

The Psychosocial Work Environment and Maternal Postpartum Depression

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Abstract

Background Postpartum depression is a debilitating mental disorder affecting women after childbirth. This study examined the correlates of postpartum depression at 11 weeks after childbirth, focusing on work-related stressors and applying the job demand–control–support model. **Method** Investigators recruited a prospective cohort of 817

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employed Minnesota women when hospitalized for childbirth in 2001. Trained interviewers collected data in person and by telephone at enrollment and 5 and 11 weeks postpartum from three Minneapolis and St. Paul hospitals. **Results** Results of hierarchical regression analysis showed that worse depression scores (Edinburgh Postnatal Depression Scale) were associated with higher psychological demands, lower schedule autonomy, and lower perceived control over work and family. Perceptions of control mediated the relationships of coworker support and schedule autonomy with postpartum depression scores. Study findings showed no significant buffering effects for decision latitude; however, coworker support and decision latitude appear to act as functional substitutes in reducing postpartum depressive symptoms.

Conclusion These findings raise questions about the applicability of the job demand–control–support model to postpartum women or to postpartum depression. Future research could assess the impact of the interaction between the work and home environment on maternal postpartum depression.

Keywords Demand–control–support model · Job control · Psychosocial factors · Postpartum depression · Maternal welfare

Introduction

Postpartum depression is an incapacitating mental disorder that affects around 10–15% of women after childbirth [1, 2]. This disorder manifests itself in multiple symptoms ranging from insomnia, fatigue, anxiety, and inability to concentrate to loss of all hope and suicidal ideation [3]. While the Diagnostic and Statistical Manual of Mental Disorders-IV states that postpartum depression begins

within 4 weeks after childbirth [4], studies show that the highest risk of postpartum depression occurs during the first 3 months after childbirth [5]. Postpartum depression negatively affects a mother's quality of life [6], her close relationships [7], and may have long-term effects on children's emotional and cognitive development [8].

Depression among US workers costs employers \$44 billion per year in lost productivity and another \$12.4 billion in health care costs [9, 10]. Few studies have investigated the relationships between work characteristics and postpartum depression, despite the facts that 54% of mothers of infants participated in the US labor force in 2003 [11], and among first time mothers employed during pregnancy, 58% returned to work by 3 months postpartum [12]. In this study, we apply two theories—the stress process and the job demand–control–support model to estimate the determinants of postpartum depression among employed women at 11 weeks after childbirth.

Theoretical Framework

Causes of postpartum depression are not well established, but biological and psychosocial factors are implicated. Low postpartum serum concentrations of progesterone, triiodothyronine/thyroxine, estradiol, cortisol, and corticotropin-releasing hormone were reported as possible endocrine-related etiologies [13]. There is also an established literature in medical sociology and psychiatric epidemiology describing the psychosocial factors associated with mental illness [14], which is the focus of our paper.

Pearlin's [15] prominent stress theory has been applied to postpartum depression. In this framework, stress is a complex multidimensional process involving stressors, moderating resources, and stress outcomes. Stressors are conditions that produce stress, such as life events and chronic stressors (e.g., marital, parenting, or employment problems). Moderating resources "prevent or reduce the impact of stressors on outcomes" (e.g., social support, coping, and mastery; [15], p. 404). Stress outcomes are how stressors and moderating resources manifest themselves within individuals as health problems such as postpartum depression.

Previous research has shown stressors such as life events experienced during pregnancy [16], infant illnesses [17, 18], and difficult infant temperament [16] to be positively associated with postpartum depression. Consistent evidence shows that the moderating resource, family social support, is associated with decreased risk for postpartum depression [16, 17]. Social support also appears to buffer the impact of difficult infant temperament [16] on postpartum depression. Based on Pearlin's [15] stress process, one might expect that negative and unexpected events that women are exposed to during the postpartum period in addition to chronic stressors

associated with their roles as mothers or workers may contribute to the risk of postpartum depression. However, few studies have investigated postpartum depression in relation to a prominent chronic stressor in contemporary women's lives: work conditions. Work-role quality has been consistently found to have a significant relationship with psychological distress measures in women, such as anxiety and depression [19].

The well-known job demand–control model [20] posits that the combination of heavy psychological job demands and limited degree of control or decision latitude results in high job strain and adverse health effects. The two-dimensional demand–control model was expanded to include support by supervisors and coworkers, a variable posited to buffer the impact of demands and control on health outcomes [20]. According to Karasek and Theorell [20], high psychological job demands cause a state of arousal (e.g., increased adrenaline levels). Given an environmental constraint such as low decision latitude, the state of arousal is converted into harmful, residual strain such as depression. This study contributes to the literature on the demand–control–support model by being the first to investigate its application to maternal postpartum depression.

Schedule autonomy is a dimension of control rarely addressed by research on the demand–control model. Kossek, Lautsch, and Eaton [21] argued that the literature on job autonomy has measured autonomy in "how the work is done" and has failed to capture essential dimensions of this construct such as "autonomy over where and when one works" (p. 251). Schedule autonomy may play an important role among new mothers who are simultaneously trying to balance work and family roles while integrating the around the clock needs of their infants into their daily schedules. Kossek, Lautsch, and Eaton [22] tested the demand–control model using a measure that incorporated schedule autonomy and found job control to be negatively associated with depression.

Individuals' perceptions of control may also be associated with postpartum depression. Perceived control reflects an individual's beliefs about personal ability to influence or adjust to one's environment [23]. Employees' perceptions of control have been shown to be negatively associated with psychological health outcomes including depression [23, 24]. Perceived control is a coping resource that may act as both a mediator and a moderator in the relationships between stressors and stress outcomes [15].

Methods

Sample Description

This study utilized data collected in 2001 as part of a larger study from three metropolitan hospitals in Minneapolis–Saint

Paul (Twin Cities) of Minnesota, USA. The study population consisted of women 18 years or older, and delivering a live, single infant at selected hospitals. Inclusion criteria were that women spoke English, had been employed during pregnancy, planned to work after childbirth, and had a generally healthy infant without neonatal complications. Out of an eligible population of 1,157 women, 817 women agreed to participate in the study (71% enrollment rate). State vital statistics data revealed that the study population was similar to all birth mothers from all non-study site hospitals providing childbirth services in the Twin Cities metropolitan area in relation to maternal demographic characteristics and the infants' average gestational age and birth weight. This study was approved by the institutional review boards for protection of human subjects at all participating hospitals and the University of Minnesota.

Perinatal nurses interviewed enrolled subjects in the hospital. University research personnel conducted telephone interviews at 5 and 11 weeks after delivery, with 88% ($N=716$) and 81% ($N=661$) response rates, respectively. This study utilizes data from the 638 women who completed the questionnaires at enrollment, 5 and 11 weeks postpartum. Statistical comparisons of the 638 women to the 179 women who missed at least one interview revealed that the included participants were significantly more likely to be white, married, older, college educated, have fewer children, and have a higher household income. Most women in the study sample were white (87%), married (76%), and reported their annual household incomes to be above the income threshold for poverty in the state (86%). The mean age was 30 years ($SD=5.3$), 46% were first-time mothers, and 46% reported prenatal mood disturbances. Women had worked an average of 38 h per week ($SD=4.0$) pre-delivery. Seven percent of the women had returned to work by 5 weeks postpartum and 49% by 11 weeks.

Measures

Data on the outcome and explanatory variables were collected using telephone interviews at approximately 11 weeks after childbirth ($M=11.2$; $SD=1.2$). Data for potentially confounding covariates (control variables) were collected at enrollment, 5, or 11 weeks postpartum as detailed below.

Postpartum Depression The outcome variable was measured using the Edinburgh Postnatal Depression Scale (EPDS; [25]). This scale consists of ten short statements about how the mother felt during the past 7 days, with four response categories ranging from 0 to 3 according to increased symptom severity.

Explanatory Variables The 18-item scale of decision latitude and psychological demands was taken from the

Job Content Questionnaire [26]. Items were evaluated on a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) and scored per Karasek [26].

Schedule autonomy consisted of two items taken from Quinn and Staines [27]: “if you were working and needed to temporarily take care of personal or family matters, how hard would it be to: (1) take time off during the workday, and (2) change the hours you begin and end work”. Each item was evaluated on a Likert scale ranging from 1 (very hard) to 4 (not at all hard). The two items were summed (Cronbach's $\alpha=0.74$).

Coworker support consisted of one item adapted from Bond and colleagues [28]: “My coworkers have been supportive of me when I have had to take care of personal or family matters.” It was evaluated on a Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree), and responses were subsequently collapsed into three categories by combining “strongly disagree” and “somewhat disagree” to address the skewed distribution of the data.

Perceived control consisted of one item adapted from Mardberg, Lundberg, and Frankenhaeuser [29]: “Since your baby was born, how much control have you had over the time and effort spent caring for family, doing home chores and paid work?” It was evaluated on a Likert scale ranging from 1 (none) to 5 (complete).

Control Variables Based on a priori causal assumptions, several covariates pertaining to demographic, socioeconomic, and health factors that could confound the relationship between job characteristics and postpartum depression were included as control variables. Age, race, education, marital status, and poverty measures were collected in person at enrollment. The poverty status measure was constructed by investigators using income guidelines for Minnesota At-Home Infant Child Care Program (Minnesota Department of Human Services [30]). The prenatal mood disturbances measure was taken from McGovern and colleagues [31]: “During this pregnancy did you ever have a problem with your mood, such as feeling depressed or anxious?” and was assessed at enrollment. Occupation (blue collar/service; clerical; professional=reference) was evaluated at 5 weeks postpartum. Leave status (1=working; 0= on leave) was assessed at 11 weeks.

Results

The means, standard deviations, and correlations of all study variables are presented in Table 1. Correlations among the variables were low, with the highest correlation being between poverty status and marital status ($r=-0.41$). The mean EPDS score indicated relatively low levels of postpar-

Table 1 Means, standard deviations, and correlations for study variables

Variable	M	SD	1	2	3	4	5
1. Postpartum depression	4.19	3.95	–				
2. Age	30.05	5.26	–0.08*	–			
3. Marital status (1 = married)	0.76	0.43	–0.08*	0.38**	–		
4. Race (1 = white)	0.87	0.34	–0.13**	0.23**	0.28**	–	
5. College educated (1 = yes)	0.49	0.50	–0.09*	0.31**	0.39**	0.24**	–
6. Blue collar/service = 1	0.14	0.35	0.06	–0.20**	–0.15**	–0.06	–0.29**
7. Clerical = 1	0.38	0.48	–0.02	–0.16**	–0.21**	–0.11**	–0.34**
8. Meets state poverty threshold (1 = yes)	0.13	0.34	0.10**	–0.28**	–0.41**	–0.36**	–0.31**
9. Prenatal moods (1 = yes)	0.46	0.50	0.27**	–0.00	–0.03	–0.05	–0.07
10. Leave status (1 = working)	0.49	0.50	0.01	–0.24**	–0.22**	–0.12**	–0.29**
11. Psychological demands	31.83	5.47	0.09*	0.04	0.02	0.03	0.06
12. Decision latitude	71.71	11.09	–0.04	0.22**	0.21**	0.17**	0.37**
13. Schedule autonomy	5.79	1.90	–0.17**	0.12**	–0.02	0.07	0.01
14. Coworker support	2.79	0.46	–0.12**	0.02	0.06	0.07	0.02
15. Perceived control	3.58	0.86	–0.26**	0.00	–0.05	0.03	–0.05

* $p < .05$. ** $p < .01$.

tum depressive symptoms in this sample. Using a 12.5-threshold score [25], prevalence of postpartum depressive symptoms was 4.7% ($n=30$) at 11 weeks after childbirth.

Three types of statistical analyses were conducted. The first was a hierarchical regression analysis that tested the demand–control–support model. The second was a Chow test that tests whether this hierarchical regression model differed for those who were on leave versus those who were back to work at 11 weeks after delivery. The third analysis tested the mediating effect of perceived control in the relationships of decision latitude, schedule control, and coworker support with postpartum depressive symptoms.

Table 2 summarizes the results from the hierarchical regression analysis¹. To prevent multicollinearity [33], we mean-centered psychological demands, decision latitude, and coworker support and then computed the interaction terms. Model 1 reveals that control variables explained 9% of the variance in postpartum depression scores. In model 2, decision latitude had no significant association with postpartum depression scores, whereas higher psychological demands were significantly associated with these scores. In model 3, schedule autonomy had a significant negative relationship with postpartum depression scores. In contrast, coworker support did not show a significant association. In model 4, perceived control was negatively associated with postpartum depression scores and explained 5% of the

variance. Model 5 did not support a moderating role for decision latitude in association with psychological demands. In model 6, there was a significant three-way interaction between coworker support, decision latitude, and psychological demands.

The Fig. 1 illustrates this three-way interaction. As specified by Aiken and West [33], we restructured the regression equations into simple regressions of postpartum depression scores on decision latitude, given the conditional values of coworker support ($M+1$ SD; $M-1$ SD) and psychological demands ($M+1$ SD; $M-1$ SD). Under conditions of low psychological job demands, higher decision latitude was associated with worse postpartum depression scores for women with high coworker support ($b=4.79$), $t(630)=2.96$, $p<0.01$. But if we compare the intercepts for women with low psychological demands, women with high coworker support have much lower depression scores than those with low coworker support. Thus, although decision latitude increases postpartum depression scores, these scores remain well below average for these women. For women with low coworker support, higher decision latitude was associated with better postpartum depression scores, although with less statistical precision ($b=-3.55$), $t(630)=1.91$, $p=0.056$. These findings suggest that in jobs with low psychological demands, coworker support may substitute for decision latitude. Thus, decision latitude appears beneficial when coworker support is low. Under conditions of high psychological job demands, the association between decision latitude and postpartum depression scores did not reach statistical significance for women with high coworker support or for women with low coworker support. However, the three-way interaction only explained a small amount of additional variance (0.6%) in postpartum depression scores (Table 2).

¹ Interactions between schedule autonomy and psychological demands and between perceived control and psychological demands were tested using hierarchical regression analysis and found to be statistically non-significant. This may be due to the fact that we do not have a corresponding measure of schedule or time demands as recommended by the stress-matching hypothesis (Cohen and Wills [32]. Thus, we decided not to include those interactions in the analyses presented in this paper to keep our model parsimonious.

Table 1 (continued)

6	7	8	9	10	11	12	13	14	15
–									
–0.31**	–								
0.14**	0.12**	–							
0.05	–0.04	–0.11**	–						
0.21**	0.11**	0.18**	–0.03	–					
–0.04	–0.16**	–0.11**	–0.01	–0.13**	–				
–0.06	–0.34**	–0.12**	–0.07	–0.09*	0.11**	–			
–0.07	0.09*	–0.03	–0.09*	0.11**	–0.30**	0.18**	–		
–0.01	0.00	–0.08*	–0.08*	0.03	–0.10*	0.15**	0.24**	–	
0.04	0.04	0.02	–0.07	0.01	–0.06	0.05	0.11**	0.12**	–

Due to the potential of this conceptual model (Table 2) to apply differently for women who were on leave from work at 11 weeks postpartum ($n=313$) as compared to those back at work ($n=325$), we conducted a Chow test [34]. Results showed no significant differences between regression coefficients for women on leave versus women at work ($F[17, 602]=0.91, p=0.56$). Thus, the associations of the

explanatory variables with postpartum depression scores were similar regardless of leave status.

Finally, given the significant effects of perceived control on postpartum depression scores in the hierarchical regression model, we explored its mediating role in the relationship of coworker support, schedule autonomy, and decision latitude with postpartum depression scores. The mediated

Table 2 Results of the hierarchical regression for predicting the postpartum depression score at 11 weeks postpartum ($N=638$)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age	–0.04	–0.04	–0.03	–0.02	–0.03	–0.02
Marital status (1=married)	–0.01	–0.01	–0.02	–0.03	–0.03	–0.02
Race (1=white)	–0.09*	–0.09*	–0.08*	–0.07	–0.07	–0.07
College educated (1=yes)	–0.04	–0.04	–0.05	–0.06	–0.06	–0.06
Blue collar=1	0.01	0.02	0.01	0.03	0.02	0.02
Clerical=1	–0.04	–0.01	0.00	0.01	0.00	0.00
Meets state poverty threshold (1=yes)	0.02	0.03	0.02	0.02	0.02	0.02
Prenatal moods (1=yes)	0.26***	0.26***	0.25***	0.23***	0.24***	0.24***
Leave status (1=working)	–0.02	–0.01	.00	–0.01	0.00	–0.00
Demand–control model components						
Psychological demands (PD)		0.10*	0.06	0.05	0.05	0.06
Decision latitude (DL)		0.01	0.05	0.07	0.05	0.05
Work resources						
Schedule autonomy			–0.11**	–0.10*	–0.10*	–0.10*
Coworker support (CS)			–0.06	–0.04	–0.01	–0.00
Perceived control				–0.23***	–0.23***	–0.23***
Psychological demands \times decision latitude					–0.06	–0.04
Coworker support \times psychological demands					0.04	0.01
Coworker support \times decision latitude					0.10*	0.10**
Three way interaction PD \times DL \times CS						–0.08*
R^2	0.09	0.10	0.12	0.17	0.18	0.19
Change in R^2	0.09	0.01	0.02	0.05	0.01	0.01
F for change in R^2	7.17***	3.31*	5.57**	38.64***	3.49*	4.46*

Standardized regression coefficients are presented

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

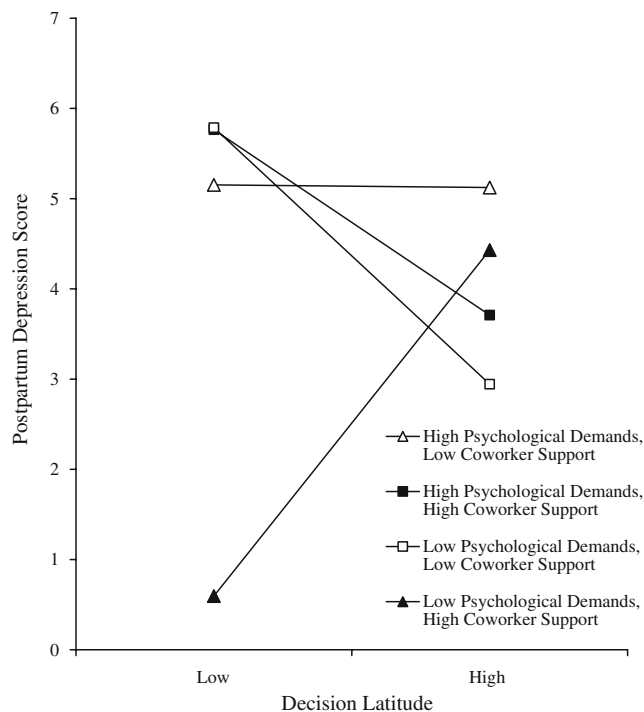


Fig. 1 Interaction between coworker support \times psychological demands \times decision latitude for the outcome variable, postpartum depression score

regression technique [35] entails conducting three regressions for each of the aforementioned explanatory variables. For example, we regressed perceived control, the proposed mediator, on the explanatory variable, coworker support. We then regressed postpartum depression on coworker support. Finally, we regressed postpartum depression on both perceived control and coworker support. The mediating effect is established when the following conditions are met: (1) the first two regressions show statistically significant relationships between the explanatory variable and the mediator, and the explanatory variable and the outcome variable; (2) the third regression shows a significant relationship between the mediator and the outcome variable; and (3) the regression coefficient for the explanatory variable in the third regression is smaller than that in the second regression. For the explanatory variables that met these conditions in our analysis, we conducted the Sobel [36] test. Perceived control was a significant mediating factor for both coworker support (Sobel $t = -2.70$; $p < 0.01$) and schedule autonomy (Sobel $t = -2.50$; $p = 0.01$). In contrast, decision latitude had no significant relations with perceived control or depression scores.

Discussion

This study investigated the determinants of postpartum depressive symptoms among employed women at 11 weeks

after childbirth. Our sample had lower prevalence of postpartum depressive symptoms than that reported in O'Hara and Swain's [1] meta-analysis, where it averaged 13%. However, the meta-analysis included samples of women of all backgrounds and did not specify whether they were employed or not.

Psychological job demands were positively associated with postpartum depression scores, consistent with the literature on the main effects of the demand–control model components on psychological health [37]. In contrast, decision latitude was not associated with postpartum depression scores nor did it moderate job demands, consistent with Sargent and Terry's [38] arguments that more specific measures are needed for the construct of job control. It may be that other dimensions of job control, such as schedule autonomy, are important for new mothers. Less schedule autonomy was associated with higher postpartum depression scores. This matches the results of Kossek and colleagues [22] on the relation between more control over where, when, and how one works and lower depression scores. Alternatively, more depressed women may have perceived their jobs to have less schedule autonomy.

Consistent with the buffer hypothesis [20], coworker support changed the slope of the association of psychological demands and decision latitude with postpartum depression scores but only under conditions of low psychological demands. It may be that one or more of the components of the demand–control–support model have curvilinear relationships with postpartum depression scores as some studies found (e.g., [39]). For women with low psychological demands, coworker support and decision latitude acted as substitutes in reducing depression scores. This is in line with the functional substitution view of the relation between people's sense of control and social support in their effects on well-being [40]. Our results pertaining to the mediating role of perceived control are consistent with studies suggesting that perceived control mediates the effects of work characteristics on employees' health [24]. Both schedule autonomy and coworker support had a positive association with perceived control over work and family. Perceived control also had a significant negative association with postpartum depression scores, consistent with Lennon's [41] findings. Additional research involving more rigorous study designs is needed to disentangle the causal effects of perceived control on postpartum depression and clarify the direction of its mediating role. Replication of our findings may warrant workplace interventions to increase employees' perceptions of control over work and family.

Our study had limitations pertaining to participants, measures, and methods. First, findings can mainly be generalized to employed women with similar demographic characteristics as this sample. Second, postpartum depres-

sion was measured by self-report and not validated by medical diagnoses; thus, interpretation of the findings should be specific to postpartum depressive symptomatology. Third, this study exclusively utilized self-report measures of the outcome and explanatory variables, which may have resulted in inflating the strength of reported relationships. Fourth, we were unable to include data on supervisor support in the analyses due to its lack of variability, and we did not have data on support of the family members or the husband. Finally, the cross-sectional measurement of study variables prohibited causal inferences. In conclusion, components of the demand–control–support model did not explain much of the variation in women's postpartum depression scores, especially in comparison with perceptions of control over work and family, raising questions about the applicability of this model to postpartum depression. Future research could assess the impact of the interaction between the work and home environment (e.g., work–family conflict) on postpartum depression.

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