical practices and prenatal clinics affiliated with two hospitals in Montreal, Canada. These hospitals are situated in the most ethnically diverse neighborhood in the city; approximately half the women who deliver in these hospitals are not native-born. Participants in the study met the following inclusion criteria: (1) born outside of Canada or the United States; (2) age 18 years or older; (3) immigrated to Canada as an adult or with a conjugal partner; (4) able to

respond to questions in English, French, or Spanish. Additional details on sample characteristics and recruitment during pregnancy can be found in Zerkowitz et al. (2004).

Participants were recontacted at two months postpartum. Thirteen women were lost to follow-up: 6 women could not be reached because their telephones were out of service, 4 were no longer interested in participating, 1 woman had moved to another city, and 2 women had social or medical problems that precluded their participation. Comparisons between participants and nonparticipants on baseline characteristics indicated that there were no significant differences between participants and nonparticipants in mean maternal age (30.6 years for participants and 30.9 years for nonparticipants), years of education (13 vs. 12 years), and length of residence in Canada (4.6 years for participants and 4.5 years for nonparticipants). Similar numbers of women in the two groups had been employed prior to migration (65 and 69%) and were working during the recent pregnancy (39 and 31%). The groups were comparable on measures of premigration stress, stressful life events, social support, and somatic symptoms. There was also no statistically significant difference between participants and nonparticipants in terms of depressive symptomatology during pregnancy, as assessed by the EPDS. We therefore conclude that the follow-up sample is generally representative of the original study sample, and that loss to follow-up is not related to the baseline characteristics.

The mean age of the participants was 30.6 years (standard deviation [SD], 4.9), and the average age of the mothers upon arrival in Canada was 26.0 years (SD, 5.4). The mean length of residence in Canada was 4.6 years (SD, 3.5), with 59% of the women residing in Canada for less than 5 years; nearly all (91%) were either Canadian citizens or landed immigrants. The majority of the participants had completed high school (92%), and the average number of years of schooling was 13.4 (SD, 2.2). Only 39% of the participants were currently employed, while 65% had worked prior to their arrival in Canada. Participants spoke 29 languages and came from 44 countries, though 89% of the women spoke some English and/or French prior to their arrival in Canada. The largest group came from Middle Eastern and North African countries (33%); others came from Europe (18%), Asia (15%), Latin America (13%), Africa (12%), and Caribbean Islands (9%). Most participants were married or cohabiting (94%). Forty-five (42.5%) participant mothers had given birth to a first child, while 61 (57.5%) mothers were multiparous.

Procedures

During pregnancy and at 2 months postpartum, a research assistant contacted study participants and made home visits during which the mothers were asked to complete self-report questionnaires. At both data collection points, women completed self-report questionnaires on depressive symptoms, functional status, social support, and marital quality. At the pregnancy evaluation, the mothers were asked to report on somatic symptoms and on specific worries they may have had about postpartum adjustment; they also provided information on premigration stress. Questionnaires were administered in English (30%), French (60%), or Spanish (10%).

Measures

A demographics questionnaire yielded data on age, parity, marital status, education, work status, citizenship status in Canada, and fluency in English and French. Occupational status was rated with a modified version of the Blishen scale (Blishen et al. 1987). Measures of education and occupational status were used as indicators of socioeconomic status (Bradley and Corwyn 2002).

The EPDS (Cox et al. 1987) was used to measure depressive symptomatology. The 10 items on the EPDS take about 5 min to complete and inquire about the mother's feelings during the past 7 days; she rates each item on a 4-point scale, from zero to three. The items refer to depressed mood, anhedonia, guilt, anxiety, and thoughts of hurting oneself. The EPDS has been widely used to assess depressive symptoms in the postpartum period, in both Western and non-Western cultures (Cox and Holden 1994), and appears to be a reliable measure for both immigrant and nonimmigrant respondents (Small et al. 2007). A French version of this questionnaire has been validated in Quebec (Des Rivieres-Pigeon et al. 2000), and a Spanish version has also been validated (Garcia-Esteve et al. 2003). Using a cutpoint of 12/13, the measure exhibited 64 to 95% sensitivity and 78 to 96% specificity in relationship to diagnosis via clinical interview (Cox et al. 1987; Harris et al. 1989; Murray and Carothers 1990; Zerkowitz and Milet 1995). The EPDS has been found to be correlated ($r=0.59$) with the structured clinical interview for DSM-IV mood disorder diagnosis (Beck and Gable 2001). Internal reliability of the measure was assessed and found to be satisfactory in this study, with Cronbach alphas of 0.80 for the prenatal EPDS and 0.81 for the postpartum EPDS. In the present study, women scoring at or above the cutpoint of 12 were considered to be at high risk for a depressive disorder.

Somatic symptoms in the sample were assessed with a 12-item scale utilized by Kirmayer et al. (1997) in a community survey of immigrants. Respondents were asked to indicate whether they had been troubled by any of the 12 symptoms in the previous year. This measure demonstrated good internal consistency, with Cronbach alphas for this measure ranging from 0.72 to 0.76. French and Spanish versions of the scale were translated and then back-translated according to standard procedures.

Functional status was assessed with the Medical Outcomes Study Short-Form General Health Survey (SF-20) (Ware et al. 1992). It comprises 20 items that form 6 subscales: physical functioning, role functioning, social functioning, mental health, bodily pain, and general health perceptions. The items inquire about health status in the past 4 weeks, as well as the duration of health problems. This measure takes only 5–10 min to complete, and its reliability and validity have been demonstrated across cultures and populations. The subscales showed excellent internal consistency in the present study, with Cronbach alphas ranging from 0.77 to 0.85. The measure has been found to discriminate between patient and general population samples. Validated French-Canadian and Spanish versions of this measure were available.

To investigate social support, the Arizona Social Support Interview Schedule (ASSIS) (Barrera 1983) was used to derive information on support in six domains: intimate interactions, material assistance, advice, positive feedback, practical assistance, and social participation. Participants provided a list of the network members from whom they received assistance in

each domain and also rated their need for and satisfaction with support on Likert scales. The interviewer also obtained information on certain characteristics of network members, including ethnic background, gender, and the nature of the relationship to the respondent. Participants could and did name network members who resided in their country of origin, as well as those living in close geographical proximity to them. The measure shows good test–retest reliability ($r = 0.88$), and satisfactory internal consistency, with Cronbach alphas in the present study of 0.76 (support satisfaction) and 0.74 (need for support). The measure has been standardized in Quebec (Lepage 1984); a Spanish version was developed and validated by Barrera. Predictive validity has been demonstrated in that the measure has been found to be associated with depression, anxiety, and somatization.

Relationship with the partner was assessed with the Dyadic Adjustment Scale (DAS) (Spanier 1976). This 32-item scale has been widely used in studies of marital quality. The scale yields a total score as well as four subscale scores: consensus, satisfaction, cohesion, and affectional expression. Internal consistency for the scale as a whole is 0.96, with subscale reliabilities ranging from 0.73 to 0.94. This measure has been translated into French and validated in Quebec (Baillargeon et al. 1986); a Spanish version has also been validated (Youngblut et al. 2006).

Perinatal anxiety was assessed with a 10-item questionnaire (Berthiaume et al. 1996) that inquired about worries related to the birth of the child and changes that might follow from this event. This instrument was developed to study emotional difficulties and fears specific to childbearing and was found to be related to prenatal depressive symptoms and stressful life events (Bernazzani et al. 1997). Among the items were questions about changes in the marital relationship, relationships with family members, and changes in work life and financial situation. Items were scored yes or no, and each item was analyzed individually. Items were also summed to create an index of perinatal anxiety. This scale showed good internal consistency, with Cronbach alpha of 0.67.

A premigration stress questionnaire was devised by the research team to investigate certain factors associated with the immigration experience. These include the reasons for migration (e.g., economic factors, discrimination, persecution) and traumatic experiences (e.g., imprisonment, loss of family members) prior to migration. Questions were selected on the basis of a review of literature on the impact of premigration stress on the mental health of immigrants and refugees (Canadian Task Force on Mental Health Issues Affecting Immigrants and Refugees 1988). Women who reported any of these experiences were classified as having premigration stress, while those who reported no such experiences were considered not to have had premigration stress.

Data analysis

First, comparisons between participant and nonparticipant mothers at 2 months postpartum were made by either Student t test for continuous variables or chi-square for categorical variables. The same methods were employed to compare the difference between depressed mothers and nondepressed mothers, who were classified on the basis of the cutoff point of 12/13 on

the EPDS. Multivariate analysis of variance (MANOVA) was performed to detect differences on the six subscales of the SF-20, and post hoc univariate analysis was performed to determine differences for each subscale.

Next, to examine how prenatal risk factors affect postpartum depressive symptomatology on a continuum, multiple linear regression with a backward elimination procedure was performed. Power analysis indicated that with a sample of 106 women, and alpha level set at 0.05, we had a power of 0.80 to detect a medium effect of $R^2 = 0.13$, with a maximum of 7 predictor variables (Green 1991). In order to decide which variables we would enter into the multiple linear regression model, we first checked the relationship of demographic variables, including marital status, language spoken at home, work status, years of education, maternal age, length of stay in Canada, and premigration experience to postpartum EPDS score. Bivariate correlations were then used to examine the relationship of prenatal EPDS scores, perinatal anxiety, total number of reported somatic symptoms, DAS total scores and social support (including network size, need for support, and satisfaction with support) assessed during the pregnancy interview to the outcome measure (postpartum EPDS scores). Those that were significantly related to the outcome measure were used as covariates in further multiple linear analyses. Linearity and collinearity were all checked before multiple regression analysis was carried out.

Finally, we examined changes in mental health status from pregnancy to two months postpartum on the basis of changes in the participant mothers' EPDS scores at both points in time. Four groups of mothers ("postpartum depressed", "never depressed", "prepartum depressed", and "prepartum and postpartum depressed"), therefore, were compared on measures of demographics, depressive and somatic symptoms, perinatal anxiety, functional status, marital quality, and social support. Paired t tests were used to determine changes from pregnancy to postpartum.

Results

Rates of depressive symptoms at 2 months postpartum

Of the 106 women who were assessed at 2 months postpartum, 40 (37.7%) scored at or above the cutpoint of 12 on the EPDS. These women were classified as the postpartum depressed group. They did not differ from nondepressed women on any of the demographic variables, including age, educational level, work status, or parity (Table 1). Comparing depressed and nondepressed women in terms of functional status, we found that the former group reported more impairment on 5 of the subscales of the SF-20: physical functioning, role functioning, mental health, bodily pain, and general health perceptions. The groups did not differ in terms of social functioning.

Factors associated with postpartum depression

We examined three sets of variables (Table 1): the experience of depressive and somatic symptoms and peri-

Table 1. Comparisons between depressed and non-depressed mothers at 2 months postpartum

Demographic variable ^a	Value for mothers	
	Depressed (<i>n</i> = 40)	Nondepressed (<i>n</i> = 66)
Demographic variables		
Mean (SD) maternal age (yr)	30.40 (4.52)	30.68 (5.14)
Mean length (SD) of maternal education (yr)	13.40 (2.37)	13.40 (2.18)
Mean age (SD) upon arrival in Canada	26.25 (4.95)	25.86 (5.76)
Mothers giving birth to 1st child (nr. [%])	19 (47.5)	26 (39.4)
Mothers working presently (nr. [%])	14 (35.0)	27 (40.9)
Mothers of male babies (nr. [%])	19 (47.5)	31 (47.0)
Mothers experiencing premigration stress (nr. [%])	19 (47.5)	20 (30.3)
Mean length (SD) of stay in Canada (yr)	4.15 (3.27)	4.82 (3.66)
Prenatal variables		
Mothers depressed during pregnancy (nr. [%])**	27 (67.5)	16 (24.2)
Mean DAS total score (SD)	52.37 (9.46)	55.44 (7.86)
Mean nr. (SD) of somatic symptoms**	7.95 (3.05)	5.79 (3.87)
Mean score (SD) for perinatal anxiety**	5.90 (2.06)	4.45 (1.96)
Social support		
Mean nr. (SD) of network members	6.45 (2.82)	7.42 (3.90)
Avg satisfaction with support (SD)	5.44 (1.48)	5.48 (1.24)
Avg need for support (SD)*	3.23 (0.77)	2.89 (0.82)
Postpartum variables		
Mean DAS total score (SD)**	49.65 (10.74)	55.50 (7.89)
Social support		
Mean nr. (SD) of network members	7.55 (5.09)	7.47 (4.13)
Avg satisfaction with support (SD)	5.53 (1.21)	5.93 (1.02)
Avg need for support (SD)	3.50 (0.75)	3.25 (0.83)
Functional status		
Mean score (SD) for physical functioning*	60.83 (33.66)	74.24 (28.97)
Mean score (SD) for social functioning	80.50 (25.01)	85.81 (20.37)
Mean score (SD) for role functioning*	67.50 (41.68)	82.58 (34.52)
Mean score (SD) form mental health**	58.20 (21.89)	77.06 (13.97)
Mean score (SD) for bodily pain*	57.00 (30.23)	68.79 (27.43)
Mean score (SD) for general health perceptions**	64.52 (22.80)	78.42 (19.93)

^a Variables for which values significantly different for the two groups were obtained are indicated by single asterisk ($p < 0.05$) or double asterisk ($p < 0.01$).

natal anxiety during pregnancy, relationship variables (marital quality and social support, both during pregnancy and in the postpartum period), and immigration variables (premigration stress and length of stay in Canada). Postpartum depressed women were more likely to have been depressed during pregnancy, reported more somatic symptoms during pregnancy, and more perinatal anxiety than did nondepressed women. Depressed mothers reported greater need for support during their pregnancy than did nondepressed mothers, but there were no other differences between postpartum depressed and nondepressed women in terms of network size, need for support, and satisfaction with support. Postpartum marital adjustment was less satisfactory among depressed women. Premigration stress and length of stay in Canada did not differ in depressed and nondepressed women.

Previous as well as the current research has investigated risk for depression with a cutoff point of 12/13 on the EPDS. This cutoff point is clinically useful in terms of identifying patients who are at risk for depression. However, using such a cutoff may mask differences between individuals who fall into the same category but who have higher or lower levels of depressive symptomatology. Consequently, it is important to investigate depressive symptomatology and its associated prenatal risk factors on a continuum. To this end, multiple linear regression analysis was used to predict total EPDS scores.

Prenatal variables that were significantly related to postpartum EPDS scores in bivariate correlation analysis (Table 2) were entered into the multiple regression analysis. The final model indicated that prenatal EPDS scores, number of somatic symptoms during pregnancy, and prenatal marital quality were significant predictors

Table 2. Prenatal correlates of postpartum EPDS scores

Prenatal variable	Postpartum EPDS score ^a
Prenatal EPDS score	0.566**
Nr. of somatic symptoms	0.379**
Perinatal anxiety	0.401**
DAS total score	-0.394**
Social support	
Nr. of network members	-0.179
Avg satisfaction with support	-0.155
Avg need for support	0.228*
Length of stay in Canada	-0.002

^a Significance at $p < 0.05$ (single asterisk) or $p < 0.01$ (double asterisk) is indicated.

of postpartum depression (Table 3), with these variables explaining 38% of the variance in EPDS scores.

Mental health trajectories from pregnancy to postpartum

In order to examine changes in mental health status from pregnancy to 2 months postpartum, women were divided into 4 groups on the basis of their EPDS scores at both

Table 3. Multiple linear regression for prenatal predictors of 2-month postpartum EPDS score ($n = 106$)

Prenatal predictor variable	Value for full-model regression coefficient: ^a		
	B	SE B	β
Prenatal EPDS score	0.430	0.089	0.433**
Prenatal DAS total score	-0.105	0.054	-0.170*
Nr. of somatic symptoms	0.249	0.122	0.174*
Overall model: $R^2 = 0.378$, Adj. $R^2 = 0.359$, $F = 20.64$, $p = 0.000$			

^a Significance at $p < 0.05$ (single asterisk) or $p < 0.01$ (double asterisk) is indicated.

points in time. The 50 women (47% of the total sample) whose EPDS scores fell below the cutpoint of 12 at both assessments were termed “never depressed.” The 13 women (12%) whose EPDS scores were below the cutpoint during pregnancy but above the cutpoint at 2 months postpartum were considered to be “postpartum depressed”. Sixteen women (15%) who scored above the cutpoint during pregnancy but below the cutpoint at

Table 4. Changes in functional status from pregnancy to the postpartum period

Group of mothers and SF-20 subscale ^a	Mean score (SD) at:		Paired t test (p)
	Pregnancy	Postpartum	
Never depressed			
Physical functioning**	59.72 (29.74)	78.00 (26.39)	3.41 (0.001)
Social functioning	84.00 (25.23)	89.20 (15.76)	1.22 (0.23)
Role functioning	75.00 (39.45)	87.00 (31.64)	1.90 (0.06)
Mental health	79.52 (14.24)	79.92 (12.24)	0.19 (0.85)
Bodily pain	61.60 (25.50)	69.60 (27.47)	1.70 (0.10)
General health perceptions*	72.52 (23.59)	81.94 (16.19)	2.82 (0.01)
Postpartum depressed			
Physical functioning	52.77 (22.40)	56.41 (36.35)	0.47 (0.65)
Social functioning	67.69 (36.10)	73.85 (29.87)	0.59 (0.57)
Role functioning	53.85 (51.89)	73.08 (38.81)	1.59 (0.14)
Mental health	71.38 (12.09)	66.46 (19.43)	-0.91 (0.38)
Bodily pain	53.85 (30.97)	63.07 (31.46)	1.00 (0.34)
General health perceptions	64.77 (22.67)	61.92 (23.89)	-0.48 (0.64)
Prepartum depressed			
Physical functioning**	39.58 (28.46)	62.50 (34.16)	3.22 (0.01)
Social functioning	68.75 (26.30)	75.25 (28.81)	1.04 (0.31)
Role functioning	40.62 (49.05)	68.75 (40.31)	1.71 (0.11)
Mental health*	56.50 (18.87)	68.12 (15.60)	2.27 (0.04)
Bodily pain*	42.50 (22.95)	66.25 (28.01)	2.59 (0.02)
General health perceptions**	50.75 (22.62)	67.44 (26.38)	4.94 (0.00)
Prepartum–postpartum depressed			
Physical functioning	49.48 (29.78)	62.96 (29.78)	1.98 (0.06)
Social functioning*	68.15 (32.47)	83.70 (22.21)	2.12 (0.04)
Role functioning*	38.89 (44.58)	64.81 (43.44)	2.76 (0.01)
Mental health	53.78 (21.41)	54.22 (22.22)	0.12 (0.91)
Bodily pain	50.37 (27.38)	54.07 (29.77)	0.59 (0.56)
General health perceptions	58.85 (20.16)	65.78 (22.61)	1.26 (0.22)

^a Variables for which values significantly different at the two assessment times were obtained are indicated by single asterisk ($p < 0.05$) or double asterisk ($p < 0.01$).

2 months postpartum were classified as “prepartum depressed”. The fourth group consisted of 27 women (25%) whose EPDS scores were above the cutpoint at both assessments; these women were termed “prepartum–postpartum depressed”.

We examined changes in functional status from pregnancy to the postpartum period in all four groups (Table 4). In both the never depressed and prepartum depressed groups, physical functioning improved dramatically from pregnancy to the postpartum period, while this was not true for both postpartum and prepartum–postpartum depressed women. Prepartum depressed women also re-

ported less pain in the postpartum period, and they perceived their general health as better postnatally than prenatally. It is of interest to note that the functional status of women who were not depressed during pregnancy but became depressed postpartum did not change in any of the 6 domains; in contrast, women who were depressed both in pregnancy and postpartum reported improved role and social functioning after the birth of the infant but continued to report relatively poor functioning in the domains of physical health.

The four groups were compared on demographic variables; no differences were found in maternal age,

Table 5. Changes from pregnancy to the postpartum period among 4 groups

Group of mothers and variable ^a	Mean (SD) value at:		Paired <i>t</i> test (<i>p</i>)
	Pregnancy	Postpartum	
Never depressed (<i>n</i> = 50)			
Perinatal anxiety	4.16 (1.95)	NA ^b	
Nr. of somatic symptoms	5.06 (3.47)	NA	
EPDS score	6.28 (3.22)	6.30 (2.93)	0.04 (0.97)
DAS total score	56.78 (6.66)	56.22 (7.62)	−0.52 (0.61)
Social support			
Nr. of network members	7.90 (4.26)	7.66 (4.31)	−0.36 (0.72)
Avg satisfaction with support	5.63 (1.02)	5.95 (1.04)	1.67 (0.10)
Avg need for support**	2.85 (0.78)	3.19 (0.83)	3.78 (0.00)
Postpartum depressed (<i>n</i> = 13)			
Perinatal anxiety	6.08 (1.85)	NA	
Nr. of somatic symptoms	7.31 (2.84)	NA	
EPDS score**	7.31 (2.21)	14.46 (2.22)	6.90 (0.00)
DAS total score	57.00 (6.96)	55.54 (6.31)	−1.33 (0.21)
Social support			
Nr. of network members	7.38 (2.72)	8.54 (3.45)	1.20 (0.25)
Avg satisfaction with support	5.99 (1.12)	5.95 (0.93)	−0.10 (0.92)
Avg need for support	2.94 (0.72)	3.09 (0.73)	0.81 (0.43)
Prepartum depressed (<i>n</i> = 16)			
Perinatal anxiety	5.38 (1.71)	NA	
Nr. of somatic symptoms	8.06 (4.26)	NA	
EPDS score**	14.25 (1.73)	8.38 (3.38)	−6.23 (0.00)
DAS total score	51.25 (9.89)	53.25 (8.57)	1.03 (0.32)
Social support			
Nr. of network members	5.94 (1.88)	6.88 (3.54)	1.66 (0.12)
Avg satisfaction with support	5.01 (1.71)	5.87 (1.04)	1.95 (0.07)
Avg need for support*	3.02 (0.96)	3.44 (0.84)	2.16 (0.05)
Prepartum–postpartum depressed (<i>n</i> = 27)			
Perinatal anxiety	5.81 (2.19)	NA	
Nr. of somatic symptoms	8.26 (3.16)	NA	
EPDS score	16.18 (3.43)	15.85 (4.03)	−0.41 (0.68)
DAS total score*	50.15 (9.80)	46.67 (11.13)	−2.05 (0.05)
Social support			
Nr. of network members	6.00 (2.80)	7.07 (5.72)	0.92 (0.37)
Avg satisfaction with support	5.18 (1.57)	5.33 (1.29)	0.60 (0.55)
Avg need for support *	3.37 (0.76)	3.70 (0.70)	2.36 (0.03)

^a Variables for which values significantly different at the two assessment times were obtained are indicated by single asterisk (*p* < 0.05) or double asterisk (*p* < 0.01).

^b NA, not measured in the postpartum period.

education, work status, or infant gender. Looking at immigration factors, postpartum depressed women were significantly more likely than women in the other 3 groups to have been resident in Canada for more than 5 years (62% vs. 38% of the never depressed group, 25% of the prepartum depressed group, and 19% of the prepartum–postpartum depressed group; $\chi^2(3) = 8.22$, $p < 0.05$). With regard to social relationships, 3 of the 4 groups of women (never depressed, prepartum depressed, and prepartum–postpartum depressed) reported a greater need for support in the postpartum period than in pregnancy.

Specific between-group comparisons serve to illuminate differences in risk factors that may predict postpartum depression, as well as factors associated with remission from depression during pregnancy. We compared the groups on somatic symptoms, perinatal anxiety and functional status, immigration factors, and relationship variables (Table 5). Because the number of cases in some of these subgroups is small, these analyses should be considered exploratory in nature.

Postpartum depressed compared to never depressed women

During pregnancy, 63 women scored below the cutpoint of 12 on the EPDS. At 2 months postpartum, 13 of these women (or 21%) reported elevated symptoms of depression. Comparing these two groups of women, we found that the postpartum depressed women differed in a number of ways from women who did not become depressed. First, the postpartum depressed women reported significantly more somatic symptoms during pregnancy (7.3 symptoms vs. 5.1 symptoms among never depressed women, Student's $t = 2.15$, $p < 0.05$). In addition, when they were pregnant, women who would become depressed postpartum reported more perinatal anxiety (mean scores of 6.1 vs. 4.2, Student's $t = -3.187$, $p < 0.01$): in particular, they were more likely than never depressed women to be worried about possible postpartum changes in couple and family relationships, as well as in their work life ($\chi^2 = 14.64$ for couple relations, 9.93 for work life, and 5.76 for relationships with relatives, $p < 0.05$ for all 3 analyses). Postpartum depressed women also differed from never depressed women in premigration stress, with the former group more likely to have immigrated to Canada for political reasons or to have personal or family experience of problems with the police or army in their countries of origin (54 vs. 26%, $\chi^2 = 3.69$, $p < 0.05$). It appears, then, that women who reported no mental health problems prenatally, but who exhibited

symptoms of depression after the birth of the infant, exhibited signs of stress and anxiety during pregnancy, reflected in somatic symptoms and worries about postpartum adjustment.

Prepartum depressed compared to prepartum–postpartum depressed women

During pregnancy, 43 women scored above the cutpoint of 12 on the EPDS. At 2 months postpartum, 16 of these women (37%) no longer scored high on the depression measure. Their remission was confirmed by improved functional status in the following 4 domains: physical functioning, mental health, bodily pain, and general health perceptions. Prepartum depressed women did not differ from prepartum–postpartum depressed women in terms of factors related to migration, such as premigration stress and length of stay in Canada. There were also no differences between the two groups in terms of prenatal depressive and somatic symptoms or in perinatal anxiety. With respect to social relationships, the two groups were comparable with respect to network size and availability of social support. However, while both prepartum depressed and prepartum–postpartum depressed women reported relatively poor marital quality during pregnancy, at 2 months postpartum, women in remission reported improved marital quality. In contrast, women who were depressed both during pregnancy and postpartum reported a continuing decline in marital quality from pregnancy to the postpartum period. By using repeated measures analysis of variance, we detected a significant difference between these two groups with respect to the changes in DAS total score ($F = 3.953$, $p = 0.05$).

Discussion

The results of this study provide further evidence that immigrant women are at risk for postpartum depression. More than one-third of the women in this community sample scored above the cutpoint for depression on the EPDS; this compares to a rate of 3.4% of women scoring 12 or higher on the EPDS in a sample of over 1500 women from the same catchment area as the current study (Zelkowitz and Milet 1995). Other studies using the EPDS as a screening tool have found prevalence rates of up to 18% (Boyd et al. 2005; Milgrom et al. 2005), considerably lower than the 37.7% prevalence in our sample of immigrant women. Of additional concern is the fact that two-thirds of the women who were depressed postpartum had been symptomatic during

pregnancy as well, indicating enduring psychological distress that may have a negative impact on marital quality and the mother–infant relationship, affect breastfeeding initiation and continuation, and have longer-term consequences for child cognitive and socioemotional development (Campbell and Cohn 1997; Grace et al. 2004; Hatton et al. 2005; Boyd et al. 2006). Behavioral dysregulation has been observed in the neonates of mothers who were depressed both prenatally and postpartum (Diego et al. 2005). The fact that the postpartum depressed women in this sample reported relatively poor functional status in several domains suggests a mechanism that may mediate between maternal mood and the quality of marital and parent–child relationships: these women report considerable pain and ill health, as well as difficulty in performing daily household tasks.

We examined 3 sets of variables that were hypothesized to be related to postpartum depression in immigrant women. The first set included symptoms of depression, somatization, and worry. The second set were relationship variables, including social support and marital quality. Variables associated with migration, including premigration stress and length of residence in the host country, constituted the third set. Overall, prenatal depressive and somatic symptoms, as well as marital quality, were the best predictors of postpartum depressive symptomatology. These results are consistent with findings in nonimmigrant community studies that prenatal depression is often a precursor of postpartum depression (O'Hara and Swain 1996; Heron et al. 2004; Robertson et al. 2004). While a lack of social support has been identified in other research as an important risk factor for postpartum depression (Small et al. 2003; Dennis et al. 2004; Robertson et al. 2004), the current study found few differences between depressed and nondepressed women in terms of network size, need for support, and satisfaction with available support. However, the quality of the marital relationship proved to be a significant predictor of postpartum depression. Support from the partner may be of particular importance in protecting women from postpartum depression (Dennis and Letourneau 2007), and it is possible that among immigrant women whose family and friends remain in the country of origin, the relationship with the spouse takes on even greater significance. If immigrant women who lack the traditional support of female relatives during the postpartum period have expectations of spousal support that are divergent from the spousal role in the country of origin, marital strain may result.

Somatic symptoms during pregnancy appear to be an important risk factor for postpartum depression among immigrant women. Research in primary care indicates that patients reporting 6 or more somatic symptoms are likely to have a diagnosis of a depressive or anxiety disorder (Kroenke et al. 1997): the mean number of somatic symptoms during pregnancy in our postpartum depressed group was 7.95. A somatic presentation of psychological distress is common in many cultures (Bashiri and Spielvogel 1999; Kirmayer 2001), and in fact, may legitimize help-seeking. Not only did the depressed women in our sample report numerous specific somatic symptoms during pregnancy, they reported poor general health and significant levels of bodily pain. It is of interest to note the numerous prenatal somatic complaints among women who were not depressed during pregnancy but reported high levels of depressive symptoms in the postpartum period. This stands in marked contrast with women who were depressed prenatally but not postpartum, whose physical functioning improved significantly from pregnancy to the postpartum period. From a clinical standpoint, these results highlight the importance of considering the presence of somatic symptoms as a possible indicator of psychological distress in pregnant immigrant women, which may warrant further investigation. At the same time, it would be important to rule out the presence of medical illness that may underlie the somatic complaints, since recent immigrants may exhibit undetected infectious disease (Hyman 2004). It should be noted, however, that more recent immigrants are at lower risk than those who have been resident in the host country for longer periods for obstetrical complications (Ray et al. 2007).

Premigration stress was associated with the development of postpartum depression among women who had not been depressed during pregnancy. It has been well established that stressful life events are a risk factor for postpartum depression (Dennis et al. 2004; Robertson et al. 2004). This subgroup of postpartum depressed women also reported considerable worry about postpartum work and family relationships. Like somatic symptoms, the experience of prenatal worries may be a precursor of postpartum depressive symptoms (Robertson et al. 2004; Austin et al. 2007). It is possible that these women constituted a high-risk group who managed to cope adequately during pregnancy but exhibited less adequate psychological adjustment when faced with the additional stressor of caring for the newborn infant.

An examination of the differing trajectories from pregnancy to the postpartum period suggests that women

with relatively few somatic complaints, low levels of perinatal stress, and satisfactory marital relations were less likely to exhibit mental health problems during pregnancy and postpartum. Women who were not depressed prenatally but reported postpartum depressive symptomatology did in fact exhibit several predisposing risk factors during pregnancy: many somatic complaints, high perinatal anxiety, and premigration stress. In this group of postpartum depressed women, there was no change in functional status between pregnancy and the postpartum period. This differentiates postpartum depressed women from women in the 3 other groups, all of whom reported some improvement in functional status from pregnancy to the postpartum period. In contrast, women who had remitted from depression during pregnancy reported better functional status, particularly in relation to physical health and bodily pain. It is possible that this group of women found the physiological changes of pregnancy to be particularly challenging, but following delivery both their physical and mental health improved, as did their marital relationships. This was not the case for women who were depressed both prenatally and postpartum: there were no changes in physical functioning, and marital satisfaction actually declined from pregnancy to the postpartum period.

The research reported here has a number of limitations that must be acknowledged. First, clinical interviewing was not used to confirm a diagnosis of postpartum depression. While a score above the cutpoint of 12 on the EPDS represents a high probability of a diagnosis of a depressive disorder, the screening measure may also yield a certain number of false positives. It should be noted that diagnostic interviewing has seldom been employed in research with childbearing immigrant women. While the EPDS has been validated in many cultures, research that demonstrates its validity in relation to clinical interview with immigrant mothers is much needed. In addition, data on help-seeking among depressed pregnant women would have been useful in understanding the trajectories from pregnancy to the postpartum period. Moreover, as noted above, the relatively small numbers of women in the prepartum, prepartum–postpartum, and postpartum depressed groups render the findings comparing these groups as exploratory. However, since there has been very little research on such trajectories in immigrant women, these data provide a basis for future studies in this area.

The present research expands our understanding of the factors that place immigrant women at high risk for

postpartum depression. Screening efforts should include assessment not only of depressive symptomatology but also of somatic symptoms and the quality of the marital relationship. Women who have personal or family experiences of trauma in their countries of origin may also be at greater risk, which may manifest itself primarily in physical symptoms and worries about postpartum adjustment, rather than symptoms of depression. Further research is required to determine the types of interventions and services that would be appropriate for childbearing immigrant women and their families.

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