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Does Delayed Onset Lactogenesis II Predict the Cessation of Any or Exclusive Breastfeeding?

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Abstract

Objectives—Delayed onset of lactogenesis II (initiation of copious milk production) is frequently been utilized as an outcome but only twice as a hypothesis-testing exposure variable. It remains unclear if previous results are replicable in a large nationally representative population. We evaluated the association between delayed lactogenesis II (>3 days postpartum; DLII) and the cessation of any and exclusive breastfeeding at 4-weeks postpartum.

Study Design—We constructed multivariable logistic regression models using data from 2491 mothers enrolled in the prospective Infant Feeding Practice Study II cohort. Models included DLII, known risk factors for breastfeeding cessation (age, education, race, parity/previous breastfeeding and exclusive breastfeeding plan) and potential confounders identified in bivariate analyses ($p < 0.1$). Backward selection processes ($p < 0.1$) determined risk factor retention in the final model.

Results—DLII was associated with cessation of any and exclusive breastfeeding at 4-weeks postpartum (OR: 1.62; CI: 1.14–2.31; OR: 1.62; CI 1.18–2.22 respectively); numerous independent risk factors qualified for inclusion in the multivariable model(s) and were associated with the outcome(s) of interest (e.g. WIC enrollment, onset of prenatal care, feeding on-demand, time initiated first breastfeed, hospital rooming-in, obstetric provider preference for exclusive breastfeeding and maternal tobacco use).

Conclusions—Women experiencing DLII may be less able to sustain any and/or exclusive breastfeeding in the early postpartum period. These findings have significant clinical and programmatic implications. Routine assessment of DLII in postpartum breastfeeding follow-up is

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warranted, and women with DLII may benefit from additional early postpartum interventions to support favorable breastfeeding outcomes.

Keywords

lactation; infant feeding; lactogenesis; maternal child nursing

Introduction

Lactogenesis II represents the onset of copious milk secretion, and due to maternal reports of breast fullness and increased volume, lactogenesis II is anecdotally referred to as “milk coming in”.¹ Through detailed longitudinal measurement of breast milk volume and composition, Neville and colleagues observed that milk volume increased steadily between 36 and 96 hours post partum and subsequently plateaued (n=13).²

Delayed lactogenesis II (DLII) is defined as lactogenesis II onset more than 72 hours post partum.^{3, 4} DLII can contribute to early breastfeeding cessation.^{5–7} In various populations and non-emergent cesarean births, incidence rates of DLII range from 17% to 44%.^{3, 4, 8, 9} Numerous factors associated with DLII have been extensively reviewed elsewhere.⁷ Evidence suggests the following factors are independent predictors of DLII: age⁹, parity^{4, 10–13}, maternal obesity^{3, 4, 9, 14}, prenatal care provider¹⁵, delivery mode^{3, 4, 11, 15}, prolonged second stage labor^{3, 4}, labor pain medication⁴, exogenous oxytocin use⁴, stress during delivery^{4, 10, 16}, infant birthweight⁹, infant Apgar score <8⁸, flat/inverted nipples⁴, supplementation within 48 hours post partum^{3, 4, 6}, infant excess weight loss⁴ and nipple pain when breastfeeding⁹. Of note, many of these predictors are also associated with poor breastfeeding outcomes (e.g. lower initiation rates or increased cessation of any and/or exclusive breastfeeding).^{5, 17, 18}

To our knowledge, DLII, most commonly used as an outcome variable^{3, 8, 13, 15}, has only been used twice as a formal exposure variable^{5, 6} (in one US and one non-US population). It remains unclear if previous results are replicable in a large nationally representative population of women, and whether DLII (as an exposure variable) affects early breastfeeding cessation in the presence of other risk factors. We conducted a secondary analysis to evaluate the following research question: among women initiating breastfeeding, is there an association between DLII and the cessation of any and exclusive breastfeeding at 4 weeks postpartum?

Patients and Methods

These analyses used the US Food and Drug Administration and the Centers for Disease Control and Prevention prospective cohort study, the Infant Feeding Practice Study II.¹⁹ Conducted to better understand the infant feeding practices used by mothers in the United States, this study provided detailed information regarding: infant feeding patterns during the first year, various aspects of infant health (specifically factors that may affect infant feeding), and information regarding mothers' health and diet.¹⁹ Participants were drawn from a nationally distributed large consumer opinion panel comprised of almost 5000 women.¹⁹ Data, collected from May 2005 through June 2007, included 1 prenatal and 10 post partum surveys spanning one year postpartum.¹⁹

Our analysis included 2491 mothers who initiated breastfeeding and met the following criteria: aged 18 with healthy singleton infants of at least 35 weeks gestational age, 5 lbs and no NICU admission. Additionally mothers had to have returned, at minimum, the neonatal survey distributed at about 3 weeks postpartum.

We derived the exposure (DLII) from the following neonatal survey item: “How long did it take your milk to come in... 1 day or less, 2 days, 3 days, 4 days or more than 4 days?” (<http://www.cdc.gov/ifps/questionnaires.htm>). Adapting the standard 72 hour postpartum cutoff, we collapsed and dichotomized responses to create the exposure variable (3 days, DLII=no; 4 days DLII=yes).³ The primary outcome was cessation of any breastfeeding at 4 weeks; the secondary outcomes of interest was cessation of exclusive breastfeeding at 4 weeks. Due to the nature of available data, we used actual maternal return to work time as a proxy for planned return to work and tobacco use at three months as a surrogate for tobacco use in the early post partum period. All data were self-reported.

Statistical Methods

Bivariate analyses compared mothers who had and had not experienced DLII (the exposure) across identified maternal demographics, exclusive breastfeeding plan, obstetric factors, hospital practices and various lifestyle factors. To describe differences in the distribution of these factors across exposure groups, chi-square tests detected covariates independently associated with DLII.

Odds ratios estimated the crude effect of DLII on the cessation of any and exclusive breastfeeding at 4 weeks. Multivariable logistic regression models were developed and adjusted for known risk factors including maternal age, race, education, parity/previous breastfeeding experience and exclusive breastfeeding plan. Additional potential confounders, identified in the bivariate analyses ($p \leq 0.10$), were retained in the model as determined by a backward selection process (retention cut off $p \leq 0.10$).

For a comparison of two independent binomial proportions using Pearson’s Chi-square statistic with a Chi-square approximation and a two-sided alpha of 0.05, we had over 80% power to detect a 5% difference in cessation of any breastfeeding within 4 weeks post partum between DLII groups. Analyses were conducted in Statistical Analysis Systems, version 9.2 (SAS Institute, Cary, NC). All p-values were two-sided, and significance was set at $\alpha < 0.05$.

Results

For the participants meeting our study inclusion criteria, the neonatal survey response time ranged from < 1 week up to 24 weeks post partum (mean=6.1; SD=2.5; median=5.6; mode=4.9). This range reflects both the timing of survey mailings (earlier outliers) and the lag in response time (later outliers). Among the above measures of central tendency, we selected the highest and determined that mean response time (< 6.1 and 6.1 weeks) did not differ by DLII status (chi-square p -value=0.44). Thus, we included all participants in our analyses. The distribution of days of self report onset of lactation are presented in Figure 1 (mean=2.8 days; SD=1.1). Mean duration of any breastfeeding was 26.0 weeks (SD=19.86; median=21.5 weeks; mode=51.6 weeks; range: 0.1–64.7 weeks). The incidence of DLII in the study population was 23.2%. Regardless of DLII status, the pattern of breastfeeding outcomes was similar (Figure 2).

Characteristics of the sample were stratified by DLII status and presented in Table 1. Bivariate analyses identified the following potential confounders eligible for inclusion in the multivariable models (p -value ≤ 0.10): maternal characteristics (geographic residential location, federal poverty level, postnatal WIC enrollment, household size), obstetric/hospital characteristics (timing of first prenatal care visit, low intervention vaginal delivery, epidural/spinal use, hospital rooming-in, timing of initiation of first breastfeed, feeding on demand, in-hospital breastfeeding support and obstetric provider prefers exclusive breastfeeding) and

postpartum/lifestyle characteristics (pediatric provider favors exclusive breastfeeding, maternal return to work and tobacco use).

Cessation of Any Breastfeeding

The crude odds ratios for the effect of DLII on any breastfeeding was statistically significant (OR: 1.59; CI: 1.24–2.05) and remained so after multivariable analyses (OR: 1.62; CI: 1.14–2.31) (Table 2). Additional statistically significant risk factors were also identified in the multivariable model (Table 2).

Exclusive Breastfeeding Cessation

The crude odds ratio for the effect of DLII on exclusive breastfeeding was also statistically significant (OR: 2.04; CI: 1.66–2.52), and though slightly attenuated, this significant association remained after multivariable analysis (OR: 1.62; CI: 1.18–2.22) (Table 2). Again, numerous statistically significant risk factors were identified in the multivariable model (Table 2).

Discussion

Utilizing a large national dataset, these analyses included a wide variety of demographic, obstetric, institutional and post partum lifestyle factors to examine the effect of DLII on the cessation of any and exclusive breastfeeding in the early post partum period. Since the variable selection process did not produce identical models (due to variability in covariate retention), we cannot statistically comment on the robustness of the DLII point estimates. However, we observed a similar and statistically significant effect of DLII on the cessation of any and exclusive breastfeeding at 4 weeks postpartum.

To our knowledge, only two other groups previously utilized DLII as an exposure to examine breastfeeding outcomes. Chapman and Perez-Escamilla conducted a secondary analysis of a larger cohort of breastfeeding women in Hartford, CT (n=92).⁵ Among women planning to breastfeed, they assessed the effect of DLII (<6 months and ≥6 months) on breastfeeding duration.⁵ Among women planning to breastfeed <6 months, no statistically significant effect was observed regarding DLII on breastfeeding duration (OR: 0.7; CI: 0.4–1.0).⁵ Among women planning to breastfeed ≥6 months, women without DLII were more likely to continue breastfeeding (OR: 3.0; CI: 1.19–4.8).⁵ No global point estimates assessed the singular effect of DLII on breastfeeding duration (without accounting for breastfeeding plan).

In four rural Guatemalan communities, Hruschka and colleagues evaluated the effect of DLII on full breastfeeding cessation within 6 months post partum.⁶ In their analyses, the median duration of full breastfeeding was 5 months; immediate post partum supplementation (prior to transitioning to lactogenesis II) was associated with DLII (OR: 4.87; CI: 2.29–10.36) and also predicted full breastfeeding cessation within 6 months post partum (HR: 1.49; CI: 1.05–2.11).⁶ DLII significantly predicted full breastfeeding cessation in 2 of the 4 communities (HR: 2.87; CI: 1.25–6.60 and HR: 3.43; CI: 1.55–7.59).⁶

Our overall results and directionality of the point estimates are consistent with previous research, although the study populations, outcomes of interest and availability of relevant confounders differed.^{5, 6} Though the timing of the outcome is different, our results add evidence to support the robustness of the demonstrated deleterious association between DLII and breastfeeding outcomes. The incidence of DLII in our study population (23%) fell within the range of previously published incidence rates for DLII (17% – 44%).^{3, 4, 8, 9}

These results have considerable clinical and programmatic implications. Care providers may advise mothers who report a delay in the onset of copious milk production to give infant formula supplements. This approach may ultimately shorten breastfeeding duration.⁶ DLII may be a useful clinical indicator to identify women at risk of early post partum breastfeeding cessation.⁷ In this case, encouraging effective and frequent milk removal (rather than introduction of formula supplements) to maintain lactation would be appropriate; however, we acknowledge that clinical management of women with DLII should be individualized and temporary use of donor milk or formula supplements may be necessary to prevent excessive infant dehydration or weight loss.^{1, 4, 20, 21, 22}

These analyses have several important limitations. First, this is a secondary analysis; results are generalizable to women satisfying the primary study's inclusion criteria. Second, we relied exclusively on self reported data (including in-hospital supplementation); while potential misclassification may occur due to recall bias, we expect this to be non-differential and therefore underestimate our demonstrated effects. Third, it is unclear if the lactogenesis onset survey question intends for mothers to count calendar or 24 hour intervals when reporting 'days' post partum. Collection of these data in hourly units is ideal, but given the available data, the dichotomous nature of the constructed DLII variable and the proximity of the mean to the cut point, we would again expect a non-differential misclassification bias, which in turn would attenuate our results. Fourth, if reported within 3 years post partum, maternal self-report of any breastfeeding duration is a validated measure, but this is not applicable to exclusive breastfeeding cessation.²³ Of note, our breastfeeding outcome data were recalled, at most, within one year post partum. Fifth, the nature of these data did not allow for evaluation of interaction terms included in previous analyses (e.g. breastfeeding frequency and maternal obesity, intervention group and parity or intervention community and DLII).^{6, 24} Finally, while significant, our findings may be spurious due to unmeasured confounding. We did not have data on all previously identified predictors of both DLII and breastfeeding outcomes and specifically maternal stress, relevant in-hospital infant feeding measures (e.g. quality, frequency of feed) or additional infant factors (e.g. birth weight, Apgar Score).

Strengths of this study include the consistency with existing literature, the large sample size and corresponding sufficient power to estimate the effect, the prospective design of the primary study and the use of conservative statistical methods to minimize spurious associations (e.g. utilization of a p-value = 0.1 cutoff for multivariable model inclusion and retention). DLII is a previously validated measure with reasonable sensitivity and specificity (71.4% and 79.3% respectively).²⁴ Of the wide array of variables eligible for inclusion into the multivariable models, these data contained both modifiable and non-modifiable risk factors for breastfeeding cessation, spanning maternal demographics, planned infant feeding behavior, obstetric factors, hospital practices and various post partum lifestyle factors. To our knowledge, preferences of obstetrical and pediatric providers for exclusive breastfeeding have not been included in an analysis of this kind. Previous evidence from the Pregnancy Risk Assessment Monitoring System indicated that older, more educated, non-smoking women of higher socioeconomic status who did not either participate in WIC or deliver a low birth weight baby, had better breastfeeding outcomes.²⁵ When compared to respondents of the National Survey of Family Growth (1998–2000), participants in the Infant Feeding Practice Study II were primarily older women with both higher education and incomes.¹⁹ Consequently, given the sample's relative homogeneity, our results may underestimate the effect of DLII on the cessation of any and exclusive breastfeeding in other populations.

Conclusion

Women experiencing DLII may be less able to sustain any and exclusive breastfeeding at 4 weeks. DLII could be used as an early clinical marker to help identify women in need of additional breastfeeding support or interventions to increase breast milk production. Additionally, these analyses identified several other independent risk factors that warrant further study including postnatal WIC enrollment and the preferences of obstetric providers for not exclusive breastfeeding.

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Abbreviations

BF	breastfeeding
WIC	supplemental nutrition program for women, infants and children
OR	odds ratio
CI	95% confidence interval
DLII	delayed onset lactogenesis II

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Figure 1.
Distribution of Maternal Self Report Onset of Lactogenesis (n=2491)

Figure 2.
Breastfeeding outcomes at 4 weeks for women experiencing delayed lactogenesis II.

Table 1

Demographics and Confounders by DLII Status.

Variables	DLII- Yes n=579 n (%)	DLII- No n=1912 n (%)	p-value ^a
Demographics			
Age ^b			0.29
18–24	116 (20.07)	438 (22.94)	
25–34	372 (64.36)	1165 (61.03)	
> 34	90 (15.57)	306 (16.03)	
Race/Ethnicity ^b			0.29
White	468 (83.72)	1556 (83.39)	
Black	18 (3.22)	97 (5.20)	
Hispanic	43 (7.69)	118 (6.32)	
Other	30 (5.37)	95 (5.09)	
Education ^b			0.61
High School	93 (17.35)	328 (18.43)	
Some College	230 (42.91)	722 (40.56)	
College Completion	213 (39.74)	730 (41.01)	
Federal Poverty Level			< 0.01
< 185 %	213 (36.79)	791 (41.37)	
185–350 %	204 (35.23)	701 (36.66)	
> 350 %	162 (27.98)	420 (21.97)	
Postnatal WIC Enrollment ^b			0.03
Yes	140 (24.18)	549 (28.77)	
No	439 (75.82)	1359 (71.23)	
Geographic Residential Location			0.04
Northeast	89 (15.37)	304 (15.90)	
Midwest	150 (25.91)	584 (30.54)	
South	214 (36.96)	595 (31.12)	
West	126 (21.76)	429 (22.44)	
Household Size			< 0.01
4 Members	522 (90.16)	1589 (83.11)	
> 4 Members	57 (9.84)	323 (16.89)	
Infant Feeding Factors			
Parity ^b			< 0.01
Primiparous	255 (44.97)	481 (25.83)	
Multiparous	312 (55.03)	1381 (74.17)	
Previous BF Experience ^b			< 0.01
Yes	272 (48.31)	1289 (69.68)	
No	291 (51.69)	561 (30.32)	
Parity/Previous BF Experience ^{b, c}			< 0.01
Primiparous	255 (45.29)	481 (26.00)	

Variables	DLII- Yes n=579 n (%)	DLII- No n=1912 n (%)	p-value ^a
Multiparous with BF experience	272 (48.31)	1289 (69.68)	0.10
Multiparous without BF experience	36 (6.39)	80 (4.32)	
Exclusive BF Plan ^b			
Exclusively BF	387 (66.96)	1350 (70.90)	
Not Exclusively BF	167 (28.89)	500 (26.26)	
Doesn't Know	24 (4.15)	54 (2.84)	0.16
Mother Believes Infant Formula is as Good as Breast Milk			
Yes or Neutral	198 (34.20)	594 (31.07)	
No	381 (65.80)	1318 (68.93)	0.02
Feeding on Demand ^b			
Whenever Baby Cried or Felt Hungry	278 (48.10)	1040 (54.59)	
On a Schedule or Routine	46 (7.96)	129 (6.77)	
Both	254 (43.94)	736 (38.64)	< 0.01
Initiation of First BF ^b			
0–30 Minutes Post Partum	125 (21.74)	653 (34.48)	
31–60 Minutes Post Partum	166 (28.87)	481 (25.40)	
> 1 Hour Post Partum	284 (49.39)	760 (40.12)	0.10
Health Care Provider Factors			
Timing of First Prenatal Care Visit ^b			
< 13 weeks	524 (91.13)	1678 (88.74)	
13 weeks	51 (8.87)	213 (11.26)	
Obstetric Provider Favors Exclusive BF ^b			
Yes	189 (32.70)	732 (38.61)	
No	389 (67.30)	1164 (61.39)	
Pediatric Provider Favors Exclusive BF ^b			
Yes	259 (44.97)	981 (51.74)	
No	317 (55.03)	915 (48.26)	
Hospital Practices			< 0.01
Low Intervention Vaginal Birth ^{b, d}			
Yes	175 (30.33)	800 (41.95)	
No	402 (69.67)	1107 (58.05)	< 0.01
Epidural/Spinal Status ^b			
Yes	484 (83.74)	1388 (72.78)	
No	94 (16.26)	519 (27.22)	0.03
Hospital Rooming-In ^b			
All the Time	308 (53.29)	1132 (59.58)	
Sometimes	154 (26.64)	437 (23.00)	
Never	116 (20.07)	331 (17.42)	< 0.01
In-Hospital BF Support ^b			
Yes	485 (83.91)	1360 (71.47)	

Variables	DLII- Yes n=579 n (%)	DLII- No n=1912 n (%)	p-value ^a
No	93 (16.09)	543 (28.53)	
Lifestyle Factors			
Prenatal Obesity ^{b, e}			0.06
Yes	148 (25.78)	415 (21.98)	
No	426 (74.22)	1473 (78.02)	
Maternal Return to Work ^b			0.02
0–6 Months	64 (15.65)	190 (14.88)	
> 6 Months	252 (61.61)	706 (55.29)	
Did Not Return	93 (22.74)	381 (29.84)	
Post Partum Maternal Tobacco Use ^b			0.06
Any	65 (13.98)	162 (10.81)	
None	400 (86.02)	1337 (89.19)	

Abbreviations: NICU, neonatal intensive care unit; DLII, delayed onset of lactogenesis II; WIC, Women Infant and Children; BF, breastfeeding; FF, formula feeding; N/A, not applicable.

^aMissing data were excluded when calculating global *p*-values

^bObservations<2491

^cCombined variables (parity and breastfeeding experience variables) used in the multivariable model, instead of 2 separate variables.

^dMaternal BMI cutoff of a score of 30 or higher

^eVaginal birth with no induction

Table 2

Early cessation of any and exclusive breastfeeding: multivariable logistic regression.

Variables	Any BF Cessation within 4 weeks		Exclusive BF Cessation by 4 weeks	
	OR (95% CI) n=1754	p-value ^a	OR (95% CI) n=1372	p-value ^a
DLII		< 0.01		< 0.01
Yes	1.62 (1.14–2.31)		1.62 (1.18–2.22)	
No	1 [Reference]		1 [Reference]	
Age		< 0.01		0.04
18–24	1.75 (1.15–2.66)		1.58 (1.04–2.39)	
25–34	1 [Reference]		1 [Reference]	
> 34	0.62 (0.37–1.03)		1.30 (0.94–1.80)	
Race/Ethnicity		0.05		0.10
White	1 [Reference]		1 [Reference]	
Black	0.85 (0.41–1.75)		2.13 (0.94–4.82)	
Hispanic	0.37 (0.16–0.83)		1.03 (0.58–1.83)	
Other	0.47 (0.17–1.28)		1.88 (0.94–3.75)	
Education		0.02		0.11
High School	1.81 (1.09–3.01)		1.55 (1.00–2.40)	
Some College	1.76 (1.16–2.66)		1.29 (0.95–1.75)	
College	1 [Reference]		1 [Reference]	
Previous BF Experience		< 0.01		0.03
Primiparous	1.91 (1.29–2.81)		1.45 (1.05–2.00)	
Multiparous with previous BF	1 [Reference]		1 [Reference]	
Multiparous without previous BF	4.26 (2.39–7.59)		1.95 (0.85–4.49)	
Exclusive BF Plan		< 0.01		< 0.01
Exclusively BF	1 [Reference]		1 [Reference]	
Not Exclusively BF	3.68 (2.59–5.22)		4.72 (3.26–6.83)	
Doesn't Know	5.65 (2.90–11.03)		2.35 (0.96–5.76)	
Geographic Residential Location		0.02		
Northeast	1 [Reference]		NA	
Midwest	1.45 (0.89–2.39)		NA	
South	1.22 (0.74–2.03)		NA	
West	0.63 (0.34–1.17)		NA	
Household Size		0.26		
4 Members	1 [Reference]		NA	
> 4 Members	1.31 (0.82–2.10)		NA	
Pediatric Provider Favors Exclusive BF		< 0.01		
Yes	1 [Reference]		NA	
No	2.12 (1.50–2.99)		NA	
Hospital Support		0.01		
Yes	1 [Reference]		NA	
No	0.58 (0.37–0.90)		NA	

Variables	Any BF Cessation within 4 weeks		Exclusive BF Cessation by 4 weeks	
	OR (95% CI) n=1754	p-value ^a	OR (95% CI) n=1372	p-value ^a
Maternal Tobacco Use		< 0.01		0.09
Yes	1.82 (1.19–2.78)		1.50 (0.94–2.39)	
No	1 [Reference]		1 [Reference]	
FPL				0.04
< 185%	NA		1 [Reference]	
185–350%	NA		1.54 (1.11–2.15)	
> 350%	NA		1.31 (0.88–1.95)	
Postnatal WIC Enrollment				0.04
Yes	NA		1.52 (1.05–2.21)	
No	NA		1 [Reference]	
Feeding on Demand				< 0.01
Whenever Baby Cried or Felt Hungry	NA		1 [Reference]	
On a Schedule or Routine	NA		2.15 (1.18–3.95)	
Both	NA		1.43 (1.10–1.87)	
Initiation of First BF				< 0.01
0–30 Min PP	NA		1 [Reference]	
31–60 Min PP	NA		1.06 (0.77–1.45)	
> 1 Hour PP	NA		1.93 (1.41–2.64)	
Timing of First Prenatal Care Visit				0.02
< 13 Weeks	NA		1 [Reference]	
13 Weeks	NA		1.70 (1.07–2.69)	
Obstetric Provider Favors Exclusive BF				< 0.01
Yes	NA		1 [Reference]	
No	NA		1.53 (1.18–1.98)	
Low Intervention Vaginal Birth ^b				0.09
Yes	NA		1 [Reference]	
No	NA		1.27 (0.97–1.67)	
Epidural/Spinal Status				0.38
Yes	NA		1.15 (0.84–1.57)	
No	NA		1 [Reference]	
Prenatal Obesity ^c				< 0.01
Yes	NA		1.66 (1.22–2.27)	
No	NA		1 [Reference]	
Maternal Return to Work				0.50
0–6 Months	NA		1.09 (0.73–1.64)	
> 6 Months	NA		1.19 (0.89–1.58)	
Did Not Return	NA		1 [Reference]	

Abbreviations: BF, breastfeeding; OR, odds ratio; CI, confidence interval; DLII, delayed onset of lactogenesis II; NA, not applicable; FPL, federal poverty level; WIC, Women Infant and Children; Min, minutes; PP Post Partum.

^a p-values represent the type 3 analysis of effects wald chi-square p-value.

^bVaginal birth with no induction.

^cMaternal BMI cutoff of a score of 30 or higher.