


Balancing Work and Family: Effect of Employment Characteristics on Breastfeeding

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Abstract

This article describes an investigation of the effect of postpartum employment and occupational type on breastfeeding initiation and duration. Data were from the Early Childhood Longitudinal Study-Birth Cohort. Postpartum employment status was classified as full-time, part-time, and not employed. Among postpartum workers, occupational type was classified as management, professional, service, sales, administrative, and “other.” In adjusted analysis, professional women had a 20% greater likelihood of initiating breastfeeding than administrative workers (risk ratio [RR] 1.20; 95% confidence interval [CI], 1.06–1.30). Full-time workers had a 10% lower likelihood of initiating breastfeeding than those not employed (RR 0.90; 95% CI, 0.82–0.97). Among breastfeeding initiators, full-time workers had a 19% lower likelihood of any breastfeeding beyond 6 months than those not employed (RR 0.81; 95% CI, 0.65–0.99). To improve breastfeeding initiation and duration in the United States, part-time options may be an effective solution for working mothers.

Keywords

breastfeeding, maternal employment, survey, workplace, predominant breastfeeding

Human breast milk is species specific, and breastfeeding is a natural way to feed infants.^{1,2} Breastfeeding offers the optimal nutrition for all infants and provides immunological, developmental, psychological, economic, and practical advantages compared with artificial feeding.³ Breastfeeding also offers important health benefits for mothers^{1,2,4–6} as well as work-related benefits.^{7,8} Despite the established benefits of breastfeeding, the current rates of breastfeeding initiation and duration in the United States fall short of the Healthy People 2010 objectives of 75% of infants being breastfed in the early postpartum, 50% at 6 months, and 25% at 12 months.⁹ Similarly, the goals of exclusive breastfeeding of 40% of infants through 3 months and 17% through 6 months have not been attained.¹⁰ Results from the National Immunization Survey show that of all US children born in 2005, 74.1% were breastfed in the early postpartum period.¹⁰ At 6 months and 12 months, the rates of breastfeeding were 42.9% and 21.5%, respectively. Exclusive breastfeeding was much lower, with 32.1% of infants born in 2005 exclusively breastfeeding through 3 months and 12.3% through 6 months.¹⁰

Work-related issues have been cited as a major reason for noninitiation^{5,11–15} and early cessation of breastfeeding.^{11,12,16} Some studies have shown that mothers who are not employed or work part-time are more likely to initiate breastfeeding than mothers who work full time.^{5,17}

Lack of part-time provisions^{18,19} and lack of job control, as are common in certain professions,^{20,21} have been found to be

negatively associated with breastfeeding initiation and continuation. Using the Infant Feeding Practices Survey (IFPS I; N = 1488), in which the respondents were more likely to be white, older, and married compared with a nationally representative sample, the authors showed that working full-time by 3 months postpartum was negatively associated with breastfeeding duration relative to not working, but working part-time had no effect.²² Similarly, in a longitudinal cohort of 1292 families from 6 rural counties in North Carolina and Pennsylvania, postpartum employment at 2 months was associated with a decreased likelihood of initiating breastfeeding or continuing until 6 months.²³

Occupational job types have also been found to be associated with breastfeeding initiation and duration. Based on the Fragile Families and Child Wellbeing Study (N = 4331), a study of mostly low-income, unwed women and their children from 20 US cities, Kimbro¹⁶ showed that mothers with

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professional or service jobs did not differ from stay-at-home (SAH) mothers in duration of breastfeeding. However, mothers with administrative and manual occupations were 34% and 35% more likely to quit breastfeeding, respectively, than SAH mothers. Using the 1988 National Maternal and Infant Health Survey (NMIHS), some researchers found that among all occupational categories, white professional women were the most likely to continue breastfeeding after returning to work and had the longest median breastfeeding duration.²¹ After the authors controlled for leave length in the models, white women in service jobs breastfed longer than professional women.

Another study, which was based on a small sample (N = 770) of full-time working mothers in California, revealed that women in managerial positions had a lower risk of failure of breastfeeding establishment (breastfeeding beyond the first month) and a lower risk of cessation compared with women in nonmanagerial positions, even after adjustment for maternity leave and job flexibility in the models.²⁰

Most studies examining the relationship between occupational type, employment status, and breastfeeding in the United States have limited generalizability given their sample characteristics as described above.^{16,20,22,23} The only seminal study that was nationally representative was based on the NMIHS, which was conducted in 1988 and as such is dated.²¹ None of these studies explored predominant breastfeeding. Furthermore, occupational type studies have used different groupings of occupation, making comparison difficult.^{16,20,21}

The objectives of the current study were to explore the associations of (1) postpartum employment status and (2) occupational type on breastfeeding initiation and duration of any and predominant breastfeeding using a nationally representative sample and standard groupings of occupation.²⁴ According to the World Health Organization, "Predominant breastfeeding means that the infant's predominant source of nourishment has been breast milk (including milk expressed or from a wet nurse as the predominant source of nourishment). However, the infant may also have received liquids (water and water-based drinks, fruit juice), ritual fluids and oral rehydration solution (ORS), drops or syrups (vitamins, minerals and medicines)."²⁵ The term *predominant breastfeeding* is used here instead of *exclusive breastfeeding* because it was not clear from the wording of the questions used in the survey whether the mother actually gave no water or any other fluids to the child. Parents were simply asked the age of the child when formula, cow's milk, or solids were introduced. Predominant breastfeeding can also be referred to as *almost exclusive* breastfeeding.²⁶

Methods

Study Design

This study used data from the Early Childhood Longitudinal Study-Birth Cohort (ECLS-B), conducted by the National Center for Education Statistics (NCES), Institute of Education

Sciences, US Department of Education. The ECLS-B is a nationally representative sample of about 10 700 children born in 2001. The sample was drawn from the US birth certificates. Information on the children's nutrition, health, development, and education were collected at age 9 months, 2 years, during the preschool year, and at the kindergarten-entry year (2006 and 2007; a total of 5 waves). The children come from a racially diverse background, with oversampling of Asian/Pacific Islander, American Indian/Native Alaskan, and Chinese populations. Twins, low birth weight babies, and very low birth weight babies were also oversampled. Data were collected from multiple sources and through multiple methods. The parent interviews were conducted during a home visit with the household member most knowledgeable about the child's care and education. At the 9-month interview, the parent respondent was the biological mother for 99% of the cases.²⁷ Written informed consents were obtained from the parents before the commencement of the study.

The first 2 waves of data collection (9-month and 2-year collections) were used in this study, because there was no question on breastfeeding behavior in subsequent data collection periods. For the first study objective, the sample was restricted to all singletons whose biological mothers were the respondents at the 9-month interview (n ~ 8750). For the second study objective, the sample was further restricted to only mothers who were currently working at the 9-month interview (n ~ 4500) since occupational type was ascertained only among this group.

Variables

Dependent variables. For the breastfeeding initiation variable, the respondent was asked, "Did you ever breastfeed [child]?" This information was obtained from the 9-month interview data. For the duration of any breastfeeding (measured in months), mothers who had initiated breastfeeding but had stopped breastfeeding by the 9-month interview were asked, "For how many months did you breastfeed [him or her]?" Mothers who were still breastfeeding their child at the 9-month interview but had stopped by the 2-year interview were asked, "How old was [child] in months when [you/child's mother] completely stopped breastfeeding [him or her]?"

There were 2 censoring times for duration of any breastfeeding. For women who were still breastfeeding at the 9-month interview but were lost to follow-up by the 2-year interview (group 1), duration was censored at the child's age by the 9-month interview. For the group still breastfeeding at the 2-year interview (group 2), duration was censored at the child's age by the 2-year interview. The proportion of the population with censored duration of any breastfeeding was 4.63% (group 1, 1.25%; group 2, 3.38%).

Duration of predominant breastfeeding was derived from the time of earliest introduction of infant formula, cow's milk, or solids among those initiating breastfeeding. Predominant breastfeeding duration length was missing for those respondents

who had missing values for time of introduction of formula, cow's milk, or solids. For observations for which the duration of predominant breastfeeding was more than the duration of any breastfeeding (with the exception of those with missing values for duration of any breastfeeding), the duration of predominant breastfeeding was set to be equal to the duration of any breastfeeding (unweighted $n \sim 450$).

Duration of predominant and any breastfeeding was set at 0.5 months for those with duration less than 1 month. For analytical purposes, duration was dichotomized: ≤ 6 months or > 6 months for any breastfeeding; and ≤ 3 months or > 3 months for predominant breastfeeding.

Main independent variables and control variables. Variable selection was based on the socioecological framework that has been used often in the literature to describe breastfeeding behavior.²⁸⁻³⁰ Variables were classified as maternal characteristics (race/ethnicity, age, marital status, education, income status [$<$ vs \geq 185% federal poverty level], smoking status in the last 3 months of pregnancy, and country of birth); child/delivery characteristics (birth weight, mode of delivery, birth order, and health care professional [HCP] advice about breastfeeding); interpersonal/family characteristics (separation from child, and child care arrangements); and organizational/community characteristics (postpartum employment status, occupational type, participation of the child or mother in the past 12 months in the Special Supplemental Nutrition Program for Women, Infants, and Children [WIC], region of residence, and urbanicity).

There were 2 main independent variables of interest: postpartum employment status and occupational type. Postpartum employment status by the 9-month interview was ascertained for the whole study population ($n \sim 8750$) and classified as ≥ 35 h/wk (full-time), < 35 h/wk (part-time), and not employed. Occupational type was ascertained from current workers ($n \sim 4500$), and classified as management (eg, business and financial occupations), professional (eg, architecture, engineering, legal, and health care practitioner occupations), service (health care support, food preparation and serving-related occupations), sales (selling goods or services, wholesale or retail businesses), administrative (office and administrative support occupations), and "other," using standard classifications by the US Department of Labor.²⁴ Occupations with small sample sizes were combined into the "other" category, namely farming, fishing, and forestry; construction and extraction; installation, maintenance, and repair; production; transportation and material moving; and military-specific occupations.

The remaining independent variables mentioned earlier were included in the models because of their possible effect on the outcome of interest. They served as potential confounders or control variables. The baseline values (at the 9-month interview) of all the independent and control variables except the country of birth variable were used in this study. The "country of birth" variable was ascertained for the first time at the 2-year interview; hence, a missing category was created for those lost to follow-up by the 2-year interview.

Maternal race/ethnicity was classified as white, non-Hispanic (NH); black, NH; Hispanic; and other, NH. The "other" category consisted of Asian, NH; Native Hawaiian or other Pacific Islander, NH; American Indian or Alaska Native, NH; and > 1 race, NH. The inclusion of race/ethnicity in this study stems from the fact that race/ethnicity is a known strong predictor of breastfeeding behavior.

Data Analysis

Univariate analysis described the population of mothers in the study. Chi-square tests were used to check for associations between postpartum employment status and the control variables. Chi-square tests were also used to test for associations between occupational type and the control variables and between the main independent variables, the control variables, and all 3 breastfeeding outcomes (breastfeeding initiation, duration of any breastfeeding, and duration of predominant breastfeeding). Since breastfeeding duration was censored for those lost to follow-up by the 2-year interview, a bivariable analysis was run to determine whether censoring was related to postpartum employment status or occupational type.

Multiple logistic regressions were used to model breastfeeding initiation on the main independent variables, adjusting for the control variables. Three models were run for each main independent variable: (1) model 1, unadjusted model; (2) model 2, model 1 + maternal characteristics only; and (3) model 3, model 1 + all control variables. Duration of any breastfeeding and predominant breastfeeding were modeled on the main independent variables using multiple logistic regressions. The odds were calculated for continuing any breastfeeding beyond 6 months and predominant breastfeeding beyond 3 months unadjusted (model 1) and again while adjusting for maternal characteristics (model 2) and all control variables (model 3). Because breastfeeding initiation, and the duration of any breastfeeding and predominant breastfeeding, were not rare outcomes in the study population (incidence $> 10\%$), the odds ratios obtained do not approximate the risk ratios for this cohort study. Hence, the odds ratios obtained from all logistic models for the 2 main independent variables were corrected using a formula recommended by Zhang and colleagues.³¹ The formula states that $RR = OR / [(1 - P_0) + (P_0 \times OR)]$, where RR is the risk ratio, OR is the odds ratio, and P_0 is the incidence of the outcome of interest in the nonexposed or reference group. The corrected risk ratios are presented in the Results and Discussion sections and in the tables.

Interactions between postpartum employment status and occupational type were tested for in adjusted models, for all breastfeeding outcomes. Interactions were also tested for between the main independent variables and time of return to work (categorized as 1-6 weeks, 7-12 weeks, and ≥ 13 weeks). All interactions were tested on a multiplicative scale. The occupational type models were also run, controlling for total maternity leave taken (categorized as 1-6 weeks, 7-12 weeks, and

≥13 weeks, and “did not take maternity leave”). Occupational type and postpartum employment status were also simultaneously entered in the full models for all breastfeeding outcomes. Since there were several levels of occupational type, we tested for contrasts between the professional occupation and every occupational group (except the reference group—administrative) in both unadjusted models and adjusted models.

Given the complex survey method and to obtain nationally generalizable estimates, weighting was applied using the W1R0 weight variable and jackknife replication techniques. Weighted analysis was conducted using SUDAAN 10.0.³² All unweighted sample sizes are rounded to the nearest multiple of 50 because of the restricted-use license requirement for the ECLS-B data. Statistical significance was set at $\alpha = .05$. This study was approved by the National Center for Education Statistics and the University of South Carolina Institutional Review Board.

Results

Descriptive Statistics

Among mothers of singletons born in 2001 in the United States, 69.5% initiated breastfeeding. Among breastfeeding initiators, the mean durations of any breastfeeding and predominant breastfeeding were 6.7 months and 2.3 months, respectively. Thirty-eight percent of those who initiated breastfeeding breastfed for more than 6 months, and 26.5% breastfed predominantly for more than 3 months.

The mean ages of the children at the 9-month and 2-year interviews were 10.5 months and 24.5 months, respectively. A majority of the population of mothers of singletons born in 2001 in the United States were white, NH (57.0%); were married (66.4%); were born in the United States or US territories (74.1%); and did not smoke in the last 3 months of pregnancy (89.0%; Table 1).

As at the time of the 9-month interview, 32.4% of the population of mothers of singletons born in 2001 in the United States were working full time (≥35 h/wk), 20% were working part time (<35 h/wk), and 47.7% were not employed. The majority of those not employed (82.6%) were not in the labor force (ie, they were voluntarily not employed), and 17.4% were looking for work. There was significant variation in postpartum employment status by several variables studied: maternal race, age, education, income status, country of birth, birth order, health care professional advice about breastfeeding, separation from child, child care arrangements, WIC participation, and region of residence (Table 1). Among the working population of mothers, the occupational type was distributed as follows: administrative 23.9%; service 23.3%; professional 22%; sales 12.2%; management 9.9; and “other” 8.7% (Table 2). There was also significant variation in occupational type by several variables: maternal race, age, marital status, education, income status, WIC participation

(all aforementioned had $P < .0001$), country of birth ($P = .0018$), smoking status ($P = .0320$), primary care arrangement ($P = .0001$), and region of residence ($P = .0183$) (data not shown).

Bivariable Analysis

Breastfeeding initiation. Part-time workers had the highest rate of breastfeeding initiation (71.9%), followed by women who were not employed (70.3%) and full-time workers (66.8%; $P = .1041$; Table 2). Women in professional occupations had the highest rate of breastfeeding initiation (83.4%), whereas women in the “other” category had the lowest rate (58.4%; $P < .0001$). All the control variables were associated with breastfeeding initiation except the mode of delivery ($P = .0821$) and HCP advice about breastfeeding ($P = .2753$; Table 2).

Breastfeeding for more than 3 and 6 months. Women who were not employed by the 9-month interview had the highest rate of any breastfeeding beyond 6 months (42.9%), followed by part-time (42.5%) and full-time workers (27.5%; $P < .0001$; Table 3). There was some variability in the duration of any breastfeeding by occupational type, with women in professional occupations having the highest rate (41.5%) and women in sales having the lowest rate (25.9%; $P = .0540$) of continuation beyond 6 months.

All the control variables were associated with duration of any breastfeeding except country of birth ($P = .0535$), mode of delivery ($P = .0816$), and urbanicity ($P = .4141$; Table 3).

There was no association between postpartum employment status or occupational type and predominant breastfeeding beyond 3 months (Table 3). The control variables associated with duration of predominant breastfeeding include maternal race ($P = .0003$), maternal age ($P = .0015$) and separation from child ($P = .0302$; Table 3).

Multivariable Analysis

Breastfeeding initiation. In the unadjusted model (model 1; Table 4), the likelihood of breastfeeding initiation did not differ by postpartum employment status. After adjustment for only maternal characteristics (model 2), full-time workers were 11% less likely to have initiated breastfeeding than women who were not employed (RR 0.89; 95% CI, 0.82-0.96). In model 3 (all control variables added), this association remained unchanged (RR 0.90; 95% CI, 0.82-0.97). Part-time workers were not different from those not employed in their likelihood of initiating breastfeeding.

Women working in management and professional occupations had a 1.27 times (RR 1.27; 95% CI, 1.14-1.38) and 1.32 times (RR 1.32; 95% CI, 1.23-1.39) greater likelihood, respectively, of initiating breastfeeding compared with women in administrative occupations (model 1; Table 4). In model 2, only the relationship between professional occupations and

Table 1. Postpartum Employment Status by Maternal Characteristics, Child/Delivery Characteristics, and Interpersonal/Family/Community Characteristics (n ~ 8750)^a

Characteristics	Unweighted n	Total, 100%	Full-time, 32.4%	Part-time, 20.0%	Not Employed, 47.4%	P Value
Maternal characteristics						
Maternal race/ethnicity						<.0001
White, NH	3700	57.0	55.4	68.1	53.5	
Black, NH	1450	14.0	17.4	10.9	12.9	
Hispanic	1650	23.2	20.8	16.8	27.4	
Other, NH	1950	5.9	6.3	4.2	6.3	
Missing	0 ^b					
Maternal age, y						.0001
15-19	700	7.6	4.4	6.7	10.0	
20-24	2250	24.4	22.9	22.6	26.2	
25-29	2150	26.3	28.8	23.6	25.7	
30-34	1100	24.8	26.0	29.0	22.4	
≥35	1550	16.9	18.0	18.1	15.7	
Marital status						.0634
Married	5650	66.4	65.2	70.9	65.5	
Single	3100	33.6	34.8	29.1	34.6	
Missing	0 ^b					
Maternal education						<.0001
≤12th grade	1800	20.0	12.4	13.0	28.0	
High school diploma/equivalent	2550	29.6	31.2	24.6	30.5	
Voc/tech or some college	2200	26.3	30.3	30.1	22.3	
Bachelor's degree or higher	2200	24.2	26.5	32.3	19.2	
Income status						<.0001
<185% FPL	4450	48.4	38.2	40.3	58.8	
≥185% FPL	4300	51.6	61.8	59.7	41.3	
Country of birth ^c						<.0001
United States/US territories	5900	74.1	77.9	81.1	68.6	
Other country	2100	18.2	15.6	12.5	22.4	
Missing	750	7.7	6.5	6.4	9.0	
Smoking status in the last 3 months of pregnancy						.2767
Yes	1000	11.0	9.7	10.3	12.1	
No	7750	89.0	90.3	89.7	87.9	
Missing	0 ^b					
Child/delivery characteristics						
Birth weight						.0568
Normal birth weight	7050	94.2	94.4	95.1	93.6	
Low birth weight	1700	5.8	5.6	4.9	6.4	
Missing	50					
Mode of delivery						.4729
Vaginal	6300	74.9	73.5	74.7	75.9	
Caesarean	2400	25.1	26.5	25.3	24.1	
Missing	50					
Birth order						.0007
1	3650	40.9	42.6	45.4	37.8	
2	2850	32.8	34.5	33.1	31.6	
≥3	2200	26.3	22.9	21.6	30.6	
Missing	50					
Health care professional advice about breastfeeding						.0493
Yes	7600	87.9	90.0	86.5	87.0	
No	1050	12.1	10.1	13.5	13.0	
Missing	150					

(continued)

Table 1. (continued)

Characteristics	Unweighted n	Total, 100%	Full-time, 32.4%	Part-time, 20.0%	Not Employed, 47.4%	P Value
Interpersonal/family/community characteristics						
Separation from child for ≥ 1 week						.0091
Yes	600	5.4	6.9	3.6	5.1	
No	8200	94.6	93.1	96.4	94.9	
Missing	0 ^b					
Child care arrangements						<.0001
Parental care	4360	49.9	14.8	32.5	81.1	
In-home care	1400	13.7	17.9	21.0	7.8	
Out-of-home care	3000	36.4	67.3	46.5	11.1	
Missing	0 ^b					
WIC participation within the last 12 months						<.0001
Yes	4750	52.2	47.3	43.3	59.4	
No	4000	47.8	52.7	56.7	40.6	
Missing	0 ^b					
Region of residence						.0002
Northeast	1300	16.8	15.7	18.7	16.9	
Midwest	1950	22.1	23.2	26.9	19.4	
South	3050	37.0	40.7	33.1	36.1	
West	2450	24.1	20.5	21.4	27.7	
Urbanicity						.4620
Urban, inside urban area	6400	73.8	72.4	74.1	74.6	
Urban, inside urban cluster	1100	11.9	12.2	11.4	12.0	
Rural	1250	14.2	15.4	14.6	13.4	

FPL, federal poverty level; NH, non-Hispanic; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children. Weight variable is W1R0. Percentages may not add up to 100 because of rounding. Unweighted sample sizes have been rounded to the nearest 50.

^aSample restricted to singletons whose biological mothers were the respondents at the 9-month wave.

^bEstimate rounds to zero.

^cThe "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.

Source: US Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) Longitudinal 9 Month-Pre-school Restricted Use Data File.

breastfeeding initiation remained, although the relative risk was reduced to 1.18 (RR 1.18; 95% CI, 1.05-1.28). In model 3, women in professional occupations still had a greater likelihood of initiating breastfeeding compared with women in administrative occupations (RR 1.20; 95% CI, 1.06-1.30).

None of the interactions tested in the full models for breastfeeding initiation were significant or suggestive of any differences. The *P* value was $>.2$ for all interactions tested. When total maternity leave and postpartum employment status were separately added in the full models, women in professional occupations still had a higher likelihood of initiating breastfeeding compared with women in administrative occupations (with total maternity leave: RR 1.18; 95% CI, 1.04-1.29; with postpartum employment status: RR 1.19; 95% CI, 1.06-1.30) (data not shown).

For the contrasts, crude models showed that professional women had a higher likelihood of initiating breastfeeding compared with women in sales (RR 1.32; 95% CI, 1.20-1.41) and "other" occupations (RR 1.43; 95% CI, 1.29-1.53). In adjusted models, only the comparison with women in "other"

occupations remained significant (RR 1.22; 95% CI, 1.01-1.39) (data not shown).

Breastfeeding for more than 3 and 6 months. In unadjusted analysis, women who worked full-time had a 35% lower likelihood (RR 0.65; 95% CI, 0.55-0.75) of breastfeeding beyond 6 months compared with women who were not employed (reference group; model 1; Table 5). After adjustment for all the control variables (model 3), the likelihood of breastfeeding beyond 6 months was 19% lower (RR 0.81; 95% CI, 0.65-0.99) for the full-time worker compared with the reference group.

With occupational type, professional women had a 50% greater likelihood (RR 1.50; 95% CI, 1.12-1.91) of breastfeeding beyond 6 months compared with women in administrative occupations in unadjusted analysis (model 1; Table 5). This relationship was no longer apparent after full adjustment (model 3).

In both unadjusted and adjusted analysis, neither postpartum employment status nor occupational type (Table 5) was a significant predictor of duration of predominant breastfeeding.

Table 2. Breastfeeding Initiation by Main Independent Variables, Maternal Characteristics, Child/Delivery Characteristics, and Interpersonal/Family/Community Characteristics (n ~ 8750)^a

Characteristics	Unweighted n	Total%	% Initiating Breastfeeding	P Value
Main independent variables				
Postpartum employment status				.1041
Full-time	2950	32.4	66.8	
Part-time	1550	20.0	71.9	
Not employed	4300	47.7	70.3	
Missing	0 ^b			
Occupational type (n ~ 4500) ^b				<.0001
Management	400	9.9	80.5	
Professional	1050	22.0	83.4	
Service	1050	23.3	62.1	
Sales	550	12.2	63.4	
Administrative	1050	23.9	63.4	
Other	400	8.7	58.4	
Missing	0 ^b			
Control variables				
Maternal characteristics				
Maternal race/ethnicity				<.0001
White, NH	3700	57.0	71.1	
Black, NH	1450	14.0	48.9	
Hispanic	1650	23.2	76.8	
Other, NH	1950	5.9	73.7	
Missing	0 ^b			
Maternal age, y				<.0001
15-19	700	7.6	54.1	
20-24	2250	24.4	60.2	
25-29	2150	26.3	70.9	
30-34	1100	24.8	75.7	
≥35	1550	16.9	78.4	
Marital status				<.0001
Married	5650	66.4	76.3	
Single	3100	33.6	56.1	
Missing	0 ^b			
Maternal education				<.0001
≤12th grade	1800	20.0	55.5	
High school diploma/equivalent	2550	29.6	61.2	
Voc/tech or some college	2200	26.3	72.8	
Bachelor's degree or higher	2200	24.2	87.6	<.0001
Income status				
<185% FPL	4450	48.4	60.8	
≥185% FPL	4300	51.6	77.6	
Country of birth ^c				<.0001
United States/US territories	5900	74.1	66.4	
Other country	2100	18.2	84.0	
Missing	750	7.7	64.9	
Smoking status in the last 3 months of pregnancy				<.0001
Yes	1000	11.0	48.3	
No	7750	89.0	72.1	
Missing	0 ^b			
Child/delivery characteristics				
Birth weight				<.0001
Normal birth weight	7050	94.2	70.2	
Low birth weight	1700	5.8	58.5	
Missing	50			
Mode of delivery				.0821
Vaginal	6300	74.9	70.5	
Cesarean	2400	25.1	66.4	
Missing	50			

(continued)

Table 2. (continued)

Characteristics	Unweighted n	Total%	% Initiating Breastfeeding	P Value
Birth order				.0228
1	3650	40.9	72.0	
2	2850	32.8	69.2	
3 or higher	2200	26.3	65.8	
Missing	50			
Health care professional advice about breastfeeding				.2753
Yes	7600	87.9	69.2	
No	1050	12.1	72.4	
Missing	150			
Interpersonal/family/community characteristics				
Separation from child for ≥ 1 week				.0096
Yes	600	5.4	59.8	
No	8200	94.6	70.0	
Missing	0 ^b			
Child care arrangements				.0137
Parental care	4350	49.9	71.9	
In-home care	1400	13.7	64.1	
Out-of-home care	3000	36.4	68.1	
Missing	0 ^b			
WIC participation within the last 12 months				<.0001
Yes	4750	52.2	59.9	
No	4000	47.8	80.0	
Missing	0 ^b			
Region of residence				<.0001
Northeast	1300	16.8	66.6	
Midwest	1950	22.1	69.5	
South	3100	37.0	63.0	
West	2450	24.1	81.4	
Urbanicity				<.0001
Urban, inside urban area	6400	73.8	72.6	
Urban, inside urban cluster	1100	11.9	65.5	
Rural	1250	14.2	56.7	

FPL, federal poverty level; NH, non-Hispanic; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children. Weight variable is WIR0. Percentages may not add up to 100 because of rounding. Unweighted sample sizes have been rounded to the nearest 50. Full-time: ≥ 35 h/wk. Part-time: < 35 h/wk.

^aSample restricted to singletons whose biological mothers were the respondents at the 9-month wave.

^bEstimate rounds to zero.

^cThe “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—WIR0.

Source: US Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) Longitudinal 9 Month-Pre-school Restricted Use Data File.

None of the interactions tested was significant or suggestive of any differences. The *P* value was $>.2$ for all interactions tested. The additional variables included in the full models for duration of any/predominant breastfeeding did not make any significant difference.

For the contrasts, in unadjusted models, women in professional occupations had a higher likelihood of any breastfeeding beyond 6 months compared with women in service (RR 1.33; 95% CI, 1.01-1.67) and sales occupations (RR 1.60; 95% CI, 1.17-2.07). In adjusted models, however, none of these relationships were seen. Similarly,

in unadjusted models for predominant breastfeeding, women in professional occupations had a higher likelihood of continuing predominant breastfeeding beyond 3 months compared with women in service (RR 1.59; 95% CI, 1.06-2.22) and “other” occupations (RR 1.82; 95% CI, 1.04-2.81). In adjusted models, none of these relationships remained (data not shown).

We found that censoring was not associated with occupational type (*P* = 0.5019). However, censoring was associated with postpartum employment status (*P* = .0103), with a greater proportion of women who were not employed being lost to

Table 3. Breastfeeding Duration by Main Independent Variables, Maternal Characteristics, Child/Delivery Characteristics, and Interpersonal/Family/Community Characteristics Among Those Who Initiated Breastfeeding^a

Characteristics	Any Breastfeeding		Predominant Breastfeeding	
	>6 mo, %	P Value	>3 mo, %	P Value
Main independent variables				
Postpartum employment status		<.0001		.5766
Full-time	27.5		24.8	
Part-time	42.5		27.5	
Not employed	42.9		27.3	
Occupation type		.0540		.2110
Management	38.1		32.2	
Professional	41.5		32.2	
Service	31.3		20.4	
Sales	25.9		25.3	
Administrative	27.6		23.9	
Other	32.7		17.6	
Maternal characteristics				
Maternal race/ethnicity		<.0001		.0003
White, NH	41.3		30.6	
Black, NH	23.5		20.6	
Hispanic	34.8		19.9	
Other, NH	42.8		27.2	
Maternal age, y		<.0001		.0015
15-19	17.2		13.4	
20-24	25.6		20.1	
25-29	36.8		29.0	
30-34	43.9		29.1	
≥35	51.3		32.1	
Marital status		<.0001		<.0001
Married	43.2		30.2	
Single	23.9		17.7	
Maternal education		<.0001		<.0001
≤12th grade	29.1		16.1	
High school diploma/equivalent	28.8		21.6	
Voc/tech or some college	37.5		25.9	
Bachelor's degree or higher	50.8		38.3	
Income status		<.0001		<.0001
<185% FPL	31.7		19.6	
≥185% FPL	42.6		31.9	
Country of birth ^b		.0535		0.1399
United States/US territories	37.8		27.7	
Other country	41.2		24.7	
Missing	29.5		20.9	
Smoking status in the last 3 months of pregnancy		<.0001		<.0001
Yes	19.2		10.5	
No	39.6		28.0	
Child/delivery characteristics				
Birth weight		<.0001		.0065
Normal birth weight	38.6		26.9	
Low birth weight	26.0		18.9	

(continued)

Table 3. (continued)

Characteristics	Any Breastfeeding		Predominant Breastfeeding	
	>6 mo, %	P Value	>3 mo, %	P Value
Mode of delivery		.0816		.2021
Vaginal	39.3		27.4	
Cesarean	34.7		24.0	
Birth order		.0335		.5425
1	35.4		25.3	
2	37.4		27.9	
≥3	43.1		26.9	
Health care professional advice about breastfeeding		.0010		.5208
Yes	36.5		26.4	
No	48.4		28.5	
Interpersonal/family/community characteristics				
Separation from child for ≥1 week		<.0001		.0302
Yes	14.4		18.1	
No	39.1		27.0	
Child care arrangements		<.0001		.2120
Parental care	46.5		28.7	
In-home care	30.8		25.0	
Out-of-home care	28.2		24.5	
WIC participation within the last 12 months		<.0001		<.0001
Yes	27.6		19.0	
No	46.5		33.5	
Region of residence		.0155		.1629
Northeast	37.4		25.0	
Midwest	38.7		27.3	
South	33.0		22.5	
West	43.5		31.8	
Urbanicity		.4141		.5276
Urban, inside urban area	38.7		27.0	
Urban, inside urban cluster	34.6		26.4	
Rural	36.1		23.1	

FPL, federal poverty level; NH, non-Hispanic; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children. Weight variable is WIR0. Percentages are row percentages. Full-time: ≥35 h/wk. Part-time: <35 h/wk.

^aSample restricted to singletons whose biological mothers were the respondents at the 9-month wave and who initiated breastfeeding ($n \sim 6000$).

^bThe “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—WIR0.

Source: US Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) Longitudinal 9 Month-Pre-school Restricted Use Data File.

follow-up by 2 years (7.7%) compared with women working full-time (2.6%) or part-time (1.8%).

Discussion

Adjusted analysis showed that full-time workers were less likely to initiate breastfeeding and had a lower likelihood of any breastfeeding beyond 6 months compared with those not employed. Part-time workers were no different from those not employed with regard to breastfeeding initiation or duration.

These findings have been corroborated by other studies,^{17,33-38} and they persisted even after adjustment for occupational type in the models. Postpartum employment status was not a significant predictor of duration of predominant breastfeeding.

Part-time options for mothers engaging in the labor force have been extolled as an effective strategy for successfully combining breastfeeding and employment.^{8,18,19,22,29} The findings of our study support this position. Some corporate lactation programs that include components such as provision of a private area to express milk, breastfeeding equipment and

Table 4. Multivariable Analysis: Effect of Postpartum Employment Status and Occupational Type on Breastfeeding Initiation

Characteristics	Model 1	Model 2	Model 3
Main independent variable			
Postpartum employment status ^a	(n ~ 8750)	(n ~ 8700)	(n ~ 8450)
Full-time	0.95 (0.88-1.01)	0.89 (0.82-0.96)	0.90 (0.82-0.97)
Part-time	1.02 (0.96-1.08)	0.95 (0.89-1.02)	0.95 (0.87-1.03)
Not employed	Reference	Reference	Reference
Occupational type ^b	(n ~ 4450)	(n ~ 4450)	(n ~ 4350)
Management	1.27 (1.14-1.38)	1.16 (0.99-1.29)	1.15 (0.97-1.30)
Professional	1.32 (1.23-1.39)	1.18 (1.05-1.28)	1.20 (1.06-1.30)
Service	0.98 (0.85-1.10)	1.07 (0.93-1.18)	1.07 (0.94-1.19)
Sales	1.00 (0.85-1.14)	1.07 (0.91-1.20)	1.07 (0.91-1.20)
Administrative	Reference	Reference	Reference
Other	0.92 (0.74-1.09)	0.96 (0.77-1.13)	1.01 (0.83-1.17)

Values are risk ratio (95% confidence interval). Weight variable is W1R0. The corrected risk ratio (RR) has been obtained using this formula: $RR = OR / [(1 - P_0) + (P_0 \times OR)]$, where P_0 is the incidence of the outcome (breastfeeding initiation) in the nonexposed group (reference group) and OR is the odds ratio. Full-time: ≥ 35 h/wk. Part-time: < 35 h/wk. Each main independent variable was assessed separately in each of the models without the other main independent variable. Model 1: unadjusted. Model 2: adjusted for maternal characteristics only (race/ethnicity, age, marital status, education, income status, country of birth, and smoking status. Model 3: adjusted for all control variables (race/ethnicity, age, marital status, education, income status, country of birth, and smoking status, birth weight, mode of delivery, birth order, health care professional advice about breastfeeding, separation from child for 1 week or more, child care arrangements, WIC participation within the last 12 months, region of residence, and urbanicity).

^aThe entire study sample—singletons whose biological mothers were the respondents at the 9-month interview (n ~ 8750).

^bAmong those currently working by the 9-month interview (n ~ 4500).

Source: US Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) Longitudinal 9 Month-Preschool Restricted Use Data File.

refrigerator, educational materials, and lactation consultants have been shown to be associated with longer breastfeeding durations for working women.^{8,18,39} However, pumping alone at work may be inadequate to maintain milk flow. This is because direct breastfeeding stimulates the breasts more effectively than do the best electric or manual pumps.⁴⁰ Using the IFPS (II), Fein and colleagues⁴¹ found that among women who breastfed and worked (N = 810), the strategy associated with the longest duration of breastfeeding after returning to work was directly feeding the infant during the workday. The United States has been criticized for placing too much attention on expressing and storing breast milk instead of focusing on finding ways to reduce mother–infant separation during the first few months.⁴² Our recommendation based on our findings is that in addition to having access to corporate lactation programs, women should be provided with part-time options so they can spend adequate time directly breastfeeding their infant. This is because new studies suggest that direct breastfeeding may provide benefits above the nutritional and psychological benefits initially shown in literature. For instance, the likelihood that direct breastfeeding conveys a mechanical stimulus that possibly results in improved lung function⁴³ provides another reason to encourage part-time options or, better still, prolonged maternity leaves for mothers.

Even though in unadjusted analysis, women in management and professional occupations had a greater likelihood of initiating breastfeeding compared with women in administrative occupations, only the relationship seen among professional occupations remained after adjustment. As shown in the

contrasts (adjusted), professional women also had a higher likelihood of breastfeeding initiation compared with women in “other” occupations.

As regards breastfeeding duration (any/predominant), there was no significant difference by occupational status in adjusted models. This was also the case in the contrast analysis (adjusted).

Research has shown that some women may not initiate breastfeeding because of their inability to sustain it for a prolonged duration.⁴⁴ It may be that professional women initiate breastfeeding knowing that they have the job control, flexibility, and space that will support their continuing to breastfeed after returning to work. In their study of the effect of maternal employment on breastfeeding, previous researchers found that among college-educated women from nonwestern states, working after delivery in technical, sales, or administrative occupation was associated with a lower probability of initiating breastfeeding, compared with not working. Professional women were no different from nonworking women in their rates of initiation.²¹ However, the reference group in the aforementioned study was nonworking women.

In our study of the effect of occupational type on breastfeeding in which the sample was limited to only women working postpartum, we did not find any impact of occupational type on breastfeeding duration. However in the Fragile Families and Child Wellbeing Study, women who were not working postpartum (SAH mothers) were included in the study and served as the reference group. The researchers found that whereas women in professional and service occupations did not differ from SAH mothers regarding breastfeeding duration,

Table 5. Multivariable Analysis: Effect of Postpartum Employment Status and Occupational Type on Breastfeeding Duration Among Those Who Initiated Breastfeeding

Characteristics	Any Breastfeeding (> 6 mo)			Predominant Breastfeeding (> 3 mo)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Main independent variables						
Postpartum employment status ^a	(n ~ 5900)	(n ~ 5900)	(n ~ 5750)	(n ~ 5100)	(n ~ 5100)	(n ~ 4950)
Full-time	0.65 (0.55-0.75)	0.59 (0.50-0.70)	0.81 (0.65-0.99)	0.91 (0.73-1.12)	0.80 (0.63-1.01)	0.89 (0.65-1.19)
Part-time	0.99 (0.86-1.12)	0.92 (0.77-1.06)	1.07 (0.89-1.25)	1.01 (0.80-1.23)	0.87 (0.67-1.11)	0.91 (0.68-1.18)
Not employed	Reference	Reference	Reference	Reference	Reference	Reference
Occupational type ^b	(n ~ 3050)	(n ~ 3000)	(n ~ 2950)	(n ~ 2750)	(n ~ 2750)	(n ~ 2650)
Management	1.38 (0.93-1.88)	1.06 (0.66-1.57)	1.13 (0.72-1.65)	1.35 (0.87-1.94)	1.04 (0.66-1.52)	1.07 (0.67-1.58)
Professional	1.50 (1.12-1.91)	1.10 (0.74-1.55)	1.09 (0.73-1.54)	1.35 (0.89-1.91)	0.96 (0.61-1.43)	0.96 (0.61-1.44)
Service	1.14 (0.84-1.48)	1.25 (0.90-1.66)	1.16 (0.80-1.59)	0.86 (0.58-1.22)	0.98 (0.65-1.43)	0.95 (0.61-1.39)
Sales	0.94 (0.63-1.33)	0.93 (0.61-1.33)	0.86 (0.56-1.26)	1.06 (0.65-1.60)	1.06 (0.65-1.60)	1.02 (0.61-1.57)
Administrative	Reference	Reference	Reference	Reference	Reference	Reference
Other	1.19 (0.73-1.74)	1.26 (0.74-1.89)	1.21 (0.71-1.84)	0.74 (0.42-1.24)	0.86 (0.47-1.43)	0.94 (0.52-1.55)

Values are risk ratio (95% confidence interval). Weight variable is WIR0. The corrected risk ratio (RR) has been obtained using this formula: $RR = OR / [(1 - P_0) + (P_0 \times OR)]$, where P_0 is the incidence of the outcome (breastfeeding initiation) in the nonexposed group (reference group) and OR is the odds ratio. Full-time: ≥ 35 h/wk. Part-time: < 35 h/wk. Each main independent variable was assessed separately in each of the models without the other main independent variable. Model 1: unadjusted. Model 2: adjusted for maternal characteristics only (race/ethnicity, age, marital status, education, income status, country of birth, and smoking status). Model 3: adjusted for all control variables (race/ethnicity, age, marital status, education, income status, country of birth, and smoking status, birth weight, mode of delivery, birth order, health care professional advice about breastfeeding, separation from child for 1 week or more, child care arrangements, WIC participation within the last 12 months, region of residence, and urbanicity).

^aAmong women who initiated breastfeeding and were currently working by the 9-month interview (n ~ 6000).

^bAmong women who initiated breastfeeding and were currently working by the 9-month interview (n ~ 3050).

Source: US Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) Longitudinal 9 Month-Pre-school Restricted Use Data File.

manual and administrative workers were more likely to quit breastfeeding compared with SAH mothers.¹⁶ The fact that SAH mothers were included in the study may account for the differences between that study and the findings in our study.

One of the strengths of our study is the use of a nationally representative sample. Therefore, findings from this study can be applied nationally, unlike previous studies that concentrated on a few states,²³ disadvantaged populations,¹⁶ or advantaged populations.²² In addition, women's breastfeeding behavior was assessed longitudinally, so we were able to conclusively examine this outcome (temporal association and time-order effect).

Limitations

The effect of predelivery occupational type on breastfeeding initiation could not be examined in this study since this variable was not available in the data set. Predelivery occupational type may be more closely related to the decision to initiate breastfeeding than postpartum occupational type. However, to the extent that a woman returns to the same job category postpartum, our findings are likely to hold true. In addition, because the time of introduction of water or water-based drinks was not asked, we could not examine exclusive breastfeeding. Censoring was associated with postpartum employment status. This may have biased the results in either direction. Assuming the women lost to follow-up had similar breastfeeding durations as those who were present at the 2-year interview, the negative effect of full-time work status on duration of any breastfeeding may have been underestimated given that a greater proportion of the women lost to follow-up were not employed. However, if among women who were not employed those lost to follow-up had shorter durations than those present, the negative effect of full-time status would have been overestimated, but the latter is unlikely.

Conclusions

Our results support the notion that part-time employment options may be an effective strategy for balancing work and family. Employers should be educated about the numerous benefits of breastfeeding to their businesses so that they can make adequate provisions and options available to support breastfeeding employees upon starting work after birth.

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