

Diminished Control and Unmet Expectations: Testing a Model of Adjustment to Unplanned Cesarean Delivery

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Compared to vaginal deliveries, surgical (cesarean) deliveries are associated with more complications, longer recovery, lower satisfaction, and greater risk of postpartum mood disturbances. Despite a steep rise in rates of surgical delivery, there have been few theoretically founded investigations of the mechanisms by which delivery method has an effect on psychosocial outcome. We tested a model of adjustment to unplanned cesarean delivery, focusing on two mediators: diminished control over labor and delivery; and unmet expectations of control over childbirth. Participants were 164 women anticipating a normal vaginal childbirth. Women who delivered by unplanned surgical delivery (24% of the sample) experienced significantly lower childbirth satisfaction than women delivering vaginally. As hypothesized, the association of delivery method with childbirth satisfaction was mediated by diminished control and unmet expectations, even after controlling for other predictors. Differences were not found between delivery groups in postpartum depressed mood. Irrespective of delivery method, perceived control during labor and delivery was strongly associated with childbirth satisfaction and lower depressed mood. Findings suggest that enabling women to exert desired control over childbirth is likely to enhance satisfaction and reduce the likelihood of postpartum mood disturbance. Implications for policies relevant to hospitals, employers, insurance companies, and legal practice are discussed.

Many women consider childbirth to be a landmark event that colors the rest of their lives (Callister, 2004; Lobel, 1998). The majority of American women hope for and prefer vaginal rather than surgical (cesarean) delivery (Pevzner, Preslicka,

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Bush, & Chan, 2011; Tully & Ball, 2013). However, approximately one-third of all births are surgical deliveries, reflecting a 60% increase since 1996 (Martin, Hamilton, & Ventura et al., 2012). Compared to vaginal deliveries, cesareans are associated with higher risk of postpartum complications such as infection, injury to internal organs, and incisional pain (Pallasmaa et al., 2010), and they require a longer recovery period (Thompson, Roberts, Currie, & Ellwood, 2002). Cesarean deliveries are also associated with feelings of loss and failure, lower self-esteem, less satisfaction with delivery, and postpartum mood disturbances (see review by Lobel & DeLuca, 2007), although a small portion of women find some positive aspects of surgical delivery (Behague, Victoria, & Barrows, 2002).

There have been few theoretically derived investigations of mechanisms by which delivery method influences psychosocial outcome (DiMatteo et al., 1996). Existing evidence suggests that cesareans may adversely affect women's moods and perceptions through two aspects of diminished control: first, by violating women's expectations about the amount of control they will wield over childbirth, and second, by restricting the actual control that women experience over birth, whether expected or not (Lobel & DeLuca, 2007). However, these ideas have not been subjected to empirical testing. The purpose of this study was to test a theoretically guided model of adjustment to unplanned cesarean delivery, focusing on mediation by two variables: diminished control over labor and delivery, and unmet expectations of control over childbirth (see Lobel & DeLuca, 2007 for more detailed description of the model and its theoretical underpinnings). Psychological research has long documented the influence of perceived control on adjustment to acute stressful events (e.g., Thompson, 1981). The degree to which events are expected, a form of predictive control, has also been shown to be an important predictor of how people cope with them (Folkman, 1984).

Mechanisms of Postcesarean Adjustment

We hypothesized that women who deliver by unplanned cesarean delivery would experience poorer postpartum adjustment than women who deliver vaginally because surgical deliveries entail a lack of control over labor and delivery and relatedly, because these deliveries violate women's expectations about the degree of control they will have over their birth.

Perceived control. Control is a central concept in foundational theories of adjustment to stressful events (e.g., Janoff-Bulman & Frieze, 1983) and has been shown to be associated with better emotional well-being, more successful coping, better health and physiological outcomes, and success at making behavioral changes (Diehl & Hay, 2010; Lledo-Boyer et al., 2010; Motl et al., 2005; Sommer & Bourgeois, 2010). A woman may be able to exercise control over many elements of a vaginal delivery including where she will deliver, how she will be positioned,

and the use of interventions. In contrast, procedures during a cesarean are usually dictated by hospital protocol. Thus, women who deliver surgically typically have little or no control over their birth, including the decision to perform this type of delivery, which is usually made by a physician.

There is some evidence that lack of perceived control over labor and delivery affects psychological outcomes (e.g., Fair & Morrison, 2012). Although these studies are rife with methodological problems, they indicate that women who lack control are the least satisfied with their birth and most likely to experience postpartum depressed mood regardless of delivery method (see review by Lobel & DeLuca, 2007).

Unmet expectations about childbirth. Exercising control over medical care has become a common expectation for Americans (Johnson, 2011). During pregnancy, some women write “birth plans” for medical staff to ensure control over their treatment (Deering, Zaret, McGaha, & Satin, 2007; Murkoff & Mazel, 2008). For many years, American women developed expectations about birth from other women (Dias & Lobel, 1997) and from attending childbirth education classes focused predominantly on vaginal delivery (Greene, Zeichner, Roberts, Callahan, & Granados, 1989). Now, a growing source of information is the reality television show: 68% of pregnant American women regularly watch reality-based programs on pregnancy and birth (Declercq, Sakala, Corry, Applebaum, & Risher, 2002) where the majority of births shown are vaginal (Morris & McInerney, 2010), presumably increasing viewers’ expectations for such a birth. Thus, it is not surprising that undergoing a cesarean is often perceived as an unexpected, undesirable turn of events (Pevzner, Preslicka, Bush, & Chan, 2011). In general, unexpected or unpredictable events are more difficult to cope with than expected or predictable ones (Johnson & Leventhal, 1974) and accurate expectations about impending procedures are important predictors of postsurgical adjustment (McCarthy, Lyons, Weinman, Talbot, & Purnell, 2003). Therefore, we predicted that in addition to the impact of diminished control per se during a cesarean, experiencing unmet expectations of control over the birth process would also adversely affect postcesarean adjustment.

Defining Postcesarean Adjustment

We conceptualized and operationalized postcesarean adjustment with two variables: childbirth satisfaction and depressive symptomatology. Prior research verifies that these factors are often correlated but they are conceptually and empirically distinct (Padawer, Fagan, Janoff-Bulman, Strickland, & Chorowski, 1988; Saisto, Salmela-Aro, Nurmi, & Halmesmaki, 2001).

Dissatisfaction with childbirth is the most consistent difference between women delivering vaginally and those delivering surgically (Conde, Figueiredo,

Costa, Pacheco, & Pais, 2008), especially unplanned surgeries. Women with negative perceptions of their birth report disappointment, anger, guilt, and inadequacy (Baker, Choi, Henshaw, & Tree, 2005). Childbirth dissatisfaction is an important focus of study because women who are dissatisfied with their birth experience are less likely to have another child (Gotvall & Waldenstrom, 2002) and more likely to suffer postpartum depressed mood (Bland, 2009). A small percentage develops posttraumatic stress disorder (Ayers, 2004; Wijma, Soderquist, & Wijma, 1997).

Other known correlates of childbirth satisfaction include use of regional rather than general anesthesia (Porter, Van Teijlingen, Yip, & Bhattacharya, 2007), the presence of a spouse during delivery (Cain, Pederson, Zaslow, & Kramer, 1984), and holding one's infant soon after delivery (Fawcett, Pollio, & Tully, 1992). The threatening nature of surgery itself (Taylor, 2009) may affect dissatisfaction with cesarean delivery, and because unplanned cesareans are performed for health reasons, a woman's concerns for herself and her baby may be heightened.

Postpartum depressed mood is also an important outcome of cesarean delivery to study for several reasons. The prevalence of depressed mood between 2 weeks and 6 months postpartum, measured by self-report depressive symptom scales including the Beck Depression Inventory (BDI), CES-D, and EPDS, ranges from 13% to 33% (Darcy et al., 2011; Hibbeln, 2002). Although women experiencing depressed mood don't show the same degree of impairment as women who suffer from clinically defined major depression, depressive symptoms reduce a woman's ability to function effectively at home or work and impair relationships with family and friends (O'Hara, 1995). Mothers with depressive symptomatology show fewer positive behaviors and more negative behaviors toward their children (Foster, Garber, & Durlak, 2008).

Maternal depression, including clinical and subclinical levels of depression, is associated with many behavioral and emotional problems in children of all ages (Downey and Coyne, 1990; Elgar, McGrath, Waschbusch, Steward, & Curtis, 2004). Infants and toddlers of depressed parents may not form secure emotional attachments to parents (Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001; Zahn-Waxler, Cummings, McKnew, & Radke-Yarrow, 1984), and children of depressed mothers may also be vulnerable to depression (Hammen, Shih, & Brennan, 2004). Although research on the relationship of delivery method to postpartum mood offers mixed findings because of methodological problems, there is suggestive evidence that experiencing a cesarean delivery, particularly when unplanned, puts women at higher risk for postpartum depressed mood than if they deliver vaginally (Blom et al., 2010; Hannah, Adams, Lee, Glover, & Sandler, 1992). Other variables found to be important predictors of postpartum depressive symptomatology include prenatal depressive symptomatology, satisfaction with postpartum social support, and childcare-related stressors (O'Hara, 1995). Another

likely predictor of postpartum depressive symptomatology is the degree to which a pregnant woman perceives threat to her health and fetus. Such threats contribute to maternal emotional states (Lobel et al., 2008), and can be precursors and concomitants of depression (Heron, O'Connor, Evans, Golding & Glover, 2004).

The Current Study

The purpose of this study was to examine the hypothesized association between delivery method and postpartum adjustment, with mediation by two variables: perceived control over labor and delivery and unmet expectations of control over childbirth. Postpartum adjustment was measured by childbirth satisfaction and depressed mood.

Poor adjustment following a cesarean may also be attributable to factors related to having a surgical delivery, particularly the prolonged period of time following delivery before the infant is first held and the health status of the neonate (Fawcett, Pollio, & Tully, 1992). Therefore, we assessed and controlled for these variables. In addition, we explored other variables that have been shown to affect maternal emotions and which might differentially affect adjustment following surgical versus vaginal delivery (Lobel & DeLuca, 2007): concerns about the health of one's self and fetus during pregnancy, perceived threat to self and baby during delivery, receipt of and satisfaction with postpartum social support, and postpartum childcare-related stressors.

A longitudinal study of women delivering vaginally and by unplanned cesarean tested the following primary hypotheses: (1) Relative to those delivering vaginally, women delivering by unplanned cesarean section will experience greater postpartum depressed mood and lower childbirth satisfaction, and (2) The relationship between method of delivery with postpartum mood and childbirth satisfaction will be mediated by perceived control during labor and delivery, and by unmet expectations of control during labor and delivery. Exploratory analyses were conducted to examine the potential influence of perceived threat to the self or the infant during pregnancy and perceived threat to the self or the infant during labor and delivery on postpartum adjustment. Finally, we explored what combination of variables would best predict each indicator of postpartum adjustment. Because of the lack of previous research on these issues, no hypotheses about these exploratory analyses were proposed.

Method

Participants

The majority of participants (95%) were White, with a mean age of 30 ($SD = 4.7$) and a range of 18 to 43 years. Almost all (97%) were married or living with

the baby's father as if married. Over half (59%) maintained full-time jobs while pregnant; 14% were employed part-time, and 27% were not employed. In comparison, 88% were employed part- or full-time before becoming pregnant. Nearly all of the participants (96%) were high school graduates, with approximately half completing college and 23% holding graduate degrees. About half (51%) of the participants had been pregnant before; 23% previously gave birth. Twenty-four percent had a prior miscarriage, 2% had a previous stillbirth. Twenty-three percent had not planned the current pregnancy. Four percent had experienced a previous cesarean delivery. All of the women were either currently enrolled in a childbirth education class or had taken one in the past. One-fifth reported they had been treated for infertility problems. Almost all (98%) expected their partner to be present for the birth. The majority of women delivered at three local hospitals referred to here as Hospitals A (43%), B (18%), and C (32%). The remaining 7% of participants delivered at eight other hospitals in this geographic region. There were no differences in cesarean rates between hospitals A and C (both 19%); however, the cesarean rate for hospital B was unusually high at 43%. There was no difference in postpartum adjustment by hospital.

Measures

Outcome Variables.

Childbirth satisfaction. The Childbirth Satisfaction Scale (CSS) was developed for this study because scales used in previous research lack conceptual clarity (e.g., Fawcett, Pollio, & Tully, 1992). Some items were adapted from the Childbirth Perception Questionnaire (Padawer et al., 1988). The CSS consisted of eight items such as "I am happy with my childbirth experience," and "I wish my labor and delivery had gone differently than they did," with a 5-point response scale (1 = Strongly Disagree, 5 = Strongly Agree). Appropriate items were reverse scored and then all item scores were summed. This scale was administered in Questionnaire 2 and exhibited acceptable interindividual variability and excellent internal consistency (Cronbach's $\alpha = .93$).

Postpartum depressed mood. Severity of depressed mood (also referred to as depressive symptomatology), was measured in Questionnaire 2 by the BDI which has high convergent validity with psychiatric ratings of depression severity in psychiatric and student samples (Beck, Steer, & Garbin, 1988). The ability of the BDI to detect episodes of depression is high (Oliver & Simmons, 1984). Also, the BDI has been used extensively in research on postpartum depression, and is appropriate for measuring nonclinical levels of depression. However, several of the items on the BDI are somatically oriented, and may produce inflated scores in postpartum women because of the bodily changes normally occurring at this time (O'Hara, 1995). Therefore, 15 cognitive depression items were selected. This cognitive subset of items (BDIcog) has been used in previous research with good

internal consistency (Eitel, Hatchett, Friend, Griffin, & Wadhwa, 1995). In this study, its Cronbach's alpha was .78.

Primary Predictor Variables

Method of delivery. Participants reported delivery type in Questionnaire 2. This was also verified from medical records.

Perceptions of control. The degree of control women expect to have during labor and delivery was measured in Questionnaire 1 by the 21-item *Expectations About Childbirth Scale* (EC1) designed for the current study. Participants rated their expectations of control during childbirth on a five-point Likert scale, with higher scores indicating greater expected control. The scale included statements like, "I will have very little say over the way my labor and delivery goes," and "During labor, I will be able to position my body however is most comfortable."

Exploratory factor analysis established scale reliability. An unrotated principal factor solution was used. This is an appropriate approach when a general factor is anticipated (Gorsuch, 1983). One factor consisting of 11 items was extracted, with factor loadings ranging from .40 to .70. Therefore, these 11 items were summed. Internal consistency was very good ($\alpha = .80$).

Questionnaire 2 included the *Experience Of Childbirth Scale* (EC2), which consists of the same statements as those in the EC1, but phrased in the past tense (e.g., "I had very little say over the way my labor and delivery went") to assess *perceived control* during childbirth. The scale established in the factor analysis of EC1 was also used to determine scoring of the EC2. This scale had excellent reliability, $\alpha = .89$.

The *Unmet Expectations of Control* variable was calculated by subtracting the EC2 score from the EC1 score. Difference scores are a reliable measure of change on a variable with two observations over time (Rogosa, Brandt, & Zimowski, 1982). A negative Unmet Expectations score was recorded to 0 to indicate that the participant had no unmet expectations.

Other Predictor Variables

Concerns about the self and fetus during pregnancy. The 10-item "Sense of Well-Being for Mother and Fetus" subscale of the well-validated Prenatal Self-Evaluation Questionnaire (Lederman & Weis, 2009) was administered in Questionnaire 1. Participants rated how well each statement represents their feelings on a scale from 1 = "Not at all" to 4 = "Very much." Statements include, "I am worried that the baby will be abnormal," and "I am afraid that I will be harmed during delivery." Internal consistency of the subscale was very good, $\alpha = .84$.

Perceived threat to self and baby during delivery. Two items were included in Questionnaire 2: "During labor and delivery, I feared for my life" and "During labor and delivery, I feared for my baby's life," with responses on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). These items were incorporated in random order into the CSS, described above. Each of the two items was scored separately.

Childcare stress. The Childcare Stress Inventory (CSI; Cutrona, 1983) assesses stressful postpartum events including health and feeding problems with the baby and discord with spouse and family in Questionnaire 2. The number endorsed of 20 items constitutes the participant's score. In this study, the first two statements were removed with the author's permission, because they focus on dissatisfaction with labor and delivery, leaving 18 statements.

Social support. Receipt from spouse and from others (e.g., friends and family) of four types of social support (material, instrumental, emotional and informational) was assessed in Questionnaire 2; participants also rated their satisfaction with support from these sources. This instrument is adapted from Collins, Dunkel-Schetter, Lobel, & Scrimshaw (1993), and has been shown to have excellent predictive validity (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; Yali & Lobel, 2002).

Prenatal depressed mood. Prenatal depressed mood was measured in Questionnaire 1 with the BDI and BDIcog, instruments described above.

Time waited to hold the baby. In Questionnaire 2, women were asked, "How long did it take after you delivered until you held your baby for the first time?" with five possible responses: 1 = 0–30 minutes; 2 = 30–60 minutes; 3 = 1–2 hours; 4 = 2–4 hours; 5 = 4 or more hours.

Infant health status. The 5-minute Apgar score, a measure of neonatal health status, was extracted from medical records. Scores were interpreted using standard criteria, that is, normal if the Apgar score was 7 or above (Casey, McIntire, & Leveno, 2001).

Procedures

Participants were recruited through mailings to patients of obstetrical practices ($n = 28$), advertisements in newspapers ($n = 7$), and at childbirth education classes ($n = 129$) throughout a suburban area of New York. Eligibility was limited to women at least 18-years old so that unique issues related to adolescent pregnancy would not affect results. Also, participants were ineligible if they were

scheduled for a planned cesarean delivery so that the two comparison groups (vaginal delivery and unplanned cesarean) would have similar expectations of a vaginal delivery. Participants were also ineligible if they received general anesthesia, a rare occurrence, but highly predictive of postsurgical depression (Edwards, Porter, & Stein, 1994). As an incentive, participants who completed both questionnaires were entered into a raffle for a \$50 gift certificate at a store which sells infant toys and supplies.

Women recruited from childbirth education classes were more likely not to have given birth before the current pregnancy compared to the other two groups ($F(2, 161) = 40.25; p < .001$), and were more likely not to have been pregnant before ($F(2, 161) = 6.48, p < .01$). The three groups also differed on cesarean rate for the current pregnancy: 7% for those recruited by mailings, 43% by advertisements, and 27% by childbirth education classes. The high cesarean rate of the advertisements group is most likely not meaningful as it contained only seven participants. There were no differences in postpartum adjustment based on recruitment source.

Questionnaire 1 was administered to women who provided informed consent at 7–9 months of pregnancy ($M = 8.7$ months, $SD = .48$). By this time, pregnant women have formed opinions about childbirth, and are focusing on the event (Yali & Lobel, 1999). Questionnaire 2 was administered 4–8 weeks postpartum ($M = 6.2; SD = 2.0$), so that women would have recent memories of childbirth, but be able to relate negative as well as positive impressions of their delivery. There is evidence that women are reluctant to describe childbirth negatively immediately afterward (Waldenstrom, 2004). Also, by this timepoint, “postpartum blues” (tearfulness and sadness occurring during the first 10 days postpartum in 40–60% of childbearing women) have ceased (Gonidakis, Rabavalis, Varsou, Kreatsas, & Christodoulou, 2007; O’Hara, 1995). Weeks postpartum at completion was not significantly related to either outcome variable.

Of the 240 women who completed Questionnaire 1, 172 (72%) completed Questionnaire 2. Women who completed Questionnaire 1 but not Questionnaire 2 were contacted; most often their reason was “too busy.” The only sociodemographic variable differentiating completers from non-completers was income: Women completing both questionnaires had higher family income than women who completed only the first questionnaire, $t(234) = 2.07; p = .04$. Of the 172 women who completed both questionnaires, eight were removed because of substantial missing data.

Results

Sample Characteristics

124 participants (76%) delivered vaginally and 40 (24%) by unplanned cesarean delivery. Participants who delivered by cesarean reported lower childbirth

Table 1. Comparisons of Delivery Groups

	Vaginal delivery (<i>n</i> = 124)		Cesarean delivery (<i>n</i> = 40)		<i>T</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Measured prenatally					
Depressed mood	4.0	3.9	4.3	3.4	-0.39
Expectations of control	49.7	5.0	48.2	5.1	1.67
Measured postpartum					
Depressed mood	3.8	4.2	4.5	4.2	-0.92
Perceived control over childbirth	49.0	7.6	40.4	6.7	6.35*
Unmet expectations of control	3.1	5.6	8.5	6.9	-4.92*
Childbirth satisfaction	33.5	6.0	25.7	7.9	6.60*
Concerns about self and fetus during pregnancy	17.8	4.4	18.8	5.0	1.19
Perceived threat to self during L & D	1.3	0.5	1.9	1.2	3.03*
Perceived threat to baby during L & D	1.9	1.1	2.3	1.5	1.82
Childcare stress	5.4	3.2	5.4	3.0	-0.09
Social support received from spouse	1.0	0.1	1.0	0.2	0.58
Satisfaction with support from spouse	2.5	0.6	2.5	0.6	0.54
Social support received from others	0.7	0.2	0.7	0.2	0.50
Satisfaction with support from others	2.0	0.8	1.8	0.6	1.05
Time Waited to hold baby after delivery	1.3	0.9	3.3	1.63	-9.88*
Five-minute infant Apgar score	9.1	0.6	9.3	0.6	0.11

**p* < .001.

satisfaction than those delivering vaginally, $F(1, 162) = 43.56$; $p < .001$. Women were generally satisfied with their childbirth experience ($M = 31.6$; $SD = 7.3$). Satisfaction was only modestly negatively correlated with postpartum depressed mood, $r(162) = -.22$, $p < .01$, confirming that these variables have sufficient independence to be examined separately. No differences were found in postpartum mood between the two delivery groups using BDIcog scores $F(1,162) = .56$, $p = .45$. Prenatal BDIcog scores ($M = 4.1$; $SD = 3.8$) were close to postpartum scores ($M = 3.6$; $SD = 3.9$) for all participants. Depressed mood was below the recommended cutoff score of 8.0 for a minor depressive episode (Whiffen, 1988). When measured by the BDI with somatic items included, postpartum depressive symptomatology was somewhat higher ($M = 7.7$; $SD = 5.2$) than prenatally ($M = 6.8$; $SD = 4.6$).

Table 1 shows comparisons of the vaginal delivery group and the cesarean delivery group. As hypothesized, perceived control was lower and unmet expectations of control were greater for women who delivered by cesarean; prenatal expectations of control over childbirth did not differ for the two groups. There were no differences between delivery groups in childcare stress, Apgar score, or any social support variable. Women who delivered by cesarean reported waiting a longer time to hold the baby after delivery compared to women delivering vaginally. This variable was therefore controlled statistically in subsequent analyses. To diminish the likelihood of Type I error because of violating the assumption of

Table 2. Correlations of Predictor Variables and Outcome Variables

Predictor variables	Outcome variables	
	Postpartum depressed mood	Childbirth satisfaction
Unmet expectations of control	.13	-.45**
Perceived control	-.27**	.51**
Prenatal depressed mood	.59**	.08
Time waited to hold baby	.073	-.42**
Childcare stress	.46**	-.15
Perceived threat to self during L & D	.12	-.35**
Perceived threat to baby during L & D	.07	-.39**
Satisfaction with social support received from spouse	-.30**	.13
Delivery type	.05	-.46**
Concerns about the self and fetus during pregnancy	.50**	.20*

* $p < .05$, ** $p < .001$.

homogeneous variance with unequal cell sizes, we re-examined group comparisons under the assumption of heterogeneous variance. The same pattern of results emerged; all comparisons that were significant remained so, and those that were nonsignificant remained nonsignificant. Type I error is unlikely in this dataset because cell sizes are greater than five and for all but one variable (perceived threat to self during labor and delivery), the ratio of variances across groups is less than 4.0 (see Clinch & Keselman, 1982; Tomarken & Serlin, 1986). Table 2 shows correlations of predictor and outcome variables.

Hypothesis Testing

Hypothesis 1. ANCOVA revealed that participants who delivered by cesarean experienced lower childbirth satisfaction even after controlling for time waited to hold the baby after delivery, $F(2,161) = 14.09$, $p < .001$. Delivery type was not directly associated with postpartum mood.

Hypothesis 2. Recommended statistical procedures (Baron & Kenny, 1986) were used to determine whether perceived control during childbirth or unmet expectations for control mediated the association between delivery type and childbirth satisfaction. Because unmet expectations of control scores were partially derived from the perceived control measure, separate sets of analyses were conducted for these variables.

The association of delivery type with perceived control was large, $\beta = -.45$, $p < .001$. Delivery type was also a significant predictor of childbirth satisfaction, controlling for time waited to hold the baby, $\beta = -.33$, $p < .001$. Childbirth

satisfaction was then sequentially regressed onto time waited to hold the baby, delivery type, and perceived control simultaneously. With perceived control added to the model ($\beta = .36; p < .001$), the direct effects of delivery type on satisfaction decreased to $\beta = -.23, p < .01$, indicating that effects of delivery type are mediated in part by perceived control. Together, delivery type, perceived control during childbirth, and time waited to hold the baby accounted for 34% of the variance in childbirth satisfaction.

Sequential regression analyses were also performed to determine whether unmet expectations for control mediated the association between delivery type and childbirth satisfaction. Partial mediation was found: Controlling for time waited to hold the baby, the effect of delivery type on childbirth satisfaction decreased ($\beta = -.24; p < .01$) after unmet expectations of control was added to the model, and unmet expectations was a significant predictor ($\beta = -.33; p < .001$). This model accounted for 33% of the variance in childbirth satisfaction.

Concerns about the Self and Fetus during Pregnancy and Labor and Delivery

Exploratory analyses revealed no differences in concerns about the self or fetus during pregnancy between the two delivery groups. Women who delivered by cesarean reported higher levels of perceived threat to the self during delivery compared to women delivering vaginally, $t(162) = -3.03, p < .001$. Perceived threat to the self during delivery ($r = -.35; p < .001$) and perceived threat to the baby during delivery ($r = -.39; p < .001$) were both significantly correlated with childbirth satisfaction. After controlling for perceived threat to the self during delivery, the impact of delivery type on childbirth satisfaction was unchanged. When controlling for the effect of perceived threat to the baby during delivery on satisfaction, the coefficient for delivery type was negligibly reduced (from $\beta = -.33, p < .001$ to $\beta = -.31, p < .001$).

Optimizing Prediction of Postpartum Adjustment

Finally, to explore what combination of variables would best predict childbirth satisfaction and postpartum mood, hierarchical multiple regression utilizing all significant predictors was performed. For each outcome variable, all variables that were significantly correlated with that outcome were included. Two regression equations are presented for childbirth satisfaction: one considering the impact of perceived control, and another considering the impact of unmet expectations of control. Because the scores of unmet expectations of control are partially derived from experience of overall control, the collinearity of these measures was very high and thus separate equations were warranted.

Table 3. Regression Models of Childbirth Satisfaction and Postpartum Depressed Mood

	ΔR^2	ΔF	R^2	F total
Regression Model of Childbirth Satisfaction				
Time waited to hold baby	.18	34.46***	.18	34.46***
Perceived threat to self during L & D	.06	13.31***	.24	25.20***
Perceived threat to baby during L & D	.05	10.27**	.28	21.19***
Delivery type	.05	12.00***	.34	19.98***
Added separately to the model above:				
Perceived control	.08	21.04***	.41	22.21***
Unmet expectations of control	.09	23.87***	.42	23.06***
Regression model of postpartum depressed mood				
Prenatal depressed mood	.38	98.42***	.38	98.41***
Childcare stress	.06	16.81***	.44	62.41***
Satisfaction with social support				
Received from spouse	.02	4.70*	.45	44.12***
Concerns about the self and fetus				
During pregnancy	.03	9.50**	.48	37.22***
Perceived control	.03	7.98**	.51	32.66***

* $p < .05$, ** $p < .01$, *** $p < .001$.

Childbirth satisfaction. Childbirth satisfaction was regressed on time waited to hold the baby, perceived threat to the self, perceived threat to the fetus during delivery, delivery type, and perceived control (in order). The relative contributions of each variable added to the equation are shown in Table 3. The full model accounted for 41% of variance in childbirth satisfaction. Childbirth satisfaction was then regressed on time waited to hold the baby, perceived threat to the fetus during delivery, delivery type, and unmet expectations of control (see Table 3). This model accounted for 42% of variance in childbirth satisfaction.

Postpartum depressed mood. For postpartum depressed mood measured by the BDIcog, postpartum depressed mood was regressed on prenatal depressed mood, childcare stress, satisfaction with spouse's social support, perceived threat to self and fetus during pregnancy, and perceived control during labor and delivery. The unmet expectations variable was not included because it was not significantly related to postpartum mood ($r = .13$, ns). This model accounted for 51% of variance in postpartum depressed mood (see Table 3).

Discussion

The purpose of this study was to examine the relationship between method of delivery and postpartum psychological adjustment, and test the mediational influence of two variables: perceived control over labor and delivery and unmet

expectations of control. In addition, we conducted exploratory analyses to develop optimal models of postpartum adjustment.

The Role of Perceived Control during Labor and Delivery

Consistent with prior studies, perceived control during labor and delivery was strongly related with childbirth satisfaction: The higher level of control one perceived, the more satisfied one was with the childbirth experience. Perceived control during labor and delivery was also significantly correlated with postpartum depressed mood. This finding is particularly important because previous studies that found a relationship between control and postpartum mood did not account for the substantial stability of depressed mood from pregnancy through the postpartum period. In this study, after controlling for over one third of the variance in postpartum mood that was because of prenatal levels, perceived control during labor and delivery significantly predicted lower postpartum depressed mood. These results suggest that offering laboring women choices and keeping them informed about medical procedures and the progress of labor and delivery offer the potential to substantially improve women's adjustment to childbirth.

The Role of Unmet Expectations of Control during Labor and Delivery

Women who delivered by cesarean were more likely to have unmet expectations of control compared to women delivering vaginally. Unmet expectations of control also mediated the association between delivery type and childbirth satisfaction. However, it is important to note that there were no differences in delivery groups on prenatal expectations of control. Women whose expectations were unmet were more dissatisfied not because their expectations were too great, but because their experience of labor and delivery afforded too little control. This finding underscores the importance of measuring women's expectations separate from their experience. Although many previous studies have emphasized encouraging women to have accurate expectations as a means of helping them cope with childbirth (Fawcett & Henklein, 1986; Greene et al., 1989; Slade, MacPherson, Hume, & Maresh, 1993), the results of this study indicate that changing the birth experience rather than changing women's expectations may be a more effective way to improve postpartum adjustment.

Childbirth Satisfaction and Postpartum Depressed Mood

Compared to women delivering vaginally, women who delivered by cesarean reported lower childbirth satisfaction, consistent with previous studies of delivery type and this outcome. Significant differences were not found between the delivery groups in postpartum depressed mood. Previous studies have reported somewhat

contradictory findings about the association of cesarean delivery with postpartum depressed mood. Our results suggest that the amount of control women experience during labor and delivery may be a more important factor in predicting postpartum mood than type of delivery.

Optimal Models of Childbirth Satisfaction and Postpartum Mood

Women most satisfied with their childbirth experience held their baby less than 30 minutes after birth, perceived lower threat to themselves and their babies during childbirth, delivered vaginally, perceived higher control during labor and delivery, and had expectations of control closer to what they experienced than women who were least satisfied. This model accounted for substantial variance in childbirth satisfaction. The most powerful predictor of satisfaction was the amount of time after birth that the mother held her baby, suggesting a simple way for health care providers to improve the satisfaction of women delivering by cesarean.

Studies show that childbirth satisfaction is related to perceptions of the newborn and subsequent parenting behavior (e.g., Arizmendi & Affonso, 1987), suggesting that dissatisfaction with childbirth may be a vital contributor explaining the impact of surgical delivery on other important outcomes. Dissatisfaction may also help explain why women who deliver surgically are less likely to choose to become pregnant subsequently (e.g., Porter, Bhattacharya, Van Teilingen, & Templeton, 2003). There has been little attention to the reasons why women's experience of childbirth has significant impact on family size, but this topic merits further investigation as it suggests there are broader effects of surgical delivery on women's lives. Having a cesarean delivery may limit a woman's ability to have the number of children she desires, both for medical and psychosocial reasons.

Women high in postpartum depressed mood were more likely to have been depressed prenatally, have higher levels of childcare stress, be less satisfied with the social support they received from their spouse, perceive more threat to themselves and their fetus during pregnancy, and perceive lower levels of control during labor and delivery. This model accounted for a slightly higher portion of variance in postpartum depressed mood than found in previous research (e.g., O'Hara, Neunaber, & Zekoski, 1984; O'Hara, Schlechte, Lewis, & Varner, 1991; Whiffen, 1988). As expected, prenatal depressed mood was the strongest predictor and the contributions of childcare stress and satisfaction with social support from one's spouse are also consistent with previous studies. The fact that perceived control predicted additional variance in postpartum depressed mood is notable because, on average, postpartum mood was slightly better than prenatal mood, and the regression strategy used was conservative. That is, perceived control was entered in the model after variance because of prenatal depressed mood, childcare stress, and perceived threat to the self and fetus during pregnancy was accounted for. This finding provides compelling evidence that perceived control during labor and

delivery can influence postpartum mood because it has not been tested in such a methodologically rigorous way previously. The finding is also consistent with research which shows that people cope better when they perceive that they have some control over a traumatic or stressful event.

Implications for Medical, Legal, and Other Policy

Members of the medical, legal, and insurance professions have particular reason for concern about women's dissatisfaction with surgical deliveries, because dissatisfied patients are more inclined to file a lawsuit against their health care provider (Wagner, 2000). Also, malpractice claims against obstetricians are more common than those against other physicians, resulting in higher malpractice insurance rates for obstetricians that make it prohibitive for some to stay in this specialty, and make others unwilling to care for high-risk patients (Hale, 2006). The resulting decrease in availability of obstetric care means that all women in need of this care are affected by the rising costs of lawsuits against obstetricians. Furthermore, some of these costs are passed along to patients in the form of higher medical insurance premiums and higher charges for medical care. The rise in surgical delivery rates has occurred concurrently with a rise in the number of malpractice claims filed for these procedures (Penna & Arulkumaran, 2003). Greater attention is needed toward factors that may increase the likelihood of lawsuits, such as the aversiveness of cesarean deliveries and women's dissatisfaction with them. For example, women who feel they have inadequate input in decision making for an unplanned surgical delivery have heightened concerns about the impact of the delivery on their health and the health of their baby compared to women with greater decisional input (Lescale et al., 1996). Whether such concerns make women more likely to pursue litigation is unknown, but is highly plausible.

Based on the current study, several interventions involving the health care of women can be posited to improve outcomes. One way to reduce the adverse psychological consequences of cesarean delivery may be to enhance maternal control over delivery, with the caveat that some people do not prefer an active role in their health care and do not benefit from having it forced upon them (Miller, Brody, & Summerton, 1988). Once the decision to perform a cesarean is made, a health care provider might offer to explain to the mother the sequence of events that will follow and what she can expect to feel during and after the surgery. Giving a woman the ability to touch her partner during surgery, and to touch the baby once it is born, may also enhance feelings of control. These practices are the norm in some, but not all hospitals. Study results suggest that as soon as feasible, a woman should be given the option of holding her baby. This simple act is one of the most powerful predictors of postpartum psychological state in women delivering surgically (Fisher, Astbury, & Smith, 1997; Lobel & DeLuca, 2007).

In addition, we found that perceived threat to the self and the baby during labor and delivery contributed to women's dissatisfaction. This variable has not previously been examined as a predictor of childbirth adjustment. A worthwhile task for future investigations is to determine the origins of threat perception during birth, such as the use of particular equipment or procedures that women may experience as threatening, and to examine how such perceptions might be allayed, or whether some of the procedures themselves can be altered.

Study Limitations and Strengths

Although no differences were observed prenatally between women completing only the first questionnaire and those completing both questionnaires, it is unknown whether postpartum adjustment was confounded with participant attrition. Another limitation is that the sample was predominantly White, well-educated, with middle to upper class income, and the majority were giving birth for the first time. The influence of control and unmet expectations on adjustment to stressful life events has been documented in broad populations, supporting the likely external validity of these findings. Nevertheless, future studies would benefit from inclusion of more diverse samples to establish the pervasiveness of these findings, and to discover how postpartum adjustment may differ by factors such as ethnicity, culture, social class, or obstetric history.

Because of the unequal sizes of the two delivery groups, Type I errors pose a possible threat to the validity of results, although these are unlikely given that most variables exhibited comparable variance across the two groups and the less populous group, surgical deliveries, was nevertheless sizeable. Type II error may be more likely; for example, the study had limited power to detect a small effect of delivery type on postpartum depressed mood, and only a small number of women in the study had elevated depressive symptomatology. According to Cohen (1992), 393 participants would be needed to detect a difference of small effect size. Levels of depressed mood were not of a clinically meaningful magnitude in this study, but large population studies would provide a stronger test of the impact of delivery type on depressed mood.

Despite its limitations, this study improved on prior research in several ways. First, it introduced a theoretically derived model of postpartum adjustment, which has not been the norm in this literature. Second, many previous studies have measured women's expectations about childbirth retrospectively. In this study, both expectations and mood were measured prospectively, permitting us to examine these factors from the prenatal to the postpartum period. Third, an important aspect of the study is that it conceptually and empirically differentiated women's expectations of control over childbirth from their experience of control over childbirth. Expectations and control are important variables to study because they are amenable to change. By providing women with information about procedures and

progress of their labor and delivery, giving them some choices, and offering them the opportunity, where possible, to hold their baby soon after delivery, health care providers may be able to improve satisfaction with surgical delivery and reduce the likelihood of postpartum dissatisfaction and mood disturbance.

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