SUPPLEMENT ARTICLE

Success of Strategies for Combining Employment and Breastfeeding

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ABSTRACT

OBJECTIVE. Return to work is associated with diminished breastfeeding intensity and duration. Although more mothers breastfeed after returning to work now than earlier, research has not documented the strategies that mothers use for combining paid work and breastfeeding or their effect on breastfeeding outcomes. This study examined which strategies are associated with smaller decrements in breastfeeding intensity and longer durations.

PARTICIPANTS AND METHODS. We analyzed 810 mothers from the Infant Feeding Practices Study II who worked and breastfed. We used regression and censored regression models to analyze 4 strategies that mothers used to combine these 2 activities: (1) feed directly from the breast only; (2) both pump and feed directly; (3) pump only; and (4) neither pump nor breastfeed during the work day. Outcomes were the difference in percentage of milk feeds that were breast milk between the month before and after return to work and duration of breastfeeding after return to work.

RESULTS. Forty-three percent of mothers pumped milk at work only; 32% fed the infant directly from the breast only. These 2 strategies, along with pumping and feeding directly, were statistically similar and superior to neither pumping nor breastfeeding during the work day for the outcome of change in breastfeeding intensity. For the outcome of breastfeeding duration, the 2 strategies that included directly feeding from the breast were associated with longer duration than pumping only, whereas the strategy of neither pumping nor breastfeeding during the work day was associated with the shortest duration.

CONCLUSIONS. Feeding the infant from the breast during the work day is the most effective strategy for combining breastfeeding and work. Ways to enable direct feeding include on-site child care, telecommuting, keeping the infant at work, allowing the mother to leave work to go to the infant, and having the infant brought to the work site. Establishing ways for mothers to feed from the breast after return to work is important to meet US breastfeeding goals. *Pediatrics* 2008;122:S56–S62

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Key Words
breastfeeding, infant care, mothers

Abbreviation
IFPS—Infant Feeding Practices Study

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POSTPARTUM RETURN TO work is associated with shorter breastfeeding duration[1–5] and lower breastfeeding intensity[6] in the United States. Even as more US mothers of infants are participating in the workforce,[7] the importance of breastfeeding in developed countries is increasingly emphasized. In 1997, the American Academy of Pediatrics increased their recommendation for the minimum duration of breastfeeding from 6 to 12 months on the basis of diverse research showing health benefits in developed countries, and their policy was reaffirmed in 2005.[8,9] National US health objectives call for exclusive breastfeeding for 6 months and breastfeeding duration for at least 12 months.[10,11] A recent series of meta-analyses of the evidence on the effects of breastfeeding on infant health in developed countries concluded that breastfeeding is associated with a reduced risk of many diseases in both mothers and their infants.[12]

Extant literature documents the difficulties faced by mothers returning to the workplace,[13] provides advice to mothers who wish to combine paid work and breastfeeding,[14–17] provides advice to companies that wish to promote breastfeeding,[18–21] and describes individual workplaces that have successfully promoted breastfeeding among employed mothers.[19,22,23] Policy statements and recommendations concerning the successful combination of maternal work and breastfeeding encourage directly feeding the infant from the breast either as a preferred accommodation[2,24] or as one of several possible accommodations.[9,11,25] However, most advice to mothers and employers centers on pumping milk at work, and most descriptions of workplace lactation programs support pumping at work. Despite past recommendations and policy statements, little research has systematically documented the strategies that mothers in

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the United States use to continue breastfeeding after returning to paid work or the association between the strategies they use and breastfeeding outcomes.

Our study used a subsample of mothers from the Infant Feeding Practices Study II (IFPS II) who concurrently worked for pay and breastfed at some point during their infant's first year of life to identify which strategies for combining paid work and breastfeeding were associated with smaller decrements in breastfeeding intensity and longer durations of breastfeeding after return to paid work. We considered 4 types of workplace breastfeeding strategies: (1) directly breastfeeding the infant; (2) pumping milk for later consumption; (3) a mixed strategy of both pumping and feeding directly; (4) and not providing milk for the infant during the work day by pumping and discarding breast milk or by neither pumping nor direct feeding during work hours. We include numerous demographic, economic, work, and attitudinal control variables to isolate the association between these 4 breastfeeding strategies and breastfeeding intensity and duration after return to work.

METHODS AND SUBJECTS

A subsample of 810 mothers who concurrently engaged in paid work and breastfeeding was analyzed from the IFPS II (see ref 26 for study details and Tables 1 and 2 for descriptive statistics for this subsample). Questionnaires were sent in the third trimester of pregnancy and at infant ages 1 through 7, 9, 10, and 12 months. All questionnaires included a food-frequency question that asked the mothers how many servings per day the infant received in the previous 7 days from a list of food groups, and these food groups included breast milk, infant formula, and other milks. In 6 of the 10 postnatal questionnaires, mothers were asked if they worked for pay and, if they also breastfed, what accommodations they used to combine the 2 activities.

Some mothers in the IFPS II completed the questionnaires when their infants were older or younger than the target age, which caused a need to correct some of the age-sensitive variables for actual infant age. For this analysis, no variables were age corrected because we had actual infant age available for the age-sensitive measures. However, 74 infants with ages greatly different from the target age on the questionnaires that included workplace breastfeeding accommodations were eliminated from the sample.

Two dependent variables that measure the impact of paid work on breastfeeding were analyzed: change in breastfeeding intensity and duration of breastfeeding after the mother's return to paid work. Change in breastfeeding intensity was measured by using the food-frequency data. The percentage of all milk feedings that were breast milk was calculated by dividing the number of breast milk feedings by the sum of the feedings of breast milk, formula, and other milks. Change in breastfeeding intensity was calculated as the difference between the percent breast milk just after and just before the mother returned to paid work, based on age of the infant when the mother returned to work and actual age of the infant when the various food-frequency questions were completed. For example, a child who received 8 breast milk feedings and 2 formula feedings in the last measurement before a mother's return to work (80% of milk feeds were breast milk) and then received 6 breast milk feedings and 4 formula feedings in the measurement taken the first month after the mother returned to work (60% of the milk feeds were breast milk) would have a value calculated as $60 - 80 = -20$ (negative numbers indicate a decrease in breastfeeding intensity after return to work). The mothers who were missing consecutive months' feeding data surrounding the return to work were omitted from the analysis; that is, if a mother did not complete the food-frequency measurement in the month before and the month after she returned to work, she was excluded from the change-in-intensity analysis.

TABLE 1 **Demographic and Breastfeeding-Related Characteristics of the Sample That Concurrently Worked for Pay and Breastfed: IFPS II ($N = 810$)**

Variable	Value
Demographic characteristics	
Mother's age, mean, y	29.8
Household income, mean, $	59 182
Education, %	
High school or less	9.8
Some college	34.5
College graduate or more	55.7
Race/ethnicity, %	
White	85.1
Other	14.9
Marital status, %	
Married	84.8
Not married	15.2
Worked prenatally, %	90.2
Breastfeeding-related variables, %	
Mother smoked prenatally	4.2
Mother was breastfed as a child	56.5
Parity by breastfeeding	
Had no other children	31.9
Had 1 other child and breastfed	39.7
Had >1 other child and breastfed	25.7
Had 1 other child and did not breastfeed	2.0
Had >1 other child and did not breastfeed	0.6
No. of friends and relatives who breastfed	
None have children/none breastfed/don't know	10.1
1–5	43.9
>5	46.0
Prenatal breastfeeding attitudes and goals, %	
Not embarrassed about breastfeeding in public	22.3
Agree breastfeeding is the best way to feed an infant	82.8
Disagree that infant formula is as good as breast milk	75.2
Agree infants should be exclusively breastfed for first 6 mo	59.5
Agree that a breastfed child is less likely to become obese	52.0
Prenatal exclusive breastfeeding goal	
No plan to exclusively breastfeed	20.5
<5 mo	29.9
>5 mo	49.6
Prenatal breastfeeding goal	
≤6 mo	25.3
>6 mo	74.7

Numbers vary slightly because of missing data.

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TABLE 2 **Description of Work Accommodations and Strategies for Concurrently Working for Pay and Breastfeeding: IFPS II (N = 810)**

Variable	Value
Change in % of milk feedings from breast milk in first month after return to work, mean	−6.6
Breastfeeding duration after return to paid work, median, wk	25.6
Total breastfeeding duration, median, wk	38.7
Age of infant when mother returned to work, mean, wk	11.4
Accommodations used in the first month after return to work, %[a]	
Keeps the infant at work and breastfeeds during the work day	31.8
Goes to infant to breastfeed during the work day	7.9
Infant is brought to mother to breastfeed during the work day	2.9
Pumps milk and saves for infant	52.7
Pumps and discards milk	0.6
Neither pumps nor feeds infant during the work day	15.9
Strategies used in the first month after returned to work, %[b]	
Feed directly from the breast only	31.3
Pump and feed directly from the breast	9.4
Pump only	43.4
Neither pump nor feed directly during the work day	15.9
Work characteristics, %	
Time worked when first returned to work, mean, h/wk	24.8
Prenatal household income from mother's salary	
None	9.8
Less than half	38.6
Approximately half	27.2
More than half	24.4
Workplace is very supportive of breastfeeding: prenatal	34.4
Workplace is very supportive of breastfeeding: postnatal	52.1

Numbers vary slightly because of missing data.

[a] Mothers could choose multiple accommodations.

[b] See "Methods and Subjects" for the method used to categorize the accommodations into mutually exclusive strategies.

Duration of breastfeeding after return to work was measured as the number of weeks of breastfeeding after the mother returned to paid work. Mothers were asked both the age of their infant when they returned to work and the age of their infant when they stopped breastfeeding. Breastfeeding duration after return to work was calculated as breastfeeding duration minus age of infant when the mother returned to work. The analysis did not account for the possibility that the mother stopped working before she stopped breastfeeding. This variable was truncated for 275 mothers because they continued to breastfeed at the time of the last survey; therefore, this variable has the statistical property of being censored, which requires statistical procedures developed to correctly analyze such data.

The key explanatory variable was the strategy that the mother used to combine breastfeeding and paid work. The question was asked on the months 2, 5, 6, 7, 9, and 12 questionnaires, providing up to 6 measures over time if the mother returned to work when her infant was ~2 months old and breastfed through 12 months of age. The question allowed mothers to choose as many options as applied among 6 ways to combine the 2 activities, and we constructed 4 mutually exclusive categories from these options. We call the questionnaire responses "accommodations" and the constructed categories "strategies" to distinguish them. The accommodations were (*a*) I keep my infant with me while I work and breastfeed during the day, (*b*) I go to my infant and breastfeed during my work day, (*c*) my infant is brought to me to breastfeed during my work day, (*d*) I pump milk during my work day and save it for my infant to drink later, (*e*) I pump milk during my work day, but I do not save it for my infant to drink later, and (*f*) I neither pump milk nor breastfeed during my work day. The 4 mutually exclusive strategies constructed for the analysis were directly breastfeeding only (any of *a*–*c* and not *d*), pumping and directly feeding (at least 1 of *a*–*c* and *d*), pumping milk for consumption only (*d*), and not providing milk for the infant during the work day (*e* or *f*). Therefore, although mothers could check as many accommodations as applied, they were placed into only 1 strategy each month. The prevalence of accommodations and strategies used during the initial month of return to work is summarized in Table 2 (11 mothers did not provide information about the accommodations used, which left a sample of 799 for subsequent analysis).

Other independent variables include age of infant when the mother returned to work, work characteristics, and characteristics likely to be related to breastfeeding duration or to combining work and breastfeeding, including attitudes toward breastfeeding, belief in the benefits of breastfeeding,[13] and personal goals for exclusive or total breastfeeding duration.[19] Exclusive breastfeeding goal was used in the intensity analysis, and total breastfeeding goal was used in the duration analysis. Demographic characteristics were used as covariates. The specific measures are listed in Table 2.

SAS software (SAS Institute, Inc, Cary, NC) was used for all analyses. Procedures used included frequencies, analysis of variance, regression, and Lifereg, which accounts for censored variables. Proc IML was used to transform censored regression coefficients produced by Proc Lifereg into marginal effects measures.

RESULTS

Demographic characteristics show that the mothers in this subsample who worked and breastfed concurrently tended to have the characteristics generally associated with longer breastfeeding duration: they were older, had higher income and education, and were more likely to be white and married than the total IFPS II sample. Most of the mothers had worked prenatally. More than two thirds had breastfed a previous infant, and their breastfeeding attitudes tended to be positive (Table 1).

The mean change in percent of milk feeds that were breast milk in the first month after returning to work was −6.6, and the mothers continued to breastfeed for a median of 25.6 weeks after they returned to work. The mothers returned to work, on average, when their infants were just over 11 weeks old, and they tended to work part-time when they first returned. The most common accommodations for combining breastfeeding and work were pumping milk for the infant to drink later and keeping the infant with the mother at work. Similarly, the most popular strategies were pumping milk for the infant and feeding the infant directly from the breast (Table 2).

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TABLE 3 **Percent (Number) of Mothers Who Changed to Each Strategy, According to First Strategy Used: IFPS II**

First Strategy Used	% (*n*) That Later Used This Strategy			
	Feed Directly	Pump and Feed Directly	Pump Only	Neither Pump Nor Feed
Feed directly from breast only (*N* = 250)	NA	10.0 (25)	9.2 (23)	15.2 (38)
Pump and feed directly (*N* = 75)	34.7 (26)	NA	26.7 (20)	22.7 (17)
Pump only (*N* = 346)	4.1 (14)	6.9 (24)	NA	29.2 (101)
Neither pump nor feed directly during the work day (*N* = 128)	9.4 (12)	0.0 (0)	6.3 (8)	NA

NA indicates not applicable.

A large minority of the mothers switched the strategy used for combining work and breastfeeding during the course of their concurrent work/breastfeeding period, with different initial strategies leading to different rates of switching (Table 3). Mothers who both fed the infant directly from the breast and pumped milk to save for the infant were most likely to switch to an alternative strategy, most likely to using only 1 of the 2 strategies. The mothers who did not initially feed the infant directly were unlikely to switch into this strategy. Few mothers began by neither pumping nor feeding their infant at work; however, a substantial number eventually switched to this strategy after returning to work. In addition, few mothers who began by neither pumping nor feeding their infant at work switched to another strategy.

The mothers who fed their infant directly from the breast as the first strategy dropped only an average of 3.3 percentage points on breastfeeding intensity (Table 4). The other 2 strategies that involved obtaining breast milk for the infant during the work day showed a similarly small decrease. In contrast, mothers whose first strategy was neither pumping for the infant nor feeding directly showed an average drop of >20 percentage points. The median duration of breastfeeding after return to work showed that either of the 2 strategies that included direct feeding of the infant had longer duration than pumping only or neither pumping nor feeding directly (Table 4).

Statistics for the regression model of change in breastfeeding intensity are shown in Table 5. In addition to the strategies, the model includes the demographic covariates and variables likely to be related to breastfeeding duration. All 3 strategies that involved providing breast milk for the infant during the work day were related to greater breastfeeding intensity in the month after return to work, compared with the strategy of neither pumping nor feeding the infant directly. There was no statistically significant difference in the change in breastfeeding intensity among the 3 strategies that involved providing breast milk for the infant during the work day. Specifically, the equality of regression coefficients for the strategies "feed infant directly" and "pump and feed" cannot be rejected (F = 0.28; $P = .60$), the equality of regression coefficients for "feed infant directly" and "pump only" cannot be rejected (F = 1.25; $P = .26$), and the equality of the regression coefficients "pump and feed" and "pump only" cannot be rejected (F = 2.10; $P = .15$).

Additional variables related to increased breastfeeding intensity in the first month at work included younger age of infant when the mother returned to work, working fewer hours on return to work, fewer cigarettes smoked per day, and being married. Breastfeeding attitudes and experience and exclusive breastfeeding goal were not related to change in intensity.

The associations between the duration of breastfeeding after return to work and the explanatory variables are listed in Table 6 as marginal effects. The marginal effect is the change in duration (in weeks) of breastfeeding after return to work for a unit change in the variable of interest. For categorical variables, the marginal effect is interpreted as the change in the duration (in weeks) if the category replaced the reference category. The marginal effects calculation accounts for the fact that 275 mothers reported a censored duration of breastfeeding after return to work (ie, reported breastfeeding in the final survey). The marginal effects calculations also assumed that all other variables were held at their mean values.

Directly feeding the infant was used as the reference category for ease of interpretation. This strategy was associated with the longest duration of breastfeeding after returning to work, but the strategy of both feeding directly and pumping was equivalent ($\chi^2(1) = 1.05$; $P = 0.31$). Compared with directly feeding the infant, the strategy of pumping only was associated with an average duration that was 7.1 weeks shorter. The strategy of neither directly feeding nor pumping during the work

TABLE 4 **Breastfeeding Outcomes According to Different Strategies for Combining Breastfeeding and Work: IFPS II**

Strategy	Change in % of Milk Feedings That Were Breast Milk, Mean (*n*)[a]	Duration of Breastfeeding After Return to Work, Median (*n*), wk
First strategy used	[b]	[c]
Feed directly only	−3.3 (185)	31.4 (250)
Pump and feed directly	−5.5 (59)	32.4 (75)
Pump only	−4.4 (287)	26.3 (346)
Neither pump nor feed during the work day	−20.9 (92)	14.3 (128)

[a] Mothers who did not provide feeding data in the month before and the month after they returned to work were deleted from the intensity-change analysis.
[b] Significantly different (analysis of variance): $P < .0001$; total, $N = 623$.
[c] No tests of significance of differences were conducted for the medians.

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TABLE 5 **Percent Change in Milk Feeds That Were Breast Milk After Returning to Paid Work, Regression Results: IFPS II**

Variable	Coefficient	SE	*P*
Intercept	−20.56	8.75	.02
First strategy used			
Feed infant directly	11.66	2.39	<.0001
Pump and feed directly	10.31	2.92	<.001
Pump only	13.72	2.17	<.0001
Neither pump nor feed directly during day	[a]	[a]	[a]
Age (weeks) of infant when returned to work	−0.33	0.08	<.0001
Time (hours/week) worked when first returned to work	−1.19	0.44	<.01
% Household income from mother prenatally	0.61	0.84	.47
Workplace support for breastfeeding postnatally	0.26	0.90	.77
Cigarettes smoked per day prenatally	−0.64	0.29	.03
Mother was ever breastfed as infant	−0.84	1.41	.55
Parity by past breastfeeding experience			
Had 1 other child and breastfed	−0.83	1.67	.62
Had >1 other child and breastfed	−2.68	1.98	.18
Had ≥1 other child and did not breastfeed	0.59	4.50	.90
Had no other children	[a]	[a]	[a]
No. of friends/relatives who breastfed	0.60	0.73	.41
Not embarrassed breastfeeding in public	0.57	0.53	.28
Attitudes toward breastfeeding prenatally			
Agree breastfeeding is best way to feed an infant	2.35	2.10	.26
Disagree that formula as good as breastfeeding	−1.03	1.75	.56
Agree infants should be exclusively breastfed for 6 mo	−1.97	1.64	.23
Agree breastfed infants less likely to be obese	2.66	1.47	.07
Prenatal exclusive breastfeeding goal	1.60	1.06	.13
Demographic characteristics			
Mother's age	0.19	0.15	.22
Household income	−0.10	0.16	.56
Education			
High school or less	−2.41	2.56	.35
Some college	1.66	1.67	.32
College graduate	[a]	[a]	[a]
White	−0.75	2.14	.73
Married	6.71	2.10	<.01

$N = 573$; $F = 5.48$; $P < .0001$; $r^2 = 0.20$.

[a] Reference category.

TABLE 6 **Duration of Breastfeeding After Return to Work, Marginal Effects From a Censored Regression: IFPS II**

Variable	Marginal Effect[a]	*P*
Intercept	8.81	.34
First strategy used		
Pump only	−7.11	<.0001
Pump and feed directly	−2.94	.31
Neither pump nor feed during day	−11.77	<.0001
Feed infant directly	[b]	[b]
Age (weeks) of infant when returned to work	−0.22	.02
Time (hours/week) worked when first returned to work	−0.49	.29
% Household income from mother prenatally	1.69	.05
Workplace support for breastfeeding postnatally	−0.15	.88
Cigarettes smoked per day prenatally	0.05	.87
Mother was ever breastfed as infant	2.17	.14
Parity by past breastfeeding experience		
Had 1 other child and breastfed	0.83	.64
Had >1 other child and breastfed	3.94	.06
Had ≥1 other child and did not breastfeed	2.59	.55
Had no other children	[b]	[b]
No. of friends/relatives who breastfed	0.74	.32
Not embarrassed breastfeeding in public	1.29	.03
Attitudes toward breastfeeding prenatally		
Agree breastfeeding is best way to feed an infant	3.07	.14
Disagree that formula as good as breastfeeding	0.63	.73
Agree infants should be exclusively breastfed for 6 mo	0.94	.56
Agree breastfed infants less likely to be obese	1.71	.27
Prenatal breastfeeding goal	1.64	<.0001
Demographic characteristics		
Mother's age	0.27	.08
Household income	−0.16	.34
Education		
High school or less	−0.47	.86
Some college	1.81	.30
College graduate	[b]	[b]
White	1.93	.34
Married	−0.84	.70

McFadden's pseudo-$R^2 = 0.18$; $N = 681$.

[a] The marginal effect is the change in duration of breastfeeding after return to work in weeks for a unit change in the variable of interest, or for categorical variables, the change in the duration in weeks if the category replaces the reference category.

[b] Reference category .

day was associated with the shortest breastfeeding duration after return to work, an average of 11.8 weeks shorter than when directly feeding the infant. Furthermore, the duration for neither feeding nor pumping was 8.8 weeks shorter than when using the strategy of pumping and feeding ($\chi^2(1) = 8.29$; $P = .004$) and 4.7 weeks shorter than pumping only ($\chi^2(1) = 4.61$; $P = .03$). The difference in duration between the strategies pump only and pump and feed was not statistically significant ($\chi^2(1) = 2.59$; $P = .11$).

Other characteristics related to longer duration of breastfeeding after return to work included younger infant age at return to work, a greater percentage of prenatal household income derived from the mother's work, fewer cigarettes smoked per day prenatally, and being married.

DISCUSSION

We found that the majority of mothers who combined breastfeeding and work pumped milk at work and saved it for their infant, whereas the second most commonly used accommodation was to keep the infant with the mother at work. We summarized accommodations into 4 strategies: (1) pump only; (2) both pump and feed directly; (3) feed directly only; and (4) neither pump nor breastfeed during the work day. We found that the first 3 strategies were statistically similar to each other and superior to the strategy of neither pumping nor breast-

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feeding during the work day on the outcome of change in breastfeeding intensity in the first month after return to work. The 2 strategies that included feeding the infant directly from the breast were associated with longer duration of breastfeeding after return to work than the strategy of pumping only, whereas neither pumping nor breastfeeding during the work day was associated with the shortest duration. This finding might be different among mothers participating in a workplace lactation program from which formal support is available, but to our knowledge, research comparing breastfeeding outcomes for different strategies within such a program has not been conducted. Although direct breastfeeding at work is impossible in some jobs, there are enough different ways it can be managed that many employers could make the strategy possible. Examples include on-site or near-site child care with breastfeeding breaks, telecommuting, keeping the infant at work with the mother, breastfeeding breaks in which the mother goes to the infant off site, and having the infant brought to the work site for feeding.

Research on what strategies women use to combine breastfeeding and work, other than research on a specific employer's lactation program, has not been reported recently. Previous research generally revealed that pumping milk for the infant was the most frequently used strategy,[27,28] but only MacLaughlin and Strelnick[28] provided distributions for several strategies. They found that 58% of breastfeeding and working mothers expressed milk at work, 4% kept their infant with them at work, and 35% provided no milk for their infant at work (the other 3% were unaccounted for and may have been a rounding error). Given these findings and the emphasis in the literature on pumping milk at work, it is likely that our result that pumping is the most common strategy is reflective of the current US population of breastfeeding and working mothers. Other researchers have not estimated the relative effect on breastfeeding of the various strategies examined in this study. However, pumping has been associated with longer breastfeeding duration than neither breastfeeding nor pumping,[29] and mothers who had access to their infants during the work day were reported to have longer duration than those without access.[30] In addition, a qualitative study indicated that mothers reported that having child care near or at the workplace helped them to succeed at both working and breastfeeding.[31]

Although we found that direct feeding of the infant was associated with longer duration of breastfeeding after return to work than pumping only, research on mothers who participate in work-site lactation programs and who only pump at work consistently has shown that they have long average duration of either breastfeeding or concurrent behavior.[19,22,23,32] This finding suggests that support for pumping at work can lead to breastfeeding outcomes similar to those of direct feeding. Because most employers do not have formal breastfeeding support programs,[33–35] it is likely that most of the IFPS II mothers did not have the benefit of a breastfeeding support program at work; therefore, it is likely that our results are based on the experiences of mothers mostly outside of formal support programs.

Similar to previous work,[1,36] we found that returning to work with reduced hours promoted the intensity of breastfeeding on return, although it had no significant effect on the duration of breastfeeding. Breastfeeding intensity is important, because exclusive breastfeeding is recommended for the first 6 months of life and research has documented a dose-response effect for the health benefits of breast milk.[37] Returning to work when the infant was older was significantly associated with a greater decline in breastfeeding intensity and with shorter-duration breastfeeding after return to work, which suggests that mothers who postpone returning to work until their infant is older are more likely to experience large changes in breastfeeding behavior after returning to work. This may be confounded with the general trend to wean older infants. Also, the measurement of breastfeeding intensity is a percentage of milk feedings; hence, at older ages the infant may receive fewer total milk feedings per day, and the substitution of other milk for breast milk for a given feeding will result in a larger percentage change in this measurement.

The results shown in Table 3 may indicate the sustainability of certain strategies and the ease of changing from 1 milk-providing strategy to another. The pump-and-feed-directly strategy, in particular, had a large percentage of changes to its 2 component parts, either direct feed only or pump only. Mothers who began with this strategy may have found the combination difficult to maintain but could easily move to either individual strategy because they were already using both. In contrast, it was relatively rare for a mother who was feeding directly only or pumping only to move to a different milk-providing strategy. A substantial percentage of the mothers who began each of the milk-providing strategies changed to the strategy of neither pumping nor feeding directly during the day. It is possible that the switches to other strategies were made by the same mothers in sequence. For example, a mother might switch from both pumping and feeding directly to feeding directly only, then pumping only, and later switch again to providing no milk for the infant during the work day.

The strengths of this study include the prospective design in which strategies the mothers used to combine breastfeeding and work were measured shortly after they returned to work, and breastfeeding duration was measured in the months after their return to work. The frequent and detailed questions on feeding the infant enabled a measure of change in breastfeeding intensity based on a comparison of before and after return-to-work measurements that each required recall of only the previous 7 days. The large, nationally distributed sample, which was not limited to any 1 workplace, enabled evaluation of various strategies of combining breastfeeding and work while controlling for multiple covariates.

The limitations of this study derive primarily from the nonrepresentative sample. Less-educated, low-income, and racial/ethnic minority women were substantially underrepresented in the sample. For these reasons, the point estimates in particular cannot be assumed to measure population values.

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CONCLUSIONS

Directly feeding the infant from the breast during the work day is the most effective strategy for combining breastfeeding and work in terms of the breastfeeding outcomes of change in breastfeeding intensity and duration of concurrent behavior. Pumping milk only is an effective strategy for maintaining breastfeeding intensity after return to work, but it is less effective than directly feeding the infant for breastfeeding duration after return to work. Establishing ways for mothers to directly feed their infants after they return to work is important for meeting US breastfeeding goals of total breastfeeding duration for at least 12 months.

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