# Changes in Women's Mental and Physical Health from Pregnancy Through Six Months Postpartum

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A longitudinal study was conducted to investigate changes in women's mental and physical health around the time of childbirth, and to determine whether health was related to length of maternity leave. Thirty-seven married, employed first-time mothers completed questionnaires during pregnancy, and again at 6 weeks, 3 months, and 6 months postpartum. Results showed that, from pregnancy to the 6th postpartum month, the number of days that mothers were ill because of infections steadily increased. In addition, depressive symptoms for new mothers rose from pregnancy to the 6th week postpartum, and declined thereafter. For women who did not return to work during the period of the study, a significant decline in depressive symptoms was observed from the prenatal period through the 6th postpartum month. These findings demonstrate significant changes in mental and physical health for this group of first-time mothers. *J Fam Pract 1991; 32:161–166.*

From the time a woman first becomes pregnant, she experiences changes in her health that result from pregnancy.[1] Although many of these changes are physiologic and resolve soon after delivery, others may contribute to physical or emotional disorders that persist for some time. In fact, several health disturbances may continue up to and beyond the traditional 6 weeks that was thought to be adequate for postpartum recovery.[2–4] In Fawcett and York's[4] study of 23 women at approximately 6 weeks postpartum, the following symptoms were frequently reported: tiredness (65%), anxiety (61%), depression (43%), and constipation (43%). Most of the women said that their symptoms had begun within the 1st week and continued through the 6th postpartum week. Other problems that may persist beyond the first few weeks after delivery include sexual concerns, mental disorders, thyroid disease, sleep disturbances, carpal tunnel syndrome, excessive vaginal bleeding, gynecologic and urologic infections, and stress incontinence.[3,5–9]

Postpartum mental disturbances may also persist for months or even years. In Kumar and Robson's[5] study of 119 primiparas, one half of the women who had received psychiatric help in the early postpartum period experienced recurrent psychiatric problems at some time during the subsequent 3 years.

The rate of postpartum recovery may be affected by several factors, one being the length of maternity leave that employed mothers have after giving birth. The impact of maternity leave on postpartum health is a timely consideration because currently over one half of women with infants in the United States are employed.[10] Although mothers' participation in the work force is increasing, very little information is available about how length of maternity leave and other job-related benefits affect their postpartum health. Tulman and Fawcett's[11] recent longitudinal study of 50 mothers provides some evidence that mothers who return to work part-time after giving birth have greater participation in household and community activities than mothers who return to full-time work. If the amount of time spent at a job is related to postpartum health, it is possible that the timing of return to work would also be related to mothers' health.

Although the literature indicates that mothers may experience a variety of postpartum emotional and physical health disorders, and that these disturbances may last for weeks or months after delivery, it does not provide a clear description of exactly how mothers' health changes over time or whether these health changes are related to length of maternity leave. The purpose of this study was to determine how mothers' mental and physical well-being changes from pregnancy through 6 months post-

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partum and to determine whether length of maternity leave is related to postpartum recovery.

## Methods

### *Design*

In this prospective study, women pregnant with their first child were asked to participate by completing a questionnaire during the last half of their pregnancy, and again at 6 weeks, 3 months, and 6 months postpartum. Pregnant women who visited one of three obstetric clinics in St Paul, Minnesota, from December 1984 through August 1986, were introduced to the study by posters, letters of introduction, and enrollment forms placed in the registration area. Receptionists at the clinics were asked to encourage patient participation in the study. Women who qualified for the study and agreed to participate completed the enrollment form and were given a prenatal questionnaire during the visit. Follow-up questionnaires were mailed to participants' homes, and reminder calls were made when questionnaires were not returned within 10 to 14 days.

### *Subjects*

Subjects for the study consisted of women who (1) had no children already living in their household, (2) were married, (3) were at least 18 years of age, (4) were employed at least 20 hours a week, (5) were at least 20 weeks pregnant, and (6) attended one of the following three St Paul obstetric clinics: Twin City Obstetrics and Gynecology, and two branches of Parkview Women's Center. Women who were less than 20 weeks pregnant were not included because of the possibility of miscarriage in the early months of pregnancy. The application of the other inclusion criteria was intended to assure a sample that was homogeneous on variables not under study, thereby permitting a smaller sample size and increasing the efficiency of the study.

### *Measures*

A list of the measures for the dependent and independent variables in this study is shown on Table 1. Because this study was intended as a pilot, the questionnaires included several measures of mental and physical health as potential dependent variables. The analysis focused on the subjects' responses to two physical and two mental health measures.

Physical health was assessed by a somatization scale and mothers' recollection of the days they had been ill with infections during the past month. The somatization questions, taken from the somatization scale of the Hopkins Symptom Checklist,[12] asked the participant to indicate the degree to which she had experienced the following problems over the previous week: feeling low in energy or slowed down; having trouble getting her breath; having hot or cold spells, a lump in her throat, headaches, and faintness or dizziness. Responses were made on a scale from 1 to 4, where 1 = not at all, 2 = a little, 3 = quite a lot, and 4 = extremely.

Table 1. Variables Included in Study of Postpartum Women

| Dependent Variables | Independent Variables |
|---|---|
| Physical health | Length of maternity leave |
| Days ill | Postpartum interval |
| Somatization | |
| Mental health | |
| Depressive symptoms | |
| Self-esteem | |

The Hopkins Symptom Checklist is a self-report symptom inventory consisting of 58 items. Previous factor analysis of the items has revealed five symptom dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, anxiety, and depression.[12] This survey has been tested on 2500 subjects, including 1800 psychiatric outpatients and 700 normal subjects. Reliability tests show high internal consistency (0.84–0.87) and high test-retest reliability (0.75–0.84). Criterion-related validity of the checklist has been demonstrated by its sensitivity to psychotropic drugs given to psychiatric patients and by an expected differentiation of scores between normal and anxious or neurotic gynecological patients. In addition, construct validity has been shown by studies that rank patient groups in a manner similar to that suggested by clinical practice and independent external criteria.[12]

Mental health was assessed by measuring depressive symptoms and self-esteem. Questions about depressive symptoms were taken from the depression scale of the Hopkins Symptom Checklist,[12] and included the following items: feeling lonely, feeling trapped or caught, blaming herself for things, crying easily, feeling hopeless about the future, experiencing a poor appetite, a loss of sexual interest or pleasure, having thoughts of ending her life, and feeling generally blue. Responses were made on a scale from 1 to 4 as described earlier for somatization.

The self-esteem scale consists of 10 items developed by Rosenberg[13] to measure self-acceptance or self-worth, and each item has a response scale from 1 to 4, where 1 = strongly agree, and 4 = strongly disagree. Previous tests on this scale have shown a 93% reproducibility, 73% item scalability, and 72% individual scalability.[13] The self-esteem scale has been used in numerous research

settings and has been specifically used in obstetric research to determine the effects of psychosocial variables on pregnancy complications. In that setting, the self-esteem scale was found to have a 0.85 test-retest reliability over a 2-week period, and a 0.57 mean concurrent validity with other self-esteem measures.[14]

Independent variables used in the analysis included maternity leave length and postpartum interval. Maternity leave length, the grouping variable, consisted of four groups: those who returned to work within the first 6 weeks, those who returned after 6 weeks but before 3 months, those who returned after 3 months but before 6 months, and those who did not return to work during the 6 months of the study.

The postpartum interval refers to the time lapsed since delivery. Because women responded to questionnaires at four specific times—before delivery, and at 6 weeks, 3 months, and 6 months postpartum—these four points in time were used in the analysis.

### *Analysis*

Only women who completed all phases of the study were included in the analysis. Internal consistency reliability for the depression, somatization, and self-esteem scales were evaluated using Cronbach's coefficient alpha. Analysis of variance using multivariate analysis of variance (MANOVA)[15] was performed for depression, self-esteem, days ill, and somatization. Two independent variables consisted of changes over time and length of maternity leave. Women were assigned to one of four "length of leave" groups—less than 6 weeks (n = 6), 6 weeks to 3 months (n = 12), 3 to 6 months (n = 9), and more than 6 months (n = 10)—on the basis of their response to the question included in each postpartum questionnaire: "Have you returned to work?" Profile analysis[16,17] was used to conduct a metric-corrected trend analysis on changes in depression over time.

## Results

Of the 61 women who qualified for the study, 54 agreed to participate and were enrolled in the study. Thirty-seven women (69% of the original sample, and 61% of eligible women) completed all four questionnaries. All the participants were white, and ranged in age from 21 to 40 years, with a mean age of 27.1 years (SD = 3.8 years). On the average, they had had 14.7 years of education (SD = 1.9 years); 40.5% had college degrees, and 5.4% had graduate degrees.

Information gathered about the participants' employment showed that 22 (60%) of the women held clerical or technical jobs, 10 (27%) had professional positions, 3 (8%) had managerial responsibilities, and the remaining 5% had other job classifications. The respondents' average annual salary was $15,000 to $20,000 while their husbands' average annual salary was $20,000 to $25,000. The women's employers provided an average of 4.6 weeks (SD = 4.6 weeks) of paid maternity leave, and would allow an average total leave (paid + unpaid) of 20.3 weeks (SD = 24.0 weeks). This average allowable leave was somewhat less than the mean desired leave of 24.7 weeks (SD = 14.7 weeks). The number of women who had returned to work at each postpartum phase of the study is as follows: 6 (16%) had returned to work by 6 weeks postpartum, 12 (32%) had returned between 6 weeks and 3 months postpartum, 9 (24%) had returned between 3 and 6 months postpartum, and 10 (27%) had not returned to work during the time of the study.

When the 37 participants were compared with women who were disqualified from the study because of incomplete data sets, there were no differences between the two groups in age, education, total family income, somatization, self-esteem, and days ill recorded in the prenatal questionnaires. The two groups differed significantly on only one measure: the participants had higher depression scores than the nonparticipants (mean = 12.5, 10.9; $T^2 = 2.13$, $df = 52$, $P < .05$). The two groups were therefore considered to be quite similar.

Reliability tests for three dependent measures showed the following standardized item alpha values at 3 months postpartum: .70 for depression, .50 for somatization, and .87 for self-esteem.

The combination of independent and dependent variables resulted in a 4 × 4 × 4 doubly multivariate design (four levels of the grouping factor by four levels of the repeated measure by four dependent measures). The design and cell means are depicted in Table 2. A MANOVA was performed on these data.

### *Changes in Health Over Time*

The results show changes over time for depressive symptoms ($T^2 = 9.79$, $P < .05$) and days ill ($T^2 = 22.91$, $P < .001$), as shown in Figure 1. The number of days ill steadily increased for the entire group from pregnancy through the 6th postpartum month. A metric-corrected trend analysis using multivariate profile analysis confirmed this linear increase in days ill over time ($F = 17.03$; $df = 1, 6$; $P < .001$). Mothers' experience with depressive symptoms was somewhat different: for the group as a whole, symptoms peaked at the 6th postpartum week and declined thereafter. The time effects were not significant for somatization or self-esteem.

Table 2. Health Measure means (Standard Deviations) for Four Maternity Leave Groups During Four Investigation Periods

| Maternity Leave Group | Health Measures* | TIME INTERVALS Predelivery | 6 Weeks Postpartum | 3 Months Postpartum | 6 Months Postpartum |
|---|---|---|---|---|---|
| <6 weeks | Depression | 11.7(1.5) | 12.5(2.4) | 13.5(2.3) | 11.2( 2.0) |
| | Somatization | 8.2(3.3) | 9.3(3.5) | 9.5(2.3) | 8.2( 2.9) |
| | Days ill† | 0.9(1.0) | 1.5(3.7) | 0.3(0.8) | 6.0(11.1) |
| | Self-esteem | 35.5(4.0) | 36.8(4.4) | 36.0(5.1) | 36.7( 4.1) |
| 6 weeks to 3 months | Depression | 11.1(2.6) | 13.9(3.1) | 11.7(2.9) | 13.3( 4.8) |
| | Somatization | 8.7(1.6) | 8.9(1.9) | 8.7(1.9) | 8.7( 2.4) |
| | Days ill | 0.5(0.4) | 2.1(4.1) | 1.3(2.8) | 3.1( 3.3) |
| | Self-esteem | 34.5(5.5) | 33.9(4.5) | 35.0(4.2) | 33.1( 4.6) |
| 3 months to 6 months | Depression | 12.8(2.5) | 13.8(3.9) | 12.2(2.8) | 11.7( 1.9) |
| | Somatization | 8.4(2.0) | 7.9(1.8) | 7.8(1.8) | 8.8( 2.1) |
| | Days ill | 0.4(0.4) | 2.7(5.5) | 3.6(6.4) | 4.2( 4.7) |
| | Self-esteem | 32.9(2.5) | 32.6(5.8) | 35.0(4.2) | 34.4( 3.2) |
| >6 months | Depression | 14.5(2.4) | 13.9(3.6) | 12.7(3.3) | 12.1( 2.5) |
| | Somatization | 8.1(1.5) | 9.0(2.1) | 8.2(2.0) | 7.2( 0.4) |
| | Days ill | 0.8(0.9) | 0.4(1.0) | 3.1(5.0) | 5.7( 4.7) |
| | Self-esteem | 33.2(3.7) | 33.7(3.2) | 35.2(4.0) | 35.4( 2.7) |

**Depression, somatization, and self-esteem scores were calculated by summing numerical responses for each subscale. Individual questions were answered using a scale from 1 to 4, and the number of questions within each scale was: depression, 9 items; somatization, 6 items; and self-esteem, 10 items. The higher the score, the greater the depression, somatization, or self-esteem.*

*†Days ill represents the total number of days ill with any infection over the previous month.*

### *The Effect of Length of Maternity Leave on Health*

The data failed to show a maternity leave group effect for any of the four measures; however, there was a significant overall time-by-group interaction for depressive symptoms ($T^2 = 28.05$, $P < .01$). Analysis of the changes in depressive manifestations over time for each of four separate maternity leave groups showed no significant time effects for the 6-week, 3-month, and 6-month leave groups, but there was a significant change in such symptoms over time for those mothers who did not return to work during the 6-month study period ($T^2 = 6.95$, $P < .05$).

To further investigate the effect of time on depressive symptoms for this latter group, a metric-corrected trend analysis was again performed. The results showed that the change in symptoms for those who did not return to work within 6 months was linear, with a steady decline from predelivery to 6 months postpartum ($F = 36.72$; $df = 1, 6$; $P < .001$). Figure 2 suggests that these effects may be the result of self-selection bias; that is, the mothers who did not return to work within 6 months appeared to have had more emotional problems predelivery. Examination of the simple main effect of group at the predelivery data point confirms that the groups differed significantly with respect to predelivery depressive symptoms ($F = 4.03$; $df = 3, 33$; $P < .05$). The groups did not differ in their depressive complaints at any other time.

## Discussion

These results show that, for this population of first-time, married, and recently employed women, there were changes in physical and mental health from pregnancy through 6 months postpartum. Specifically, the number of days ill secondary to infections steadily increased during this period, while depressive symptoms peaked at 6 weeks postpartum and gradually declined thereafter. It should be noted that this study did not intend to diagnose depression, but rather to follow changes in depressive-type symptoms over the course of several months. The findings related to the participants' depressive symptoms, however, may reflect their experience with postpartum depression. In fact, these findings are somewhat similar to those of a previous study[5] of 119 first-time mothers, which showed increases in depressive neurosis early in pregnancy and again during the first 3 months after delivery. Somewhat different results were found by Buesching et al,[18] who showed a peak in depression prenatally but not postnatally.

Although the phenomenon of postpartum depression is fairly well known, less is known about its causes or timing. It is possible that a number of factors unique to the postpartum period contribute to depression, including biological, psychological, cognitive, life-event, and social influences.[2] Furthermore, it is likely that the occurrence or timing of depression is related to a woman's unique experience with these factors.

The progressive increase in days ill from pregnancy through the 6th postpartum month is a remarkable find-

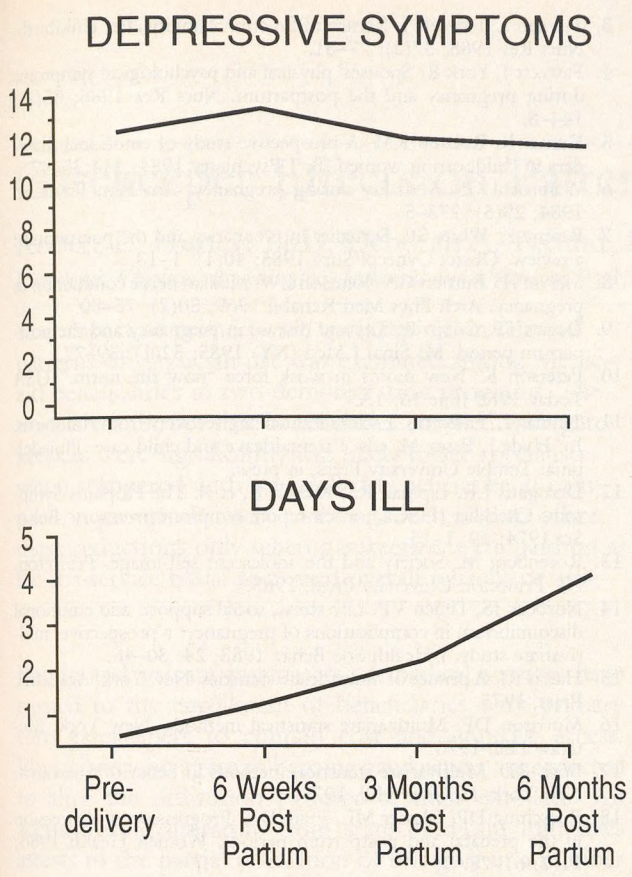


Figure 1. Significant changes over time in health measures for entire sample (for depressive symptoms, $T^2 = 9.8$, $F = 3.06$, $df = 31$, and $P < .05$; for days ill, $T^2 = 22.9$, $F = 7.17$, $df = 31$, and $P < .001$).

ing. Mothers' increasing rates of infectious illnesses might be explained on the basis of infections transmitted by their infants, who in turn become increasingly exposed to infectious diseases through their day-care contacts. It is also possible that the mothers experienced increased levels of stress as they resumed their job responsibilities and other activities in the months following childbirth, and these stresses may have predisposed them to physical illnesses. These possibilities should be explored in future investigations.

For women who did not return to work during the course of the study, levels of depressive symptoms were highest at the prenatal period and progressively declined thereafter. This finding may be a result of self-selection bias; that is, mothers who feel depressed during pregnancy may choose not to return to work, or to delay their return to work, following their delivery. One wonders what would happen to women who feel depressed during pregnancy and do not have the option of taking a longer maternity leave. Research with women of lower socioeconomic status than those in this study could provide an answer to this question.

In contrast to depressed expectant mothers, women who feel well during pregnancy may wish to return to work relatively soon after delivery, and this early resumption of job-related activities might result in subsequent symptoms of depression; this trend was in fact observed with the under 6-week maternity leave group. A similar trend was seen with the 6-week to 3-month maternity leave group, which showed a secondary increase in symptoms of depression at the 6-month period. It was not possible to substantiate this pattern with the 3-month to 6-month group because data points beyond the 6th month were not obtained. Further research is needed to determine whether this peak in emotional difficulties after the maternity leave is real, and if so, whether it occurs only in women who have relatively short maternity leaves.

This study has several limitations. The sample was small and not necessarily representative. These mothers had higher income and educational levels than the average American woman, and all were residents of a single metropolitan area. In addition, the participants were volunteers, and the health of women who chose not to participate in the study was not measured. While the health measures used in this study provided some useful information about postpartum health changes, other health measures might be explored for future studies. For example, a standardized measure of depression that has been shown to correlate with clinical depression might be helpful. Finally, although the discussion at times implies cause-and-effect relationships, this study does not address the direction of causation. Future studies are thus needed

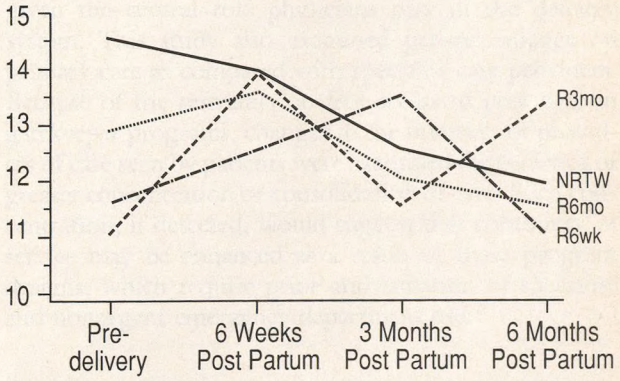


Figure 2. Changes in depressive symptoms over time for four maternity leave groups. The four maternity leave groups are R6wk (returned to work before 6 weeks), R3mo (returned to work after 6 weeks, but before 3 months), R6mo (returned to work after 3 months, but before 6 months), and NRTW (did not return to work before 6 months).

to determine, for example, whether depression during pregnancy reduces the likelihood of returning to work after delivery or whether prenatal depression might result from a decision made during pregnancy not to return to work after the baby is born.

These results showed dynamic changes in postpartum mental and physical health for this group of women, and the changes appeared to continue at least through the 6th postpartum month. Although trends were observed in the relationship of maternity leave length to health, additional studies are needed to confirm these findings. Certainly the postpartum period is an important time for mothers and their infants, and efforts should be made to determine ways to optimize mothers' health during this critical time.

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