

The Effect of Maternity Leave Length and Time of Return to Work on Breastfeeding



WHAT'S KNOWN ON THIS SUBJECT: It is known that breastfeeding behavior is affected by maternity leave length and time of return to work. However, previous studies have mainly been conducted among subgroups of women and limited to small sample sizes.



WHAT THIS STUDY ADDS: This study adds to the literature by using recent, nationally representative data. In addition, breastfeeding duration was followed longitudinally for up to 2 years compared with previous studies that have looked at breastfeeding duration for ≤ 1 year.

abstract

FREE

OBJECTIVE: We investigated the effect of maternity leave length and time of first return to work on breastfeeding.

METHODS: Data were from the Early Childhood Longitudinal Study—Birth Cohort. Restricting our sample to singletons whose biological mothers were the respondents at the 9-month interview and worked in the 12 months before delivery ($N = 6150$), we classified the length of total maternity leave (weeks) as 1 to 6, 7 to 12, ≥ 13 , and did not take; paid maternity leave (weeks) as 0, 1 to 6, ≥ 7 , and did not take; and time of return to work postpartum (weeks) as 1 to 6, 7 to 12, ≥ 13 , and not yet returned. Analyses included χ^2 tests and multiple logistic regressions.

RESULTS: In our study population, 69.4% initiated breastfeeding with positive variation by both total and paid maternity leave length, and time of return to work. In adjusted analyses, neither total nor paid maternity leave length had any impact on breastfeeding initiation or duration. Compared with those returning to work within 1 to 6 weeks, women who had not yet returned to work had a greater odds of initiating breastfeeding (odds ratio [OR]: 1.46 [1.08–1.97]; risk ratios [RR]: 1.13 [1.03–1.22]), continuing any breastfeeding beyond 6 months (OR: 1.41 [0.87–2.27]; RR: 1.25 [0.91–1.61]), and predominant breastfeeding beyond 3 months (OR: 2.01 [1.06–3.80]; RR: 1.70 [1.05–2.53]). Women who returned to work at or after 13 weeks postpartum had higher odds of predominantly breastfeeding beyond 3 months (OR: 2.54 [1.51–4.27]; RR: 1.99 [1.38–2.69]).

CONCLUSION: If new mothers delay their time of return to work, then duration of breastfeeding among US mothers may lengthen. *Pediatrics* 2011;127:e1414–e1427

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KEY WORDS

breastfeeding, work, maternity leave, ECLS-B, survey

ABBREVIATIONS

FMLA—The Family and Medical Leave Act

ECLS-B—Early Childhood Longitudinal Study—Birth Cohort

FPL—federal poverty level

WIC—Supplemental Nutrition Program for Women, Infants, and Children

OR—odds ratio

RR—risk ratio

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The literature attests to the benefits of breastfeeding for infant and maternal health.¹ Economic benefits have also been described.¹ In recognition of these benefits, the American Academy of Pediatrics² and several other health organizations^{3,4} recommend exclusive breastfeeding for the first 6 months of life. The American Academy of Pediatrics further encourages breastfeeding, with other foods, for at least the first year of life and beyond.² Despite these recommendations, the national rates of breastfeeding initiation, duration, and exclusivity still fall short of the Healthy People 2010 breastfeeding objectives.^{5,6}

Work-related issues have been repeatedly noted as a major reason for noninitiation^{7–12} and early cessation of breastfeeding.^{7,8,13} Lack of supportive work environments, such as provision of lactational facilities and paid maternity leave, have been cited as barriers to breastfeeding initiation and prolonged duration.^{14–21} The United States does not mandate paid maternity leave for any employee.^{22–24} The Family and Medical Leave Act (FMLA) of 1993, which provides for unpaid time away from work for perinatal care, childbirth, newborn care, or the care of a newly adopted child,^{25–26} is limited to 12 weeks and only applies to relatively large employers.^{25,27} Only 5 states (CA, HI, NJ, NY, and RI) have gone beyond the FMLA requirement by offering partial wage compensation for women unable to work because of pregnancy, birth, or bonding with a new child.^{28,29}

Several smaller studies have shown that the length of maternity leave is positively associated with breastfeeding initiation^{28,30} and duration.^{30,31} Analysis on a subset of women in the Infant Feeding Practices Survey—that is, those who initiated breastfeeding ($n = 712$)—revealed that each week of work leave increased breastfeeding duration by ~ 0.5 week.³¹ In a review

of breastfeeding practices among physician-mothers in the United States, maternity leave length was shown to be a positive factor in breastfeeding maintenance.³² In 1 of the articles reviewed, maternity leave length was positively associated with breastfeeding duration for first- and second-born children but not for subsequent children. However, a study exploring personal breastfeeding practices of physicians in Newfoundland and Labrador, Canada, did not find maternity leave length to be a significant predictor of duration among physician-mothers.³³

When compared with women not working, women with maternity leave lengths < 6 weeks breastfeed for a shorter duration.³⁴ There is also no association between maternity leave lengths < 6 weeks

and breastfeeding initiation.³⁴ Maternity leave remuneration is positively associated with breastfeeding duration.³⁵ Early return to full-time or part-time work has been found to be associated with decreased rates of breastfeeding initiation,^{36,37} duration,^{31,37,38} and predominance.³⁸ Returns within 6 weeks^{30,36,37} and 12 weeks^{31,37} are associated with poorer breastfeeding behaviors.

Previous studies examining the relationship between maternity leave length/time of return to work and breastfeeding initiation and duration had limitations of small sample sizes^{28,31} and limited generalizability due to sample characteristics.^{13,28,31} The objective of the present study was to determine the effect of 3 slightly different but related factors (total ma-

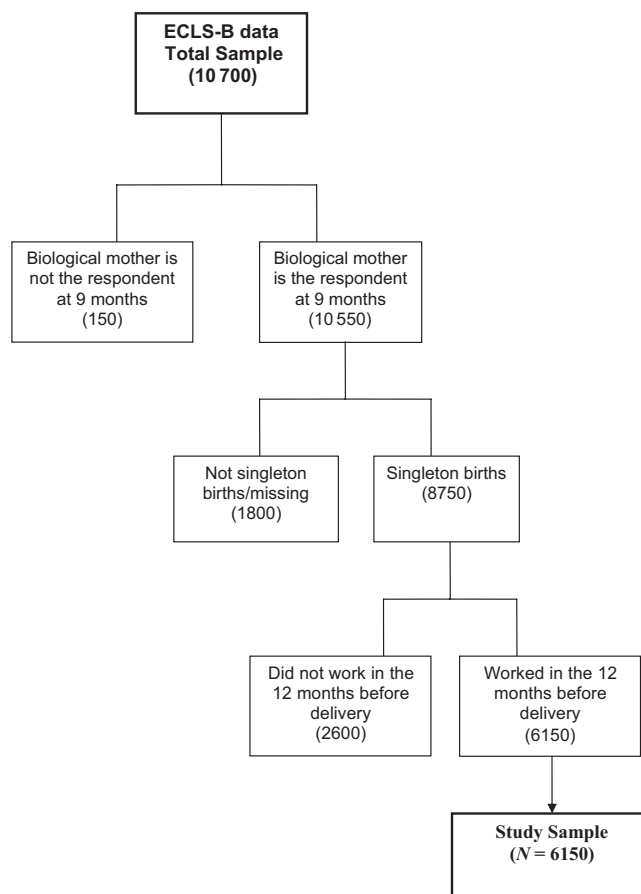


FIGURE 1

Flowchart for the determination of the study sample. Sample sizes were rounded to the nearest “50” due to the restricted-use license requirement.

TABLE 1 Total Maternity Leave Length According to Maternal Characteristics, Child/Delivery Characteristics and Interpersonal/Family/Community Characteristics (*N* = 6150)^a

Characteristics	Unweighted <i>n</i>	Total %	Length of Maternity Leave (%)				<i>P</i>
			1–6 wk	7–12 wk	≥13 wk	Did Not Take (%)	
All women			20.2	31.1	13.9	34.7	
Maternal characteristics							
Race/ethnicity							.03
White, non-Hispanic	2800	61.2	62.4	66.0	62.4	55.8	
Black, non-Hispanic	1050	14.5	14.4	11.7	14.9	16.7	
Hispanic	950	18.6	16.8	16.7	16.7	22.2	
Other, non-Hispanic	1300	5.7	6.4	5.6	6.0	5.3	
Missing	0 ^b						
Age, y							<.0001
15–19	350	5.2	3.2	1.8	2.3	10.5	
20–24	1600	24.4	25.1	17.1	15.6	34.2	
25–29	1500	27.0	33.3	29.7	21.6	23.1	
30–34	1550	26.0	25.8	29.8	34.1	19.7	
≥35	1100	17.4	12.6	21.6	26.4	12.6	
Marital status							<.0001
Married	4000	67.2	68.8	75.6	75.5	55.4	
Single	2150	32.8	31.2	24.4	24.5	44.6	
Missing	0 ^b						
Education							<.0001
≤12th grade	950	14.0	10.4	7.2	8.7	24.1	
High school or equivalent	1800	29.8	33.9	25.1	21.9	34.7	
Vocational/technical or some college	1750	29.5	32.3	32.7	29.8	24.8	
Bachelor's degree or higher	1650	26.8	23.4	35.0	39.7	16.4	
Income status							<.0001
<185% FPL	2800	42.2	41.7	28.5	29.1	59.8	
≥185% FPL	3350	57.9	58.3	71.5	71.0	40.3	
Country of birth ^c							.26
US/US territories	4450	79.5	82.2	79.8	83.7	76.1	
Foreign country	1250	13.9	12.3	13.4	11.0	16.7	
Missing	450	6.5	5.6	6.9	5.4	7.2	
Smoking in last 3 mo of pregnancy							<.0001
Yes	750	11.5	12.1	7.1	9.2	15.9	
No	5400	88.5	87.9	92.9	90.8	84.1	
Missing	0 ^b						
Child/delivery characteristics							
Birth weight							.01
Normal (≥2500 g)	4900	94.2	94.7	95.2	94.4	93.0	
Low (<2500 g)	1200	5.8	5.3	4.8	5.6	7.0	
Missing	0 ^b						
Mode of delivery							.10
Vaginal	4350	74.4	78.3	71.8	72.1	75.3	
Cesarean	1750	25.6	21.7	28.2	27.9	24.7	
Missing	50						
Birth order							.32
1	2750	44.8	41.9	47.4	43.1	45.1	
2	1950	31.9	32.1	32.3	34.7	30.3	
≥3	1400	23.3	26.1	20.3	22.3	24.6	
Missing	50						
Health care professional advice about breastfeeding							.37
Yes	5300	87.7	88.3	87.0	85.0	89.0	
No	750	12.3	11.7	13.0	15.0	11.0	
Missing	100						
Interpersonal/family/community characteristics							
Separation from child for ≥1 week							.29
Yes	400	5.7	7.7	5.3	5.3	5.2	
No	5750	94.3	92.3	94.7	94.7	94.8	
Child care arrangements							<.0001
Parental care	2500	40.4	34.7	25.6	28.3	61.5	
In-home care	1050	14.9	14.1	16.3	18.5	12.9	
Out-of-home care	2600	44.7	51.2	58.1	53.2	25.6	
Missing	0 ^b						

TABLE 1 Continued

Characteristics	Unweighted <i>n</i>	Total %	Length of Maternity Leave (%)				<i>P</i>
			1–6 wk	7–12 wk	≥13 wk	Did Not Take (%)	
WIC participation by mother or child in last 12 mo							<.0001
Yes	3150	48.5	47.5	35.0	36.3	66.1	
No	2950	51.5	52.5	65.0	63.7	33.9	
Missing	0 ^b						
Region							<.0001
Northeast	950	18.0	15.2	17.8	27.9	15.9	
Midwest	1450	23.7	24.0	25.8	21.5	22.5	
South	2150	36.7	41.2	36.4	26.6	38.5	
West	1550	21.6	19.7	20.0	24.1	23.1	
Urbanicity ^d							.03
Urban, inside urban area	4450	72.9	68.2	73.3	79.3	72.5	
Urban, inside urban cluster	750	11.7	13.3	11.5	9.0	12.1	
Rural	950	15.4	18.6	15.2	11.7	15.4	

Length of leave is given in weeks. Weight variable is W1R0. Percentages may not add up to 100 due to rounding. Unweighted sample sizes have been rounded to the nearest 50. Column percentages are shown for the control variables.

^a Sample restricted to singletons whose biological mothers were the respondent at the 9-month wave and worked in the 12 months before delivery.

^b Estimate rounds to 0.

^c The country of birth variable has a large number of missing observations because it was ascertained at the 2-year interview, by which time some participants had been lost to follow-up. The missing category is included in the analysis by applying the 9-month weight (W1R0).

^d Urban/rural location of interview.

SOURCE: US Department of Education, National Center for Education Statistics, ECLS-B Longitudinal 9 Month-Preschool Restricted Use data file.

ternity leave length, paid maternity leave length, and time of return to work) on breastfeeding initiation and duration using a longitudinal, nationally representative sample and racially diverse data.

METHODS

Study Design

Data were drawn from the Early Childhood Longitudinal Study–Birth Cohort (ECLS-B), conducted by the National Center for Education Statistics. The ECLS-B is a nationally representative sample of ~10 700 children born in 2001, drawn from US birth certificates. Information on the children's nutrition, health, development, and education were collected at 5 time periods. The children come from racially diverse backgrounds with oversampling of certain populations. Data were collected from multiple sources and through multiple methods. Parent interviews were conducted during a home visit with the household member most knowledgeable about the child's care and education. Informed consents were obtained from the parents before the study commenced. At the 9-month in-

terview, the parent respondent was the biological mother for 99% of the children.

Our study sample was restricted to singletons whose biological mothers were the respondents at the 9-month interview and had worked in the 12 months before delivery ($N = 6150$) (Fig 1). Only the first 2 waves of data collection (9-month and 2-year) included a question on breastfeeding behavior.

Variables

Dependent Variables

For breastfeeding initiation, respondents were asked: "Did you ever breast-feed [child]?" This information was obtained from the 9-month interview data. Duration of any breastfeeding in months was ascertained only among breastfeeding initiators. We censored duration of any breastfeeding for 3.99% of the study population: those still breastfeeding by the 9-month interview but who were lost to follow-up by the 2-year interview had duration censored at the child's actual age by the 9-month interview (0.94%) whereas those still breastfeeding at the 2-year interview

had duration censored at the child's actual age by the 2-year interview (3.05%).

Duration of predominant breastfeeding was derived from the time of earliest introduction of infant formula, cow's milk, or solids among breastfeeding initiators. We imputed predominant breastfeeding duration values for observations where any breastfeeding values were less than predominant breastfeeding values (unweighted $n = 300$). We refer to predominant rather than exclusive breastfeeding because there was no ascertainment in the survey of the time of introduction of water or water-based fluids.

Duration of any and predominant breastfeeding was set at 0.5 month for those with duration of <1 month. For analytical purposes, breastfeeding duration was dichotomized: ≤ 6 or > 6 months (any breastfeeding) and ≤ 3 or > 3 months (predominant breastfeeding). The cutoff points were chosen on the basis of the Healthy People 2010 objectives of 50% of infants being breastfed at 6 months and 40% of infants being exclusively breastfed through 3 months.^{5,6}

TABLE 2 Time of Return to Work According to Maternal Characteristics, Child/Delivery Characteristics and Interpersonal/Family/Community Characteristics (*N* = 6150)^a

Characteristics	Unweighted <i>n</i>	Total %	Time of Return to Work (%)				<i>P</i>
			1–6 wk	7–12 wk	≥13 wk	Not Yet Returned to Work	
All women			18.6	35.8	21.2	24.5	
Maternal characteristics							
Race/ethnicity							.26
White, non-Hispanic	2800	61.2	64.2	61.8	61.6	57.7	
Black, non-Hispanic	1050	14.5	13.1	14.3	16.1	14.6	
Hispanic	950	18.6	16.3	18.2	17.7	21.9	
Other, non-Hispanic	1300	5.7	6.5	5.8	4.7	5.8	
Missing	0 ^b						
Age, y							<.0001
15–19	350	5.2	4.8	3.6	6.8	6.5	
20–24	1600	24.4	27.0	19.6	26.2	28.3	
25–29	1500	27.0	32.2	27.2	22.1	26.8	
30–34	1550	26.0	23.6	29.8	25.4	23.0	
≥35	1100	17.4	12.4	19.8	19.4	15.4	
Marital status							.35
Married	4000	67.2	68.9	69.9	64.9	65.7	
Single	2150	32.8	34.1	30.1	35.1	34.3	
Missing	0 ^b						
Education							<.0001
≤12 grade	950	14.0	11.4	10.1	15.2	20.6	
High school or equivalent	1800	29.8	33.7	26.3	28.1	33.2	
Vocational/technical or some college	1750	29.5	31.7	32.7	27.5	25.2	
Bachelor's degree or higher	1650	26.8	23.2	30.9	29.2	21.0	
Income status							<.0001
<185% FPL	2800	42.2	44.2	34.7	41.2	52.5	
≥185% FPL	3350	57.9	55.8	65.3	58.8	47.5	
Country of birth ^c							.08
US/US territories	4450	79.5	83.8	79.3	80.1	76.1	
Foreign country	1250	13.9	10.2	14.1	13.4	17.2	
Missing	450	6.5	6.0	6.6	6.5	6.8	
Smoking in last 3 mo of pregnancy							.01
Yes	750	11.5	13.9	8.9	10.7	14.0	
No	5400	88.5	86.1	91.1	89.3	86.0	
Missing	0 ^b						
Child/delivery characteristics							
Birth weight							.01
Normal (≥2500 g)	4900	94.2	95.5	94.7	93.5	93.3	
Low (<2500 g)	1200	5.8	4.5	5.3	6.5	6.7	
Missing	0 ^b						
Mode of delivery							.07
Vaginal	4350	74.4	79.6	72.7	73.2	73.5	
Cesarean	1750	25.6	20.4	27.3	26.8	26.5	
Missing	50						
Birth order							.01
1	2750	44.8	38.8	44.6	49.9	45.6	
2	1950	31.9	35.6	33.0	29.9	28.8	
≥3	1400	23.3	25.6	22.4	20.2	25.6	
Missing	50						
Health care professional advice about breastfeeding							.61
Yes	5300	87.7	88.3	88.2	88.2	85.9	
No	750	12.3	11.7	11.8	11.8	14.1	
Missing	100						
Interpersonal/family/community characteristics							
Separation from child for ≥1 wk							.61
Yes	400	5.7	7.2	5.7	5.3	5.0	
No	5750	94.3	92.8	94.3	94.7	95.0	
Child care arrangements							<.0001
Parental care	2500	40.4	32.3	22.3	29.8	81.8	
In-home care	1050	14.9	16.3	17.9	18.6	6.6	
Out-of-home care	2600	44.7	51.4	59.8	51.7	11.6	
Missing	0 ^b						

TABLE 2 Continued

Characteristics	Unweighted <i>n</i>	Total %	Time of Return to Work (%)				<i>P</i>
			1–6 wk	7–12 wk	≥13 wk	Not Yet Returned to Work	
WIC participation by mother or child in last 12 mo							<.0001
Yes	3150	48.5	50.8	40.7	49.6	57.7	
No	2950	51.5	49.2	59.3	50.4	42.3	
Missing	0 ^b						
Region							.07
Northeast	950	18.0	13.4	17.0	21.5	20.0	
Midwest	1450	23.7	25.8	24.0	24.5	21.2	
South	2150	36.7	40.5	39.2	33.3	33.3	
West	1550	21.6	20.3	19.8	20.8	25.6	
Urbanicity ^d							.02
Urban, inside urban area	4450	72.9	65.3	72.5	76.2	75.9	
Urban, inside urban cluster	750	11.7	14.9	12.3	10.5	9.6	
Rural	950	15.4	19.9	15.1	13.3	14.5	

Weight variable is W1R0. Percentages may not add up to 100 due to rounding. Unweighted sample sizes have been rounded to the nearest 50. Column percentages are shown for the control variables.

^a Sample restricted to singletons whose biological mothers were the respondent at the 9-month wave and worked in the 12 months before delivery.

^b Estimate rounds to 0.

^c The country of birth variable has a large number of missing observations because it was ascertained at the 2-year interview, by which time some participants had been lost to follow-up. The missing category is included in the analysis by applying the 9-month weight (W1R0).

^d Urban/rural location of interview.

SOURCE: US Department of Education, National Center for Education Statistics, ECLS-B Longitudinal 9 Month-Preschool Restricted Use data file.

Main Independent Variables and Control Variables

The main independent variables of interest were: (1) total (paid + unpaid); and (2) paid maternity leave length (in weeks). Maternity leave length may not always coincide with time of return to work because some women may quit their jobs after their maternity leave and start a new job at a later time.³⁹ Thus, we also investigated the effect of time of return to work. For total maternity leave, respondents who took maternity leave were asked: "In total, how many weeks of maternity leave, paid or unpaid, did you take?" For paid maternity leave, they were asked: "In total, how many weeks of paid maternity leave did you receive from your job while you were on maternity leave?" For the time of return to work variable, women who had started work by the 9-month interview were asked: "How old was child when you first went to work at a job?" Total maternity leave length was classified as 1 to 6, 7 to 12, ≥13 weeks, and did not take maternity leave; paid maternity leave length as 0 (took maternity leave without remuneration), 1 to 6, ≥7 weeks, and did not

take maternity leave (no maternity leave); and time of return to work as 1 to 6, 7 to 12, ≥13 weeks, and not yet returned to work. Imputations were also made, replacing missing values of total maternity leave length with non-missing values of paid maternity leave length and shorter total maternity leave lengths with longer paid maternity leave lengths (unweighted *n* = 100).

Selection of control variables was guided by the socioecological framework.^{18,40,41} Variables were classified

as maternal (race/ethnicity, age, marital status, education, income status (</≥185% of federal poverty level [FPL]), smoking status in last 3 months of pregnancy, and country of birth); child/delivery (birth weight, mode of delivery, birth order, and health care professional advice about breastfeeding); interpersonal/family (separation from child and child care arrangements); and organizational/community (participation of the child or mother in the past 12 months in the

TABLE 3 Association Between Maternity Leave Length and Time of Return to Work (*N* = 6150)^a

Characteristics	Time of Return to Work (wk)				<i>P</i>
	1–6	7–12	≥13	Not Yet Returned to Work	
Total maternity leave, wk					<.0001
1–6	54.5	22.3	10.7	12.6	
7–12	10.0	69.4	11.3	9.3	
≥13	6.6	29.3	54.9	9.2	
Did not take maternity leave	10.2	16.3	22.9	50.6	
Paid maternity leave, wk					<.0001
0	28.9	39.4	20.1	11.6	
1–6	32.6	40.2	16.2	11.1	
≥7	7.7	58.9	24.7	8.6	
Did not take maternity leave	10.2	16.3	22.9	50.6	

Row percentages are shown.

^a Sample restricted to singletons whose biological mothers were the respondent at the 9-month wave and worked in the 12 months before delivery. SOURCE: US Department of Education, National Center for Education Statistics, ECLS-B Longitudinal 9 Month-Preschool Restricted Use data file.

Supplemental Nutrition Program for Women, Infants, and Children [WIC]; region of residence; and urbanicity).

All independent and control variables, except country of birth, were drawn from the 9-month interview data. Country of birth was ascertained at the 2-year interview; hence, we created a missing category for those lost to follow-up by the 2-year interview.

Data Analysis

Univariate analysis described the characteristics of mothers in our population. χ^2 tests were used to determine associations between total maternity leave/time of return to work and the control variables. χ^2 tests were also used to delineate associations between the main independent/control variables and the 3 breastfeeding outcomes (breastfeeding initiation, duration of any breastfeeding, and predominant breastfeeding). We also conducted a posthoc bivariable analysis of maternity leave length (total/paid) and time of return to work.

Multiple logistic regressions were then used to investigate the effect of the 3 main independent variables on breastfeeding initiation, continuing any breastfeeding beyond 6 months, and predominant breastfeeding beyond 3 months. Continuing any breastfeeding beyond 3 months was also explored. Each main independent variable was examined separately. Three models were run for each main independent variable: (1) a crude model; (2) a maternal model (crude model + maternal characteristics); and (3) a full model (crude model + all control variables). The maternal model was explored to see whether maternal characteristics were of greater importance than other characteristics. Interactions between the main independent variables and race/ethnicity were tested in full models.

Given that the study outcomes were not rare, the odds ratios (ORs) obtained

TABLE 4 Breastfeeding Initiation Among Mothers Who Worked Before Delivery, According to Maternity Leave Characteristics, Maternal Characteristics, Child/Delivery Characteristics and Interpersonal/Family/Community Characteristics (*N* = 6150)^a

Characteristics	Unweighted <i>n</i>	% Initiating Breastfeeding	<i>P</i>
Main independent variables			
Maternity leave length			
Total maternity leave in weeks			.0004
1–6	1250	64.6	
7–12	1850	73.3	
≥13	850	74.2	
Did not take maternity leave	2200	66.9	
Missing	50		
Paid maternity leave in weeks			.01
0	1350	66.9	
1–6	1300	70.5	
≥7	1300	74.8	
Did not take maternity leave	2200	66.9	
Missing	0 ^b		
Time of return to work			.05
1–6	1150	63.3	
7–12	2100	70.4	
≥13	1350	70.2	
Not yet returned to work ^c	1500	71.9	
Missing	50		
Control variables			
Maternal characteristics			
Race/ethnicity			<.0001
White, non-Hispanic	2800	71.1	
Black, non-Hispanic	1050	51.0	
Hispanic	950	76.8	
Other, non-Hispanic	1300	74.1	
Missing	0 ^b		
Age, y			<.0001
15–19	350	57.2	
20–24	1600	60.2	
25–29	1500	70.3	
30–34	1550	74.7	
≥35	1100	76.9	
Marital status			<.0001
Married	4000	75.5	
Single	2150	57.1	
Missing	0 ^b		
Education			<.0001
≤12th grade	950	52.3	
High school/equivalent	1800	59.5	
Vocational/technical or some college	1750	71.3	
Bachelor's degree or higher	1650	87.4	
Income status			<.0001
<185% FPL	2800	59.3	
≥185% FPL	3350	76.8	
Country of birth ^d			<.0001
US/US territories	4450	67.1	
Foreign country	1250	84.5	
Missing	500	66.1	
Smoking last 3 mo of pregnancy			<.0001
Yes	750	49.8	
No	5400	72.0	
Missing	0 ^b		
Child/delivery characteristics			
Birth weight			.001
Normal (≥2500 g)	4900	70.1	
Low (<2500 g)	1200	59.2	
Missing	0 ^b		

TABLE 4 Continued

Characteristics	Unweighted <i>n</i>	% Initiating Breastfeeding	<i>P</i>
Mode of delivery			.23
Vaginal	4350	70.3	
Cesarean	1750	66.9	
Missing	50		
Birth order			.0003
1	2750	74.5	
2	1950	67.7	
≥3	1400	25.5	
Missing	50		
Health care professional advice about breastfeeding			.26
Yes	5300	69.0	
No	750	73.1	
Missing	100		
Interpersonal/family/community characteristics			
Separation from child for ≥1 wk			.02
Yes	400	58.7	
No	5750	70.1	
Child care arrangements			.10
Parental care	2500	72.1	
In-home care	1050	65.1	
Out-of-home care	2600	68.5	
Missing	0 ^b		
WIC participation by mother or child in the last 12 mo			<.0001
Yes	3150	59.0	
No	2950	79.3	
Missing	0 ^b		
Region			<.0001
Northeast	950	66.7	
Midwest	1450	68.8	
South	2150	63.4	
West	1550	82.7	
Urbanicity ^e			<.0001
Urban, inside urban area	4450	72.6	
Urban, inside urban cluster	750	64.9	
Rural	950	57.9	

Weight variable is W1R0. Percentages may not add up to 100 due to rounding. Unweighted sample sizes have been rounded to the nearest 50.

^a Sample restricted to singletons whose biological mothers were the respondent at the 9-month wave and worked in the 12 months before delivery.

^b Estimate rounds to 0.

^c Not yet returned to work by the 9-month interview.

^d The country of birth variable has a large number of missing observations because this was a variable ascertained at the 2-year interview by which time some participants had been lost to follow-up. The missing category is included in the analysis by applying the 9-month weight (W1R0).

^e Urban/rural location of interview.

SOURCE: US Department of Education, National Center for Education Statistics, ECLS-B Longitudinal 9 Month-Pre-school Restricted Use data file.

from this cohort study do not approximate risk ratios (RRs). As a result, we corrected the ORs using a formula recommended by Zhang and Yu⁴²: $RR = OR / ([1 - P_0] + [P_0 * OR])$, where P_0 = incidence of the outcome of interest in the nonexposed or reference group. We present the corrected RRs in addition to the ORs.

Because of the complex survey methods, weighting was applied (W1R0)

with SUDAAN 10 (Research Triangle Institute, Research Triangle Park, NC)⁴³ using Jackknife replication techniques to make our results generalizable to the US population. All unweighted sample sizes are rounded to the nearest "50" due to the restricted-use license requirement. Statistical significance was set at $\alpha = 0.05$. This study was approved by the institutional review boards of the National Center for Edu-

cation Statistics and the University of South Carolina.

RESULTS

Study Population

The majority of women with singleton births in 2001 who worked in the 12 months before delivery were white, non-Hispanic (61.2%), married (67.2%), born in the United States or US territories (79.5%), and had a normal-weight infant (94.2%) (Table 1). The mean age of the child at the 9-month and 2-year interviews was 10.5 and 24.5 months, respectively.

In our study population, 69.4% initiated breastfeeding. The mean duration of any and predominant breastfeeding among initiators was 6.5 and 2.3 months, respectively, with 36.5% breastfeeding for >6 months and 26.4% breastfeeding predominantly for >3 months.

Among maternity leave takers, the mean length of total and paid maternity leave was 11.1 and 5.2 weeks, respectively, and among those who had returned to work by the 9-month interview the average time of return was 12.4 weeks. There was significant variation in total maternity leave length according to several characteristics, including maternal race, age, marital status, education, and region of residence (Table 1). Teenage mothers, those with education ≤12th grade, primiparas, and urban/inside urban area dwellers were more likely to return later to work (Table 2). According to the posthoc bivariable analysis, total and paid maternity leave length were each positively associated with the time of return to work ($P < .0001$; Table 3).

Breastfeeding Initiation

Women who took ≥13 weeks of total maternity leave had the highest rate of breastfeeding initiation (74.2%), whereas women who took 1 to 6 weeks

TABLE 5 Adjusted Analysis: The Effect of Total Maternity Leave Length, Paid Maternity Leave Length, and Time of Return to Work on Breastfeeding Initiation Among Women Who Worked in the 12 Months Before Delivery (*N* = 6150)

Characteristics	Model 1 ^a (<i>n</i> = 6100)		Model 2 ^b (<i>n</i> = 6100)		Model 3 ^c (<i>n</i> = 5950)	
	OR (95% CI)	RR (95% CI)	OR (95% CI)	RR (95% CI)	OR (95% CI)	RR (95% CI)
Total maternity leave in weeks						
1–6 (reference)	1.00	1.00	1.00	1.00	1.00	1.00
7–12	1.50 (1.16–1.94)	1.13 (1.05–1.20)	1.20 (0.89–1.61)	1.06 (0.96–1.15)	1.16 (0.85–1.60)	1.05 (0.94–1.15)
≥13	1.58 (1.20–2.08)	1.15 (1.06–1.22)	1.31 (0.99–1.72)	1.09 (1.00–1.17)	1.28 (0.95–1.73)	1.08 (0.98–1.17)
Did not take maternity leave	1.11 (0.88–1.40)	1.04 (0.95–1.11)	1.39 (1.04–1.86)	1.11 (1.01–1.19)	1.26 (0.92–1.72)	1.08 (0.97–1.17)
Paid maternity leave in weeks						
0 (reference)	1.00	1.00	1.00	1.00	1.00	1.00
1–6	1.18 (0.91–1.55)	1.05 (0.97–1.13)	0.83 (0.62–1.11)	0.94 (0.83–1.03)	0.82 (0.61–1.11)	0.93 (0.83–1.03)
≥7	1.47 (1.11–1.94)	1.12 (1.03–1.19)	0.89 (0.65–1.21)	0.96 (0.85–1.06)	0.88 (0.64–1.21)	0.96 (0.84–1.06)
Did not take maternity leave	1.00 (0.80–1.26)	1.00 (0.92–1.07)	1.12 (0.86–1.47)	1.04 (0.95–1.12)	1.03 (0.77–1.38)	1.01 (0.91–1.10)
Time of return to work in weeks						
1–6 (reference)	1.00	1.00	1.00	1.00	1.00	1.00
7–12	1.38 (1.05–1.82)	1.11 (1.02–1.20)	1.18 (0.86–1.61)	1.05 (0.94–1.16)	1.15 (0.83–1.61)	1.05 (0.93–1.16)
≥13	1.37 (0.98–1.91)	1.11 (0.99–1.21)	1.32 (0.93–1.89)	1.10 (0.97–1.21)	1.33 (0.94–1.88)	1.10 (0.98–1.21)
Not yet returned to work ^d	1.48 (1.12–1.97)	1.14 (1.04–1.22)	1.67 (1.24–2.24)	1.17 (1.08–1.26)	1.46 (1.08–1.97)	1.13 (1.03–1.22)

Weight variable is W1R0. The corrected RR has been obtained using this formula: $RR = OR / [(1 - P_0) + (P_0 * OR)]$, where P_0 is the incidence of the outcome (breastfeeding initiation) in the nonexposed group (reference group). Each main independent variable was assessed separately in each of the models without the other main independent variables.

^a Unadjusted model.

^b Adjusted for maternal characteristics only (race/ethnicity, age, marital status, education, income status, country of birth, and smoking status).

^c Adjusted for all control variables (race/ethnicity, age, marital status, education, income status, country of birth, smoking status, birth weight, mode of delivery, birth order, health care professional advice about breastfeeding, separation from child for ≥1 week, child care arrangements, WIC participation within the last 12 months, region of residence, and urbanicity).

^d Not yet returned to work by the 9-month interview.

SOURCE: US Department of Education, National Center for Education Statistics, ECLS-B Longitudinal 9 Month-Pre-school Restricted Use data file.

of total maternity leave had the lowest rate (64.6%; $P = .0004$; Table 4). For paid maternity leave, those who took ≥7 weeks had the highest rate of initiation (74.8%) while women who had 0 weeks of paid maternity leave and those who did not take any leave had the lowest rate of initiation (both, 66.9%; $P = .01$). Women who had not yet returned to work by the 9-month interview had the highest rate of initiation (71.9%) whereas women returning to work within 1 to 6 weeks postpartum had the lowest rate (63.3%; $P = .05$). All maternal, child, and community variables were associated with breastfeeding initiation except for mode of delivery ($P = .23$), health care professional advice about breastfeeding ($P = .26$), and child care arrangements ($P = .10$).

In unadjusted analysis (model 1; Table 5), any maternity leave was positively associated with breastfeeding. The odds of initiating breastfeeding were higher among women who took ≥13 weeks (OR: 1.58 [95% confidence interval (CI): 1.20–2.08]; RR: 1.15 [95% CI:

1.06–1.22]) and 7 to 12 weeks (OR: 1.50 [95% CI: 1.16 to 1.94]; RR: 1.13 [95% CI: 1.05–1.20]) of total maternity leave, compared with women who took 1 to 6 weeks. After adjusting for maternal characteristics (model 2) and all control variables (model 3), however, these relationships were no longer significant.

Women who had ≥7 weeks of paid maternity leave had greater odds of initiating breastfeeding than women who had 0 weeks of paid maternity leave (OR: 1.47 [95% CI: 1.11–1.94]; RR: 1.12 [95% CI: 1.03–1.19]). In analyses adjusting for maternal and for maternal plus child and community characteristics, this relationship was no longer significant.

Women who had not yet returned to work by the 9-month interview had greater odds of initiation compared with women returning within 1 to 6 weeks (OR: 1.48 [95% CI: 1.12–1.97]; RR: 1.14 [95% CI: 1.04–1.22]; Table 5). This relationship persisted in the adjusted analysis, with an OR of 1.67 (95% CI:

1.24–2.24; RR: 1.17 [95% CI: 1.08–1.26]) when controlling for maternal characteristics and an OR of 1.46 (95% CI: 1.08–1.97); RR: 1.13 [95% CI: 1.03–1.22]) when also controlling for child and community characteristics. Women who returned to work within 7 to 12 weeks had higher odds of initiation compared with women returning within 1 to 6 weeks (OR: 1.38 [95% CI: 1.05–1.82]; RR: 1.11 [95% CI: 1.02–1.20]). In adjusted analyses, this relationship was no longer observed. None of the interactions tested reached significance at the 0.05 level.

Breastfeeding Duration

There was no variation in the duration of any or predominant breastfeeding according to total or paid maternity leave length (Table 6); nevertheless, the highest proportion of mothers continuing to breastfeed beyond 6 months was among women who had not yet returned to work by the 9-month interview (46.7%) and the lowest proportion was among women returning within 7 to 12 weeks (30.1%; $P =$

.0001). There was an association between all the maternal, child and community variables, and duration of any breastfeeding, except country of birth ($P = .07$), mode of delivery ($P = .13$), birth order ($P = .34$), and urbanicity ($P = .51$).

Women returning to work at ≥ 13 weeks had the highest proportion of predominant breastfeeding beyond 3 months (33.9%), whereas those returning within 1 to 6 weeks had the lowest proportion (18.3%; $P = .01$). The control variables associated with predominant breastfeeding duration include marital status ($P = .0001$) and maternal education ($P < .0001$).

In both unadjusted and adjusted analysis, neither total nor paid maternity leave length was a significant predictor of duration of any or predominant breastfeeding (Table 7). Women who had not yet returned to work at the 9-month interview had greater odds of continuing any breastfeeding beyond 6 months compared with women returning within 1 to 6 weeks (OR: 1.83 [95% CI: 1.21–2.77]; RR: 1.45 [95% CI: 1.13–1.42]), but this relationship was not present in the adjusted analysis. The odds of continuing predominant breastfeeding beyond 3 months were higher among women returning at ≥ 13 weeks than the women returning within 1 to 6 weeks in unadjusted (OR: 2.30 [95% CI: 1.40–3.76]; RR: 1.86 [95% CI: 1.31–2.51]) and in adjusted (OR: 2.54 [95% CI: 1.51–4.27]; RR: 1.99 [95% CI: 1.38–2.69]) analyses. Women who had not returned to work were also more likely to have continued predominant breastfeeding in both unadjusted (OR: 1.87 [95% CI: 1.07–3.28]; RR: 1.62 [95% CI: 1.06–2.33]) and adjusted (OR: 2.01 [95% CI: 1.06–3.80]; RR: 1.70 [95% CI: 1.05–2.53]) analyses than women returning within 1 to 6 weeks. Additional analysis (adjusted) found that women who returned to work at ≥ 13 weeks had a

TABLE 6 Long and Short Breastfeeding Durations According to Maternity Leave Characteristics, Maternal Characteristics, Child/Delivery Characteristics, and Interpersonal/Family/Community Characteristics^a

Characteristics	Any Breastfeeding		Predominant Breastfeeding	
	>6 mo (%)	<i>P</i>	>3 mo (%)	<i>P</i>
Maternity leave characteristics				
Total maternity leave in weeks		.29		.15
1–6	33.5		24.6	
7–12	34.0		26.8	
≥ 13	38.7		33.2	
Did not take maternity leave	39.4		23.9	
Paid maternity leave in weeks		.41		.30
0	36.0		25.1	
1–6	35.1		28.8	
≥ 7	34.0		28.4	
Did not take maternity leave	39.4		23.9	
Time of return to work		.0001		.01
1–6	32.3		18.3	
7–12	30.1		23.9	
≥ 13	38.4		33.9	
Not yet returned to work	46.7		29.5	
Maternal characteristics				
Maternal race/ethnicity		<.0001		.02
White, non-Hispanic	39.3		29.3	
Black, non-Hispanic	22.8		20.3	
Hispanic	33.8		20.9	
Other, non-Hispanic	40.9		27.9	
Maternal age, y		<.0001		.06
15–19	18.3		13.9	
20–24	26.3		19.6	
25–29	34.0		29.5	
30–34	41.8		28.4	
≥ 35	47.5		30.2	
Marital status		<.0001		.0001
Married	41.4		29.6	
Single	23.3		18.7	
Maternal education		<.0001		<.0001
<12th grade	26.8		18.8	
High school diploma/equivalent	26.6		18.1	
Vocational/technical or some college	34.8		25.7	
Bachelor's degree or higher	48.5		37.2	
Income status		<.0001		<.0001
<185% FPL	29.6		18.9	
$\geq 185\%$ FPL	40.3		30.9	
Country of birth ^b		.07		.68
US/US territories	36.4		26.8	
Foreign country	40.4		26.0	
Missing	26.6		22.6	
Smoking status in the last 3 mo of pregnancy		.0003		<.0001
Yes	20.2		10.9	
No	38.0		27.9	
Child/delivery characteristics				
Birth weight		<.0001		.001
Normal (≥ 2500 g)	37.2		26.9	
Low (<2500 g)	24.1		16.7	
Mode of delivery		.13		.34
Vaginal	37.8		27.1	
Cesarean	33.4		24.1	
Birth order		.34		.96
1	36.6		26.6	
2	34.4		26.4	
≥ 3	39.6		25.8	
Health care professional advice about breastfeeding		.004		.97
Yes	35.0		26.5	
No	46.8		26.3	

TABLE 6 Continued

Characteristics	Any Breastfeeding		Predominant Breastfeeding	
	>6 mo (%)	<i>P</i>	>3 mo (%)	<i>P</i>
Interpersonal/family/community characteristics				
Separation from child for ≥1 wk		<.0001		.07
Yes	11.7		18.5	
No	37.8		26.8	
Child care arrangements		<.0001		.31
Parental care	47.1		29.1	
In-home care	31.7		25.7	
Out-of-home care	27.9		24.4	
WIC participation by mother or child within the last 12 mo		<.0001		<.0001
Yes	25.8		18.4	
No	44.0		32.7	
Region		.01		.38
Northeast	37.7		25.0	
Midwest	36.4		26.5	
South	31.2		23.2	
West	42.7		31.6	
Urbanicity ^c		.51		.53
Urban, inside urban area	37.3		27.1	
Urban, inside urban cluster	33.2		26.1	
Rural	34.8		22.8	

Weight variable is W1R0. Percentages are row percentages.

^a Sample restricted to singletons whose biological mothers were the respondent at the 9-month wave and who initiated breastfeeding and worked in the 12 months before delivery (*n* = 4200).

^b The country of birth variable has a large number of missing observations because this was a variable ascertained at the 2-year interview by which time some participants had been lost to follow-up. The missing category is included in the analysis by applying the 9-month weight (W1R0).

^c Urban/rural location of interview.

SOURCE: US Department of Education, National Center for Education Statistics, ECLS-B Longitudinal 9 Month-Pre-school Restricted Use data file.

greater odds of continuing any breastfeeding beyond 3 months (OR: 1.55 [95% CI: 1.09–2.19]; RR: 1.21 [95% CI: 1.04–1.36]) (data are not shown).

DISCUSSION

Approximately 70% of our study population initiated breastfeeding, with 37% of initiators breastfeeding for >6 months and 26% breastfeeding predominantly for >3 months. Our results indicate that women returning later to work are more likely to initiate breastfeeding and continue predominant and any breastfeeding beyond 3 months. Maternity leave length (total/paid) was not associated with any of the 3 breastfeeding outcomes in adjusted analyses.

Guendelman et al²⁸ previously found a positive association of maternity leave

length and breastfeeding establishment/duration in a study on the basis of a cohort of 770 full-time working mothers in California. The present study, which was based on a nationally representative sample, did not find this association. This variance may be due to the select nature and sample size of the previous study. Thus, findings derived from a very small spectrum of women may not reflect the experience of all women in the United States. In our study, the associations that were found in the crude models for maternity leave length disappeared in adjusted analysis. A possible explanation for this occurrence is that maternity leave length may not be an independent factor for breastfeeding initiation or duration. Its effect may be explained by adjusting for other variables such as mother's age, race/ethnicity,

and marital status. The positive effect of later return to work on breastfeeding initiation and duration of predominant breastfeeding persisted in full models and has been supported by a number of other studies.^{35,36,38,44,45}

The 12 weeks provided by the FMLA need not be taken consecutively,⁴⁶ potentially creating a disparity between time of first return to work and total maternity leave length. In our study population, total maternity leave length did not always coincide with time of return to work, so we postulate that the ideal variable to explain the relationship between time away from work (leave) and breastfeeding behavior may actually be the time of first return to work as used in this study.

However, to the extent that the maternity leave length is positively associated with time of return to work, as observed in our posthoc bivariable analysis of maternity leave length and time of return to work, leave policies (unpaid/paid maternity leave) should be instituted at all governmental and organizational levels to enable women to take sufficient time off work after delivery to properly nurture their infants. Studies in Canada⁴⁷ and the United States⁴⁶ support the notion that an increase in maternity leave length mandates in the United States would likely result in a greater proportion of women staying at home longer after delivery. Job security may also play an important role in delaying the time of first return to work postpartum. Informal arrangements between employers and employees that enable women to delay their time of return to work after delivery should be encouraged.

Some of the strengths of this study include the generalizability of the findings; the ability to adjust for several potential confounders; and the ability

TABLE 7 Unadjusted and Adjusted Analysis: The Effect of Total Maternity Leave Length, Paid Maternity Leave Length, and Time of Return to Work on Long and Short Breastfeeding Durations Among Women Who Worked in the 12 Months Before Delivery and Who Initiated Breastfeeding ($n = 4200$)

Characteristics of Maternity Leave	Any Breastfeeding (>6 mo)				Predominant Breastfeeding (>3 mo)				
	Model 1 ^a ($n = 4150$)		Model 2 ^b ($n = 4050$)		Model 1 ^a ($n = 3650$)		Model 2 ^b ($n = 3550$)		
	OR (95% CI)	RR (95% CI)	OR (95% CI)	RR (95% CI)	OR (95% CI)	RR (95% CI)	OR (95% CI)	RR (95% CI)	
Total maternity leave, wk									
1-6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7-12	1.02 (0.76-1.36)	1.01 (0.83-1.21)	0.95 (0.68-1.32)	0.97 (0.76-1.19)	1.12 (0.75-1.68)	1.09 (0.80-1.44)	1.01 (0.66-1.56)	1.01 (0.72-1.37)	
≥ 13	1.25 (0.89-1.77)	1.15 (0.92-1.40)	1.07 (0.74-1.55)	1.05 (0.81-1.31)	1.52 (0.98-2.37)	1.35 (0.98-1.77)	1.40 (0.86-2.27)	1.27 (0.89-1.72)	
Did not take maternity leave	1.29 (0.93-1.78)	1.17 (0.95-1.41)	1.27 (0.87-1.86)	1.16 (0.91-1.44)	0.96 (0.63-1.47)	0.97 (0.69-1.32)	1.12 (0.71-1.75)	1.09 (0.77-1.47)	
Paid maternity leave, wk									
0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
1-6	0.96 (0.73-1.28)	0.97 (0.81-1.16)	0.79 (0.57-1.10)	0.85 (0.67-1.06)	1.20 (0.80-1.80)	1.14 (0.84-1.50)	1.00 (0.65-1.55)	1.00 (0.71-1.36)	
$7 \geq 7$	0.92 (0.64-1.31)	0.95 (0.74-1.18)	0.69 (0.45-1.05)	0.78 (0.56-1.03)	1.18 (0.82-1.70)	1.13 (0.86-1.45)	0.90 (0.60-1.35)	0.92 (0.67-1.24)	
Did not take maternity leave	1.16 (0.80-1.67)	1.10 (0.86-1.35)	1.07 (0.71-1.62)	1.04 (0.79-1.32)	0.94 (0.60-1.46)	0.95 (0.67-1.31)	1.01 (0.65-1.59)	1.01 (0.71-1.39)	
Time of return to work, wk									
1-6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
7-12	0.90 (0.64-1.26)	0.93 (0.72-1.16)	0.87 (0.59-1.28)	0.91 (0.68-1.17)	1.40 (0.98-2.01)	1.31 (0.98-1.71)	1.41 (0.94-2.13)	1.31 (0.95-1.77)	
≥ 13	1.31 (0.88-1.95)	0.19 (0.92-1.50)	1.31 (0.86-2.00)	1.19 (0.90-1.52)	2.30 (1.40-3.76)	1.86 (1.31-2.51)	2.54 (1.51-4.27)	1.99 (1.38-2.69)	
Not yet returned to work	1.83 (1.21-2.77)	1.45 (1.13-1.82)	1.41 (0.87-2.27)	1.25 (0.91-1.61)	1.87 (1.07-3.28)	1.62 (1.06-2.33)	2.01 (1.06-3.80)	1.70 (1.05-2.53)	

Weight variable is WFR0. The corrected RR has been obtained using this formula: $RR = OR / (1 - P_{0j} + IP_{0j} * OR)$, where P_{0j} is the incidence of the outcome (breastfeeding duration) in the nonexposed group (reference group).

^a Unadjusted model.

^b Adjusted for all control variables (race/ethnicity, age, marital status, education, income status, country of birth, smoking status, birth order, health care professional advice about breastfeeding, separation from child for ≥ 1 week, child care arrangements, WIC participation within the last 12 months, region of residence, and urbanicity).

SOURCE: US Department of Education, National Center for Education Statistics, ECLS-B Longitudinal 9 Month-Pre-school Restricted Use data file.

to properly examine breastfeeding duration given the longitudinality of the data. A limitation of this study is the unavailability of a measure on breastfeeding intent. In addition, because of the time lag between the interviews and actual breastfeeding practice, there may have been some reporting errors that resulted in an overestimation or underestimation of the actual duration of breastfeeding or the main independent variables of interests. However, this possibility could not be tested.

A recent amendment to the FMLA, which allows relatives of members of the armed forces who are undergoing medical treatment, recuperation, or therapy up to 26 weeks of unpaid leave to care for them,⁴⁸ could be studied for its impact on breastfeeding in the armed forces population. Positive effects, if found, may buttress the need for the extension of the FMLA for all workers. In addition, providing women with some form of monetary compensation during their time off work may encourage more women to take the leave that is provided.⁴⁹

CONCLUSION

If new mothers delay their time of return to work, then duration of breastfeeding among US mothers may lengthen.

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