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# Birth Interventions Related to Lower Rates of Exclusive Breastfeeding and Increased Risk of Postpartum Depression in a Large Sample

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**Overview:** This study examines the impact of birth interventions, such as epidurals, inductions, pain medications, and cesarean sections, on breastfeeding and postpartum depression with a large sample of mothers.

**Method:** Data for the present analyses were from the Survey of Mothers' Sleep and Fatigue, a 253-item online survey of 6,410 mothers 0–12 months postpartum.

**Findings:** Mothers were significantly more likely to be breastfeeding if they had unassisted vaginal births, or did not have epidurals or other pain medication during labor. Mothers had higher depressive symptoms if they perceived that their labors were difficult and they experienced high levels of pain. They also had higher depressive symptoms if they had planned or emergency cesareans, but unplanned (nonemergent) cesareans were associated with lower levels. When multivariate analysis was conducted, only epidural, postpartum hemorrhage, and postpartum surgery were significantly related to depressive symptoms.

**Conclusions:** The type of birth a woman experiences influences breastfeeding and her emotional health. Contrary to previous findings, epidurals are associated with lower breastfeeding rates and higher rates of postpartum depression. Other birth interventions and complications, such as postpartum hemorrhage or surgery, have a negative impact as well.

**Keywords:** birth, epidurals, labor medications, cesarean section, inductions, postpartum hemorrhage, postpartum surgery, postpartum depression, breastfeeding

Many women experience interventions, such as inductions, epidurals, pain medications, or cesarean sections, during their births. These interventions are common, but some studies have found that they were associated with two negative outcomes: lower breastfeeding rates and high rates of postpartum depression. This study examines the relationship between birth interventions and these postpartum outcomes in a large sample of new mothers.

In the early postpartum period, researchers have found that birth interventions were related to delays in lactogenesis II. For example, a study of women from Guatemala found that women who had highly stressful births had high cortisol levels, which in turn were related to significant delays in lactogenesis II (Grajeda & Perez-Escamilla, 2002). Similarly, a longitudinal study of 2,366

women in the United States found that women who had epidurals or other pain medications for vaginal births, planned cesareans, or emergency cesareans had two to three times the risk of delayed lactogenesis II. Mothers who had emergency cesareans had three times the risk of delayed lactation—especially when they combined epidurals and other pain medications (Lind, Perrine, & Li, 2014).

In contrast, a study comparing 317 mothers who had epidurals and 617 mothers who did not found that epidurals had only a small effect on the first breastfeed and no effect on neonatal outcomes (Gizzo et al., 2012). Similarly, a study from Italy of 366 mothers, 209 of whom had epidurals, found that timing of breastfeeding onset did not differ between the groups. But women who did not have epidurals were more likely to initiate breastfeeding (Mauri et al., 2015).

Type of delivery also had an impact on breastfeeding. A national survey of 5,332 mothers in England at 3 months postpartum found that women who had forceps-assisted births and unplanned cesareans had the

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most breastfeeding difficulties (Rowlands & Redshaw, 2012). Bai, Wu, and Tarrant (2013) examined the impact of four labor interventions on breastfeeding duration and exclusivity. Their sample included 1,280 mothers and infants from Hong Kong. The researchers found that induction of labor, opioid pain medications, and emergency cesarean birth were associated with shorter duration of both “any” breastfeeding and exclusive breastfeeding. However, once they controlled for confounding variables, they no longer found this association.

Another study of 85 mothers who delivered younger than 32 weeks found that mothers who had cesarean sections had significantly lower milk volume on Day 4 than mothers who delivered vaginally (Murase et al., 2014). Moreover, mothers with low Day 4 milk volumes were significantly less likely to be exclusively breastfeeding at neonatal intensive care unit discharge. The authors noted that cesarean deliveries were also associated with other factors that could lead to nonexclusive breastfeeding, such as pregnancy-induced hypertension and low pumping frequency.

### **Impact of Birth Interventions on Postpartum Depression**

Birth interventions can also increase the risk for postpartum depression, but some studies have found that interventions actually seem to lower women’s risk. For example, one recent and widely cited study from China found that women who had epidurals had lower rates of postpartum depression (Ding, Wang, Qu, Chen, & Zhu, 2014). The sample was 214 women who had vaginal births, half of whom had epidurals. Depression was assessed via the Edinburgh Postnatal Depression Scale at 3 days and 6 weeks postpartum. The researchers found that depression occurred in 14% ( $n = 15$ ) of those who had an epidural versus 35% ( $n = 37$ ) of those who did not, leading the researchers to conclude that epidurals decreased the risk of postpartum depression. They also found that attendance in childbirth education classes and continued breastfeeding decreased the risk of depression.

Along these same lines, 185 women were assessed for depression at 1 week and 4 months postpartum (Hiltunen, Raudaskoski, Ebeling, & Moilanen, 2004). The researchers found that women who had epidurals ( $n = 104$ ) had lower depression scores at 1 week postpartum than women who received no anesthesia. Some of the women who had epidurals also received pudendal blocks ( $n = 4$ ), nitrous oxide ( $n = 47$ ), or acupuncture ( $n = 18$ ). There was no difference in rates

of postpartum depression at 4 months postpartum for women who had epidurals versus those who did not. The authors concluded that pain relief during a vaginal delivery was associated with a decrease in postpartum depression at 1 week postpartum.

Type of birth can also be related to depression risk. A sample of 139 women who had elective cesareans found high rates of both depression and anxiety (Kuo, Chen, & Tzeng, 2014). Approximately 25%–28% of mothers in their study were depressed and 30%–37% had anxiety symptoms. These symptoms were stable over the 6-month study period. Sleep difficulties in the last trimester also predicted both depression and anxiety symptoms.

The findings from previous studies suggest that birth interventions might influence breastfeeding and postpartum depression. Given the importance of these outcomes for mothers’ and infants’ long-term health, it is important to understand whether birth interventions are associated with these negative effects. The purpose of this study was to examine the relationship between a wide range of birth interventions, breastfeeding, and postpartum depression in a large sample in the first year postpartum. Specifically, this study examines the impact of type of delivery, use of pain medications and epidurals, episiotomy, and inductions on both breastfeeding and postpartum depression. We also included two postpartum complications: postpartum hemorrhage and postpartum surgery. For postpartum depression, we included mothers’ perceptions of the difficulties of their births (a measure of maternal stress during labor) and their perception of the amount of pain they experienced. In a multivariate model, we examined the relation of the birth interventions and complications to each other along with several variables that are independently related to postpartum depression (Kendall-Tackett, 2010, 2014a, 2014b; Kendall-Tackett, Cong, & Hale, 2013). These included mothers’ education and income, whether they are primiparous or multiparous, their history of depression, their current level of anxiety and anger or irritability, their history of sexual assault, and the total number of hours that they were in labor.

## **Method**

### **Study Participants**

The data included women who participated in the Survey of Mothers’ Sleep and Fatigue. Data were collected in 2008–2009. The total sample from this study was 6,410, representing 59 countries. To be in the study, mothers

needed to have one infant who was 12 months of age or younger.

### Sample Recruitment

The sample was recruited via announcements and flyers distributed to lactation consultants, La Leche League leaders, peer counselors, and U.S. State Breastfeeding Coalition Coordinators. The investigators described the study and asked for assistance in recruiting mothers. Flyers and cards were distributed electronically and via hard copy, with a Web link for the survey. This survey was open to all mothers with babies 0–12 months of age who had access to the website.

### Survey Development

The research questions were taken from the 253-item Survey of Mothers' Sleep and Fatigue. The questions were predominantly close-ended in format and were developed for this study via open-ended interviews with mothers and feedback from mothers and healthcare professionals.

### Measures

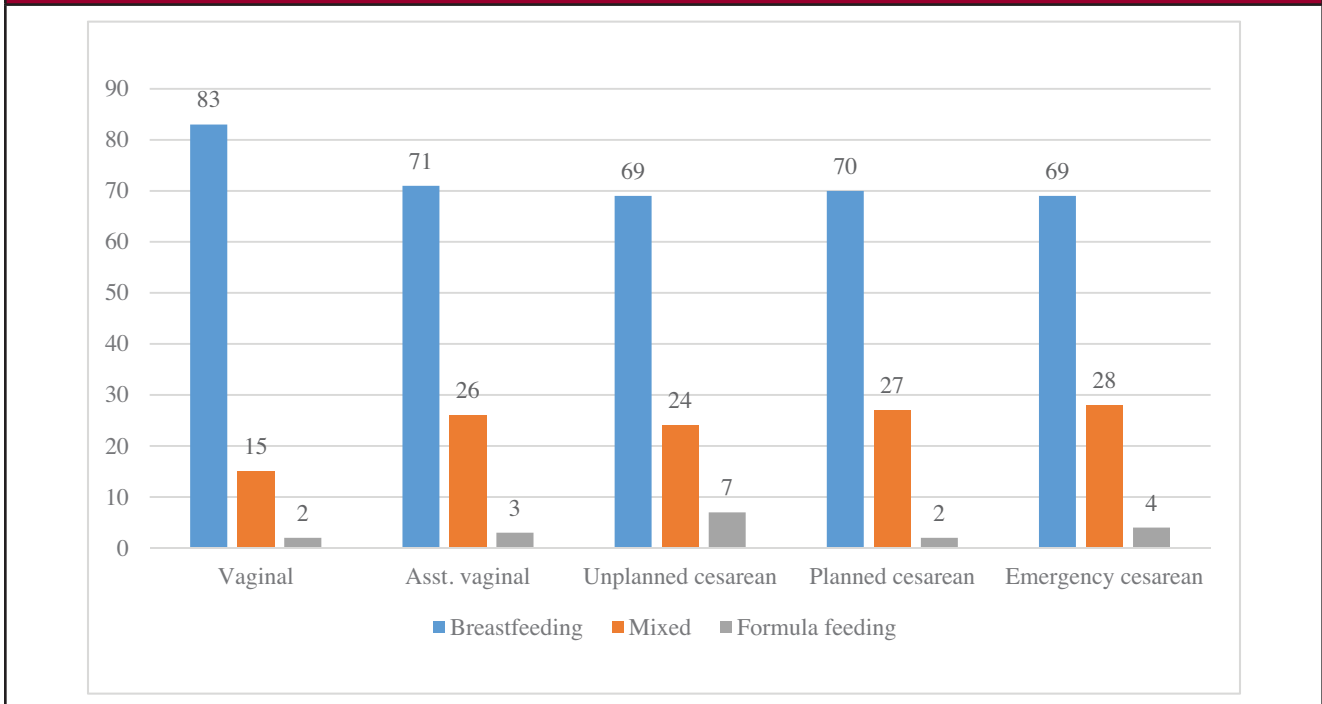
Breastfeeding status was assessed via a series of questions about the mother's breastfeeding experiences. For this study, we used the following summary question to assess breastfeeding: "Since your baby was born, did you breastfeed, formula feed, or both breastfeed and formula

feed?" This item was used in an earlier article from this same data set (Kendall-Tackett, Cong, & Hale, 2011) and has proven to be useful. This was a cross-sectional study, so the data included women at any time during the first 12 months postpartum. Postpartum depression was measured via the Patient Health Questionnaire-2 (PHQ-2; Gjerdingen, Crow, McGovern, Miner, & Center, 2009).

Mothers were asked to rate the difficulty of their labors on a 5-point Likert scale (*not at all difficult* to *very difficult*). They were also asked to rate the amount of pain they experienced during labor on a 5-point Likert (*low pain* to *high pain*). They rated how often they felt anxious and angry on a scale of 0 (*never*) to 3 (*often*). The question about the type of birth they had was a listing of the five types on Figure 1. Interventions and complications were assessed by asking a series of yes/no questions (epidural, other pain medication, induction, postpartum hemorrhage, postpartum surgery). They also reported the number of hours they were in labor.

Income was asked about in U.S. dollars (range = \$10,000–\$150,000 or more) and education ranged from "some high school" to "doctorate." Mothers were asked about the number of children they had. Mothers with one child were coded as "primips." Mothers with two or more were coded as "multips." Sexual assault status was coded for a previous study (Kendall-Tackett et al., 2013).

**Figure 1. Feeding Method by Birth Type**



They were coded as “yes” if they answered yes to a question about ever having been raped or sexually assaulted and/or if they had experienced oral, anal, or vaginal penetration as a child.

### Data Collection

Data were collected via an online survey that was available on the Texas Tech University Department of Pediatrics website. A screening question asked for the baby’s age. If the response was 12 months or younger, the mother was allowed to continue the survey. The survey and data collection procedure was reviewed and approved by the Texas Tech University School of Medicine, Institutional Review Board.

### Data Analyses

Data were analyzed using SPSS, 22nd Edition, using  $\chi^2$ , *t* test, ANOVA, and linear regression as appropriate.

## Results

### The Impact of Birth Interventions on Breastfeeding

Consistent with previous findings, we found that women who had unassisted vaginal births were significantly more likely to indicate that they were “breastfeeding only” in the first year. Planned cesareans, in particular, were associated with increased rates of exclusive formula use. There was little difference between assisted vaginal births and the three types of cesareans. But all had significantly lower breastfeeding rates than unassisted vaginal births,  $\chi^2(8) = 162.01, p < .0001$  (Table 1 and Figure 1).

### Epidurals and Other Pain Medications

In contrast to previous studies, we found that epidurals did make a difference: 58% ( $n = 2,745$ ) of women who did not have an epidural were breastfeeding only compared to 42% of women who did ( $n = 1,964$ ). Women who had epidurals were more likely to be mixed

feeding ( $n = 725; 65%$ ) compared to those who did not ( $n = 383; 35%$ ). There was a similar pattern for exclusive formula feeding. Women were more likely to be formula feeding if they had an epidural ( $n = 115; 68%$ ) than women who did not ( $n = 53; 32%$ ),  $\chi^2(2) = 235.16, p < .001$  (Figure 2).

Also consistent with previous studies, women were more likely to be breastfeeding only if they did not have other pain medication during labor ( $n = 3,594; 76%$ ) compared with women who did ( $n = 1,110; 24%$ ),  $\chi^2(2) = 71.12, p < .0001$  (Figure 3).

There was no significant impact on feeding method for postpartum hemorrhage,  $\chi^2(2) = .683, p > .05$ ; episiotomy,  $\chi^2(2) = .140, p > .05$ ; or postpartum surgery,  $\chi^2(2) = .274, p > .05$ .

### Impact of Birth Interventions on Postpartum Depression

#### *Mother’s Perception of Ease of Labor and Labor Pain*

Mothers were more likely to have depressive symptoms if they perceived that their labors were very difficult. Mothers who perceived that their labors were easy or very easy had significantly fewer depressive symptoms,  $F(4, 5992) = 9.11, p < .001$  (Figure 4).

Similarly, mothers who reported high amounts of pain during labor reported significantly higher depressive symptoms than mothers who reported lower pain levels,  $F(4, 5892) = 3.01, p < .005$  (Figure 5).

#### *Impact of Epidurals and Pain Medications*

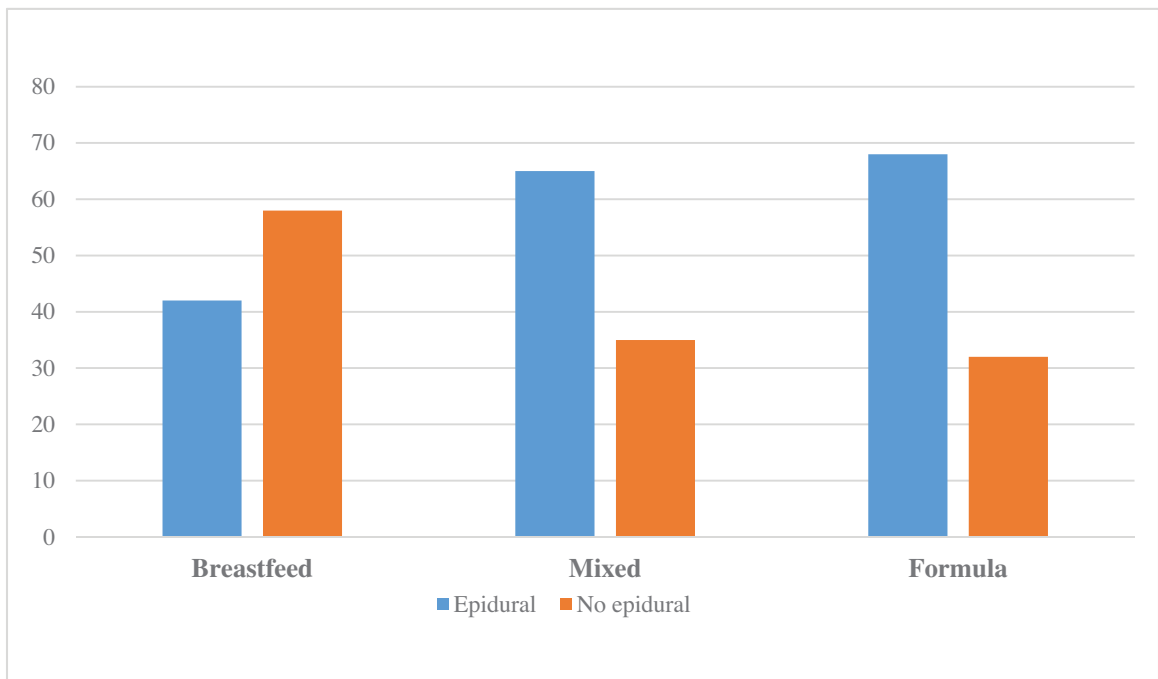
In contrast to the results of Ding et al. (2014) and Hiltunen et al. (2004), women who had epidurals had significantly higher scores on the PHQ-2 ( $M = .97, n = 2,773$ ) than women who did not,  $M = .83, n = 3,149, t(5920) = 4.03, p < .001$  (Figure 6).

We had a similar finding for use of other pain medications. Women who had pain medications other than epidurals had significantly higher scores

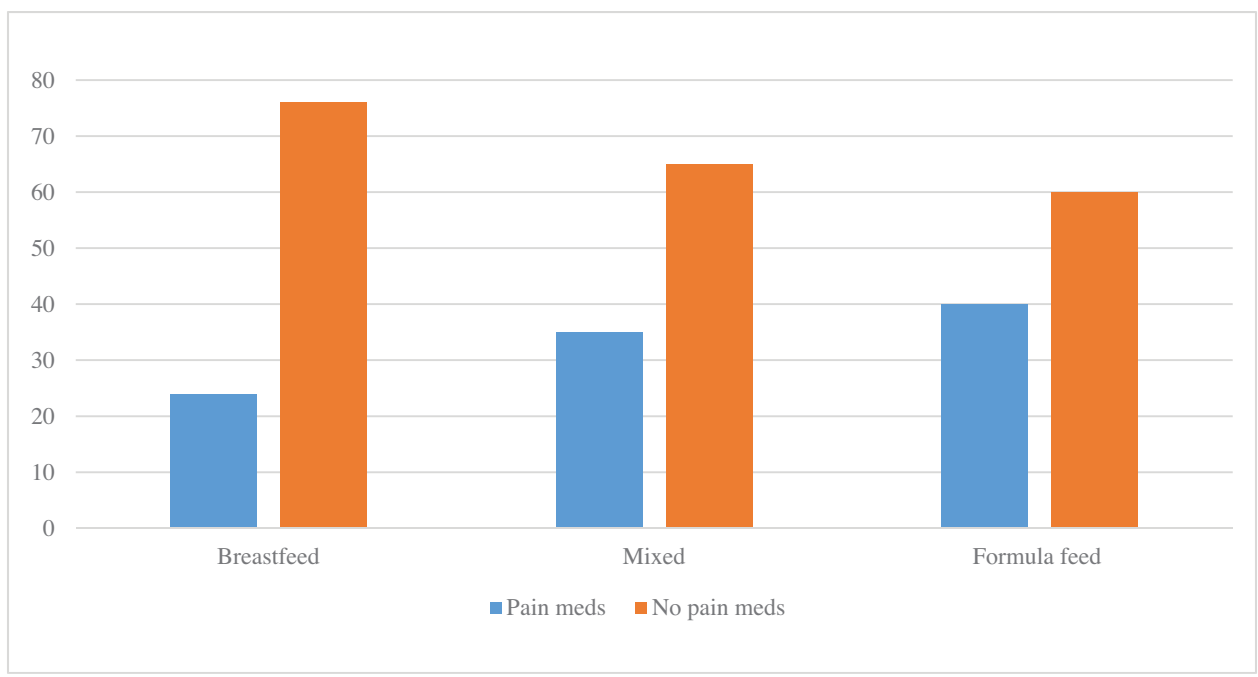
**Table 1. Delivery Type by Feeding Method (Percentage of Mothers)**

	Vaginal	Assisted Vaginal	Planned Cesarean	Unplanned Cesarean	Emergency Cesarean	Total
Breastfeeding	3,445 (83%)	227 (71%)	416 (69%)	410 (70%)	270 (69%)	4,768 (79%)
Mixed feeding	620 (15%)	85 (26%)	148 (24%)	159 (27%)	109 (28%)	1,121 (18%)
Formula feeding	96 (2%)	9 (3%)	41 (7%)	13 (2%)	14 (4%)	173 (4%)
Total	4,161	321	605	582	393	6,062

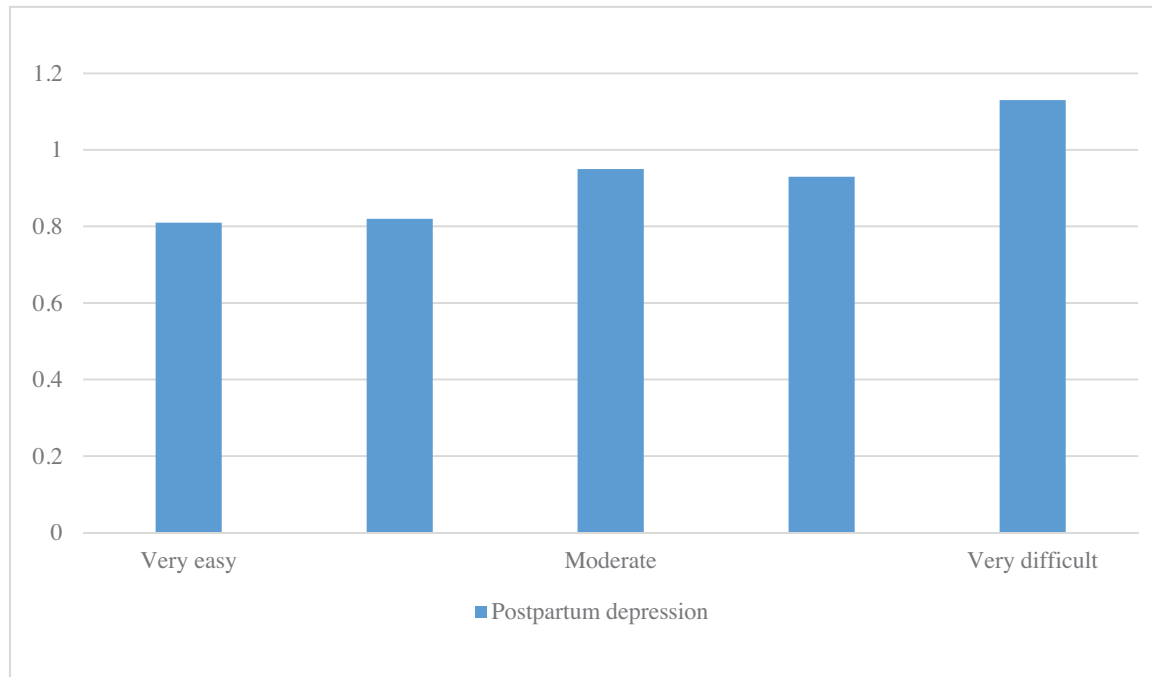
**Figure 2. Epidural Anesthesia by Feeding Method**



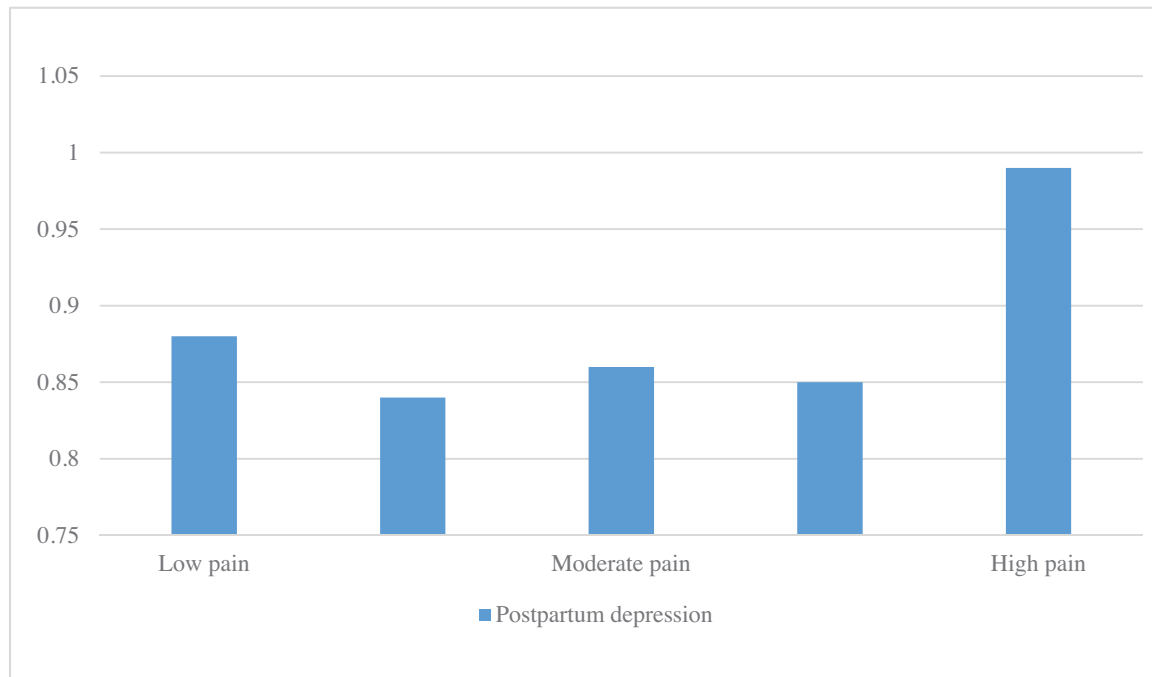
**Figure 3. Other Pain Medications by Feeding Method**



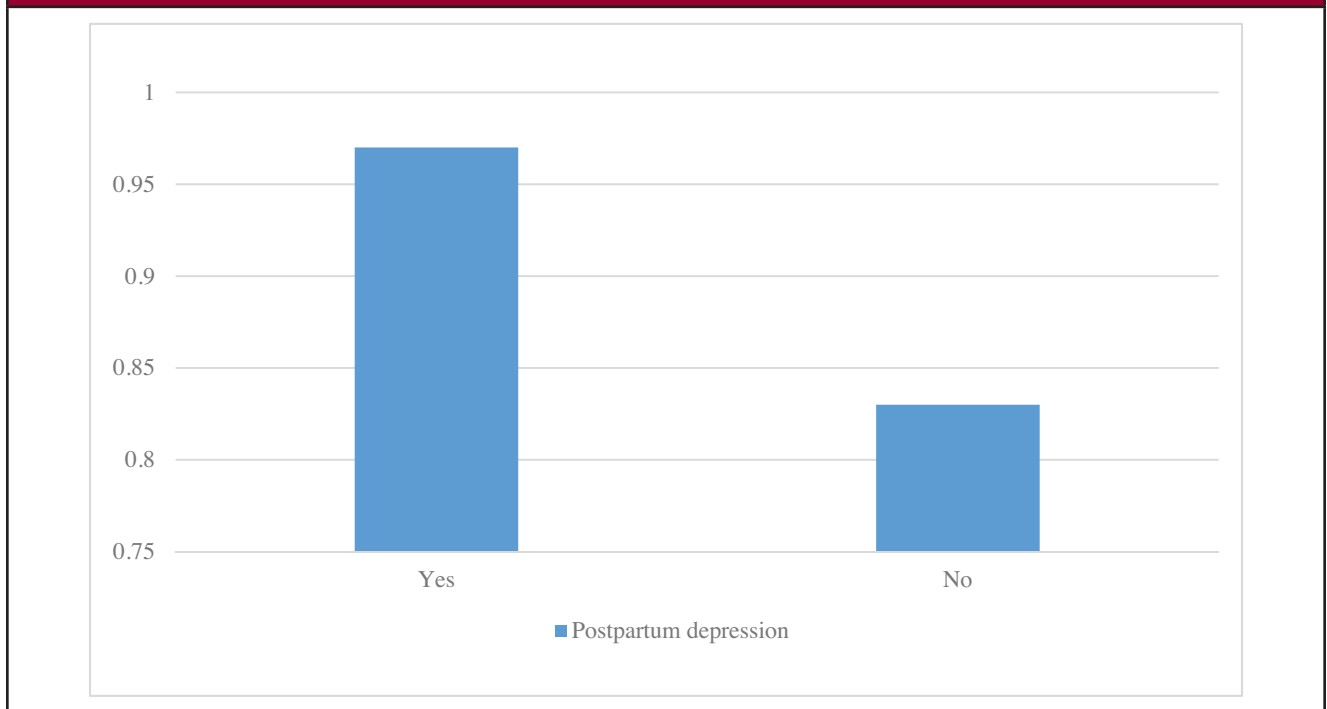
**Figure 4. Mothers' Perception of Ease/Difficulty of Labor by Patient Health Questionnaire-2 Score**



**Figure 5. Mothers' Perception of Labor Pain by Patient Health Questionnaire-2 Scale**



**Figure 6. Impact of Epidural Anesthesia on Patient Health Questionnaire-2 Score**



( $M = 1.01$ ;  $n = 1,540$ ) on the PHQ-2 than women who did not,  $M = .85$ ,  $n = 4,368$ ,  $t(5906) = 4.22$ ,  $p < .001$ .

#### *Impact of Delivery Type and Birth Interventions*

The type of birth women had was related to their score on the PHQ-2. Women who had unassisted vaginal births or unplanned cesareans had the lowest scores on the PHQ-2 ( $M = .87$  for both). The finding about unassisted vaginal births was consistent with previous studies. But the finding on unplanned cesareans was unexpected. Women with planned cesareans and emergency cesareans had the highest depressive symptoms ( $M = 1.04$  and  $M = 1.00$ , respectively). Women who had assisted vaginal births, including both forceps delivery and vacuum extraction, also had elevated PHQ-2 scores, but they were less than those of women who had emergency or planned cesareans,  $F(4, 5994) = 2.77$ ,  $p < .026$  (Figure 7). One possible explanation for the finding on unplanned cesareans could be that women who had nonemergent but unplanned cesareans felt involved in the decision, and that they had at least some experience of labor without the fright of a medical emergency. Many mothers have shared that type of experience.

In addition to birth type, other labor interventions were related to higher PHQ-2 scores. Women whose labor was induced had more depressive symptoms ( $M = .98$ ) than women whose labors were not induced,  $M = .86$ ,  $t(5943) = 2.74$ ,  $p < .006$ .

Women reported more depressive symptoms if they had a postpartum hemorrhage ( $M = 1.15$ ) than if they did not,  $M = .87$ ,  $t(5927) = 4.40$ ,  $p < .006$ . Women also reported higher depressive symptoms if they had surgery postpartum ( $M = 1.36$ ,  $n = 236$ ) than those who did not,  $M = .88$ ,  $n = 5,751$ ,  $t(5980) = 5.52$ ,  $p < .001$ . There was no significant impact on PHQ-2 score if women had an episiotomy ( $M = .88$ ) versus who did not,  $M = .91$ ,  $p > .05$ .

#### **Total Number of Interventions**

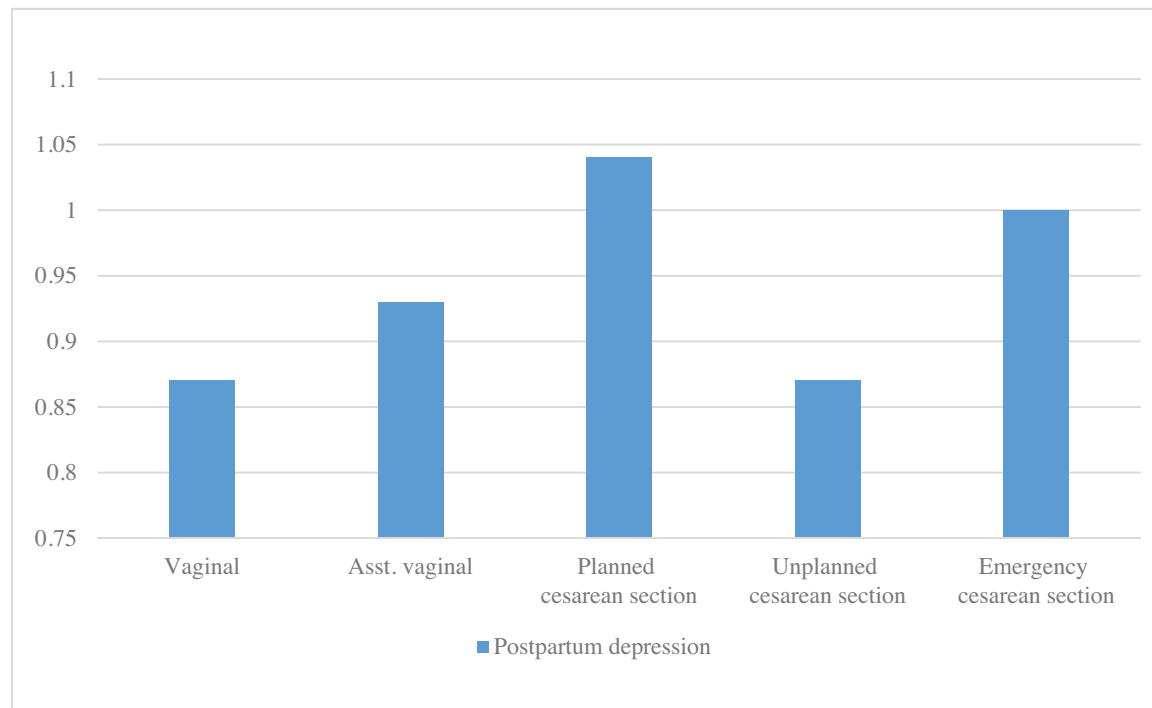
Birth interventions often co-occur. We examined whether the total number of interventions was related to depressive symptoms. Not surprisingly, the more interventions the mothers reported, the higher their depressive symptoms,  $F(1, 5758) = 33.46$ ,  $p < .001$ .

#### **Multivariate Analysis**

The final analysis included all of the interventions and to examine their independent contributions to depressive symptoms. We also controlled for several variables related to postpartum depression in previous studies to see if the birth variables were still significant. The variables included demographics (income, education, and primip/multip status) and prior emotional/psychiatric factors (history of sexual assault, history of depression, current anger/irritability, and current anxiety). The total model accounted for 17% of the variance,  $F(1, 15) = 93.95$ ,  $p < .000$ ,  $R^2 = .17$  (Table 2).



**Figure 7. Type of Birth by Patient Health Questionnaire-2 Score**



In contrast to previous studies, epidurals were still significantly related to depressive symptoms even after controlling for other factors that could account for the relationship. The number of hours of labor was negatively associated with depressive symptoms, with shorter labors being associated with more depressive symptoms. Postpartum hemorrhage and surgery were also significantly associated with more depressive symptoms. Income and education were both negatively associated with depression, with mothers with lower incomes and/or education levels having more depressive symptoms. A prior history of depression or sexual assault was associated with higher depressive symptoms, as were current histories of anxiety and anger/irritability.

## Discussion

This study found that type of birth made a difference in rates of breastfeeding only, as did use of epidurals and other pain medication during labor. Women with unassisted vaginal birth had the highest rates of breastfeeding—by far—compared to women who had assisted vaginal or cesarean births. In addition, use of epidurals or other pain medications was associated with lower rates of breastfeeding and higher rates of mixed- and formula feeding. Our findings are consistent with a recent policy update from California that found that high rates of birth interventions often meant lower rates of exclusive breastfeeding (California WIC Association, & UC Davis

Human Lactation Center, 2012). For many mothers, a high-intervention birth, combined with inadequate breastfeeding support, compromises breastfeeding in the early days of life. The California WIC Association and the UC Davis Human Lactation Center noted that many birthing practices, which some hospitals consider routine, are not necessary, do not meet current standards of care, and can have a negative impact on the mother's and infant's well-being in the postpartum period.

To get a copy of the *Maternity Care Matters: Overcoming Barriers to Breastfeeding* report, go to [http://calwic.org/storage/restricted/hospitalreport/Maternity%20Care%20Matters\\_2012.pdf](http://calwic.org/storage/restricted/hospitalreport/Maternity%20Care%20Matters_2012.pdf).

Birth interventions also had a negative impact on maternal mental health. Contrary to recent studies, we found that epidurals, postpartum hemorrhage, postpartum surgery, and short labor duration increased depressive symptoms on the PHQ-2, even after controlling for confounding variables. The other birth variables were not significant when additional factors were controlled for. Given that postpartum depression has been identified as a major health risk for mothers and babies—and that depressed mothers are more likely to stop breastfeeding—these findings are sobering (Kendall-Tackett, 2010; Mathews, Leerkes, Lovelady, & Labban, 2014).

**Table 2. Multivariate Analysis of Birth Variables and Postpartum Depression Risk Factors**

	$\beta$ (Beta)	<i>p</i>
Birth variables		
Induction	.16	.716
Epidural	.082	.022*
Other pain medications	.065	.1
Hours in labor	−.004	.006*
Ease of labor	.027	.065
Pain in labor	−.002	.802
Postpartum hemorrhage	.23	.000*
Postpartum surgery	.27	.002*
Demographics		
Income	−.05	.001*
Education	−.06	.001*
Primip versus multip	−.06	.125
Psychiatric vulnerability factors		
History of depression	.23	.000*
History of sexual assault	.09	.052*
Current anxiety	.28	.000*
Current anger/irritability	.28	.000*
Constant	.206	.044
$R^2 = .17$		

\**p* < .05, statistically significant.

These findings do not mean that every mother who has an epidural or pain medications (or other interventions) will have breastfeeding problems. It also does not mean that she will become depressed. Some women freely choose these birth interventions and feel positively about them. What these findings do mean, when considered across the whole sample, is that women who experienced these interventions are at increased risk.

### Strengths and Limitations

A major strength of this study is the sample size, which is significantly larger than samples in previous studies. Also, the data provided a snap shot of the entire first year and was not just limited to the immediate postpartum period. The average age of the infant was 6.9 months. It is interesting to note that these rates of breastfeeding and postpartum depression lasted long past the immediate newborn period.

A limitation of the study was that the data were cross-sectional. Data were only collected at one time point, and it could have been any time in the first postpartum year.

We do not know, for example, if mothers were depressed before their births. The multivariate analysis did allow us to control for some of the preexisting risk factors, such as history of depression and sexual assault, however.

An interesting question to consider in future studies is the possible underlying mechanisms for the relationship between birth interventions, breastfeeding issues, and depressive symptoms. One possibility is that birth interventions activate the stress and inflammatory response systems (Kendall-Tackett, 2007; Maes et al., 2009). One recent study found that mothers who had cesareans had significantly higher levels of C-reactive protein than mothers who delivered vaginally at 1–3 days postpartum (Ozarda, Cansev, & Ulus, 2014). This increase corresponded to the increased levels of choline in these mothers' milk. Increased inflammation may also increase the risk of depression (Kendall-Tackett, 2007; Maes et al., 2009). These possible explanations can be explored in future research.

### Clinical Implications

The clinical implications of these findings are somewhat challenging. On one hand, we need to recognize that mothers who have had these interventions may be at higher risk for both breastfeeding difficulties and postpartum depression. But we don't want to put negative expectations on mothers because these can become self-fulfilling prophecies. For example, Chapman (2014), in a recent commentary, notes that when hospital staff told women that lactogenesis II may be delayed following their cesareans (likely true, based on previous studies), the women thought that meant they wouldn't be able to breastfeed. This is definitely a case of "too much information." Mothers are very sensitive in the immediate postpartum period. We need to be watching for possible problems while being careful about how much information we share.

Perhaps, the best approach is increased surveillance. Lactation consultants know that breastfeeding problems and depression are possibilities. So if possible, check in with these mothers more frequently, especially during that first critical week, or make sure they have support in the community. If peer supporters are working with the mother, the peer supporters need to know when to refer a mother to an International Board Certified Lactation Consultant (such as the first possible signs that lactogenesis II is delayed). Clinicians can pay attention to a mother without necessarily sharing everything that they are concerned about. If lactogenesis II is delayed, lactation consultants can recommend a pumping regimen, increased skin to skin and/or babywearing, stress reduction, and increased social support to decrease

the mother's stress levels. A calming, loving presence, as well as someone to handle household responsibilities, can make a world of difference. When stress hormones drop, lactogenesis II can occur. If lactogenesis II is significantly delayed, mothers may need to briefly supplement. If this becomes necessary, it should always be presented to the mother as a short-term strategy to get breastfeeding back on track. Always emphasize that this is not her fault and it does not mean she will not be able to breastfeed. Express your confidence that breastfeeding will work. Confidence is contagious and will help mothers persist through the difficult patches.

Regarding depression and possible birth trauma, simply having materials available about topics such as depression and birth trauma in offices, consultation rooms, restrooms, and any other places mothers may go can also open the door to conversations. When you speak to mothers, ask them open-ended questions about how they are doing. They may say "fine" initially, but you have at least to let them know that it is OK to talk to you about how they are feeling. Know what resources are available in your communities and online, so that when mothers ask, you know where she can go for further help. Some free handouts for mothers are available at UppityScienceChick.com (<http://www.uppitysciencechick.com/ppdhandouts.html>).

## Conclusion

The World Health Organization (WHO) and American Academy of Pediatrics recommend exclusive breastfeeding for the first 6 months of life. High-intervention birthing practices can undermine breastfeeding and mothers' mental health, particularly when mothers do not receive skilled support in the hospital or in their communities. Fortunately, as the California WIC Association and UC Davis Human Lactation Center (2012) report indicates, hospital policies can change birthing practices for the better. We need hospitals that are not only baby friendly but also mother friendly. WHO's *Every Newborn Action Plan* initiative seeks to integrate mother-friendly birthing practices into the Baby-Friendly Hospital Initiative (<http://www.everynewborn.org/every-mother-every-newborn-ensuring-quality-care-birth/>). WHO's goal is to ensure that every mother receives respectful care during labor—a goal we should embrace. In summary, if we want to increase breastfeeding rates, we need to pay attention to what happens to mothers during birth.

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