

Prevalence and Risk Factors for Early, Undesired Weaning Attributed to Lactation Dysfunction

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Abstract

Background: Breastfeeding durations in the United States fall short of public health objectives. We sought to quantify the prevalence and identify risk factors for early, undesired weaning that mothers attribute to physiologic difficulties with breastfeeding.

Methods: We analyzed data from the Infant Feeding Practices Study (IFPS) II, a longitudinal study of US women. We defined disrupted lactation as early, undesired weaning attributed to at least two of the following three problems: breast pain, low milk supply, and difficulty with infant latch. We used logistic regression to estimate the association maternal body mass index (BMI), postpartum depressive symptoms, and disrupted lactation.

Results: Of 4,902 women enrolled in the IFPS II, we analyzed 2,335 women who reported prenatal intention and breastfeeding initiation. The prevalence of disrupted lactation was 12 per 100 women (95% confidence interval [CI] 11, 13) during the first year of life. Women in this group weaned earlier (median 1.2 months, interquartile range [IQR] 0.5–2.8) than women without disrupted lactation (median 7.0 months, IQR 2.8–2.0, $p < 0.01$). In multivariable-adjusted (MV-adj.) models, we found increased odds of disrupted lactation among overweight (odds ratio [OR] 1.6, 95% CI 1.1–2.3) or obese (OR 1.7, 95% CI 1.2–2.6) women, compared with women with a normal pregravid BMI. Maternal depressive symptoms at 2 months, defined as Edinburgh Postnatal Depression Scale ≥ 13 , were also associated with disrupted lactation (MV-adj. OR 1.7, 95% CI 1.1–2.7).

Conclusion: In a longitudinal sample of US women, disrupted lactation affected one in eight mothers who initiated breastfeeding. These findings underscore the need for both improved early breastfeeding support and targeted research to define the underlying pathophysiology and to determine management strategies that will enable more mothers to achieve their breastfeeding goals.

Introduction

BREASTFEEDING IS A SIGNIFICANT PREDICTOR of health outcomes. For infants, never breastfeeding or early weaning is associated with increased risks of otitis media, diarrhea, lower respiratory tract infection, sudden infant death syndrome, leukemia, and type 1 diabetes.¹ Among mothers, never breastfeeding or early weaning is associated with increased risks of breast cancer, ovarian cancer, diabe-

tes, hypertension, and myocardial infarction.² Based on these associations, all major medical organizations recommend 6 months of exclusive breastfeeding, with continued breastfeeding through the infant's first year and beyond.³

However, breastfeeding rates in the United States fall far short of these recommendations. Although 77% of US mothers initiate breastfeeding, just 16% of mother-infant dyads achieve the recommended 6 months of exclusive breastfeeding.⁴ Multiple factors impact breastfeeding

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duration,^{5–10} and recent public health campaigns have drawn attention to social constraints,¹¹ such as paid maternity leave, attitudes toward nursing in public, and workplace accommodations for mothers of nursing infants. However, successful breastfeeding also depends on the integrated psychology and physiology of mother and child.¹² The prevalence of early, undesired weaning that mothers attribute to disrupted physiology is unknown.

Both obesity and depression have been associated with differences in lactation physiology, and these conditions are associated with reduced breastfeeding duration.^{13–16} Obesity and insulin resistance are associated with differences in prolactin levels,¹⁷ onset of lactogenesis,¹⁸ and the human milk fat layer transcriptome.¹⁹ In addition, in animal models, obesity is associated with poor milk production.²⁰ With respect to depression and lactation, women with symptoms of depression and anxiety had lower oxytocin levels during feeding in a recent study,²¹ and several other neuroendocrine mechanisms may link maternal mood disorders with breastfeeding difficulties.¹² Furthermore, in animal models, disruption of oxytocin physiology results in dysregulated stress responses and poor feeding.²² Thus, maternal health conditions may disrupt lactation, leading to early, undesired weaning.

The prevalence of such disrupted lactation is not known. We therefore sought to define the prevalence of early, undesired weaning that mothers attribute to lactation dysfunction, which we defined as difficulties with latch, pain, and milk supply. We used data from the Infant Feeding Practices Study (IFPS) II to estimate the proportion of women who experience disrupted lactation and to estimate associations between demographic characteristics and disrupted lactation. We hypothesized that the prevalence of disrupted lactation would be increased among women with increased maternal body mass index (BMI) or depressive symptoms, independent of sociodemographic confounders.

Methods

The IFPS II has been described in detail elsewhere.²⁶ Briefly, this longitudinal study from the CDC recruited 4,902 women between May 2005 and June 2007 from a nationally distributed panel of more than 500,000 US households. Participants completed questionnaires in the third trimester of pregnancy and through the first 12 months of the child's life. IFPS II participants were more likely to be middle class, employed, and white than nationally representative samples. We included in our analysis all women who (1) reported on the prenatal questionnaire how long they intended to breastfeed and (2) reported that they had ever breastfed on the neonatal questionnaire administered at 1 month postpartum.

Of the 4,902 women enrolled in the IFPS II, 3,452 met birth screener criteria for the parent study, of whom 3,033 completed a qualifying neonatal questionnaire.²⁶ Of these 3,033 participants, 2,403 had reported an intended breastfeeding duration on the prenatal questionnaire, of whom 2,335 initiated breastfeeding. These 2,335 women comprised our study sample.

Assessment of breastfeeding intention and outcome

The IFPS II assessed breastfeeding intention in the prenatal period. Mothers were asked how old they anticipated their infant would be before stopping breastfeeding altogether.

Infant feeding was assessed with monthly questionnaires in the first 7 months, followed by questionnaires at 9, 10, and 12 months. If the dyad had stopped breastfeeding, the mother was asked the infant's age at weaning and whether she had breastfed as long as she wanted to. We defined "early weaning" as discontinuation of breastfeeding earlier than the duration the mother reported in response to the prenatal question "How old do you think your baby will be when you completely stop breastfeeding?" We defined "undesired weaning" as the mother answering no to the question "Did you breastfeed as long as you wanted to?" Upon stopping, mothers were asked to consider a list of reasons for weaning and indicate their importance on a Likert scale. For this analysis, we dichotomized reasons for weaning into two categories of "Not Important" ("Not at all important" or "Not very important") and "Important" ("Somewhat important" or "Very important").

Definition of disrupted lactation

The goal of our study was to estimate the proportion of women who were unable to sustain their intended duration of breastfeeding owing to physiologic problems with lactation. To identify such women within the constraints of a secondary analysis, we analyzed self-reported physiologic reasons for early undesired weaning. Prior studies have reported that pain, low milk supply, and difficulty with infant latch were the most commonly cited reasons for early weaning.²⁷ We therefore defined disrupted lactation as early, undesired weaning in the setting of a mother's reporting at least two of these three problems as important reasons for stopping breastfeeding. We used at least two of these reasons as our threshold in order to define a population that reported multiple difficulties with lactation physiology.

Assessment of breastfeeding experience and support

At the time of weaning, mothers rated their feelings about their experience of having breastfed their baby on a Likert scale from "1 - Very unfavorable" to "5 - Very favorable" and their likelihood of breastfeeding again if they had another child ("1 - Not at all likely" to "5 - Very likely"). Answers were dichotomized as "Favorable" (4 or 5) or "Unfavorable" (1, 2, or 3) and as "Likely" (4 or 5) or "Unlikely" (1, 2, or 3). On the neonatal questionnaire, mothers were asked whether they had received breastfeeding help from a health professional and whether that help had solved the problems or made them better, using a Likert scale from "No, not at all (1)" to "Yes, very much (5)."

Assessment of maternal BMI and mood

On the prenatal questionnaire, mothers reported their weight immediately before pregnancy and their height. We used these values to calculate pregravid BMI, kg/m², which we categorized as underweight (BMI < 18.5 kg/m²), normal (BMI 18.5–< 25 kg/m²), overweight (BMI 25–< 30 kg/m²), or obese (BMI ≥ 30 kg/m²). Maternal mood was assessed on the 2-month postnatal questionnaire using the Edinburgh Postnatal Depression Scale (EPDS). This 10-item, well-validated questionnaire measures depression and anxiety symptoms during the perinatal period.²⁸ We classified women with an EPDS ≥ 13 as having depressive symptoms.

This threshold has a sensitivity of 75% and specificity of 84% for major depression among postnatal women.²⁸

Analysis

We classified women into five groups: (1) early, undesired weaning; (2) early, desired weaning; (3) expected, undesired weaning; (4) expected, desired weaning; and (5) breastfed ≥ 12 months. Women with disrupted lactation comprised a subset of women with early, undesired weaning. We used breastfeeding for ≥ 12 months as our referent category because the American Academy of Pediatrics recommends at least 1 year of breastfeeding; thus, women in this group have succeeded according to a consensus public health recommendation.³ We further conducted a sensitivity analysis to determine how classifying women who breastfed ≥ 12 months into the four weaning categories would affect the prevalence of early, undesired weaning.

Loss to follow-up occurred over the 15 months that women participated in the IFPS II. Of the 2,335 women who were included in our analysis, 1,414 completed the 12-month questionnaire. We used multiple imputation to approximate a complete set of covariates for all women who completed the prenatal and neonatal questionnaires. We implemented multiple imputation using PROC MI in SAS (SAS Institute, Cary, NC) for variables used in the analysis, including demographic variables, maternal BMI, EPDS score at 2 months, breastfeeding duration, pain and problems with early breastfeeding, and reasons for weaning. Ten imputations were generated for evaluation. We used these imputed data sets to estimate the prevalence of disrupted lactation in our study population and to measure associations with risk factors for this outcome. We used the methods described in Rubin²⁹ to construct confidence intervals (CIs) for prevalence. Using our imputed data set, we calculated means and standard deviations or counts and frequencies, as appropriate, for IFPS II participants.

We used PROC LIFETEST in SAS (SAS Institute, Cary, NC) to estimate Kaplan-Meier survival curves. The average across the 10 survival curve estimates was used to generate a summary survival curve to compare durations of breastfeeding among these five groups. R-2.14 was used to graph the survival curves. The average duration of breastfeeding between the groups (excluding the group breastfeeding at the last study questionnaire) was compared using the imputed data with SAS procedures MIXED and MIANALYZE (SAS Institute, Cary, NC).

We compared durations of breastfeeding between women who did or did not meet criteria for disrupted lactation. We also compared help received from health professionals, maternal feelings about the breastfeeding experience, and likelihood of breastfeeding a future child for women who did or did not meet criteria for disrupted lactation using SAS procedures LOGISTIC (SAS Institute, Cary, NC) and MIANALYZE.

Several maternal and infant risk factors have been associated with early discontinuation of breastfeeding owing to physiologic difficulties, including maternal obesity^{13,17} and postpartum depression.^{15,30} We modeled associations between these factors and both disrupted lactation and early, undesired weaning, using LOGISTIC and MIANALYZE. We present both unadjusted models and models adjusting for

maternal age, parity, education, race/ethnicity, marital status, and Women, Infants, and Children (WIC) participation. All statistical analyses were conducted using SAS.V9.3.

The IFPS II was approved by the Research Involving Human Subjects Committee of the US Food and Drug Administration (FDA). This secondary analysis was reviewed by the University of North Carolina Office of Human Research Ethics and found not to require institutional review board (IRB) approval.

Results

The 2,335 IFPS II participants who both reported an intended duration of breastfeeding and initiated breastfeeding comprised our study population. Participants were predominantly married (75.6%), white (81.4%), and multiparous (68.0%), and 38.8% had completed a college degree. About a third of participants participated in postnatal WIC (37.0%) (Table 1).

In our complete case analysis, 12.1 women per 100 (208/1,721) met criteria for disrupted lactation. This result was similar to the proportion in our imputed data set (12/100, 95% CI 11, 13). The median duration of breastfeeding among women who met criteria for disrupted lactation was 1.2 months (quartile [Q]1, Q3: 0.5, 2.8 months), compared with 7.0 months (Q1, Q3: 2.8, 12.0) among mothers who did not meet criteria for disrupted lactation (Fig. 1, Table 2). Compared with women who did not meet criteria for disrupted lactation, those who did were more likely to be young, Hispanic, unmarried, and nulliparous; to not have a college degree; to receive postnatal WIC; to live in a household with one to two people; to be employed; and to have a nonprofessional occupation (Table 1).

Forty-five per 100 study participants (95% CI 44, 47) reported early, undesired weaning, with a median breastfeeding duration of 2.7 months (Q1, Q3: 0.9, 5.4 months). Median duration of breastfeeding differed for women with expected vs. early and desired vs. undesired weaning (Fig. 2, Table 2, $p < 0.0001$). Women with early weaning intended to breastfeed longer than women with expected weaning. The median intended duration among women who breastfed ≥ 12 months was 12 months (interquartile range [IQR] 12, 18).

In our sensitivity analysis, we found that among women who had breastfed ≥ 12 months, 57.6% (250/434) had exceeded their prenatal intention and so met criteria for expected weaning. We found that 19 women had breastfed for ≥ 12 months and weaned prior to completing the last study questionnaire. Among these women, 84.2% (16/19) reported desired weaning, and 15.8% (3/19) reported undesired weaning. We used these probabilities to estimate the prevalence of desired vs. undesired weaning among women who were still breastfeeding at the last study questionnaire. If we assumed that all women who were breastfeeding at the last questionnaire went on to wean prior to meeting their intended duration, the prevalence of early, undesired weaning in our population would be 46.4%. If all women who were still breastfeeding achieved their intended duration, the prevalence of early, undesired weaning would be 45.2%.

Women with disrupted lactation were more likely than women without disrupted lactation to get help with breastfeeding from a health professional (63.5% vs. 54.9%, $p = 0.004$) but were less likely to report that the assistance

TABLE 1. DEMOGRAPHIC CHARACTERISTICS FOR ACTUAL AND IMPUTED DATA FOR WOMEN WHO INTENDED TO BREASTFEED AND HAD EVER BREASTFED (N= 2,335)

	n (%)	Missing outcome	Complete case		Imputed data	
			Disrupted lactation	Undisrupted lactation	Disrupted lactation	Undisrupted lactation
Postnatal WIC						
No	1,471 (63.0)	366 (24.9)	107 (9.7)	998 (90.3)	145 (9.8)	1,327 (90.2)
Yes	864 (37.0)	248 (28.7)	101 (16.4)	515 (83.6)	136 (15.7)	728 (84.3)
Household size						
1–2	642 (27.5)	140 (21.8)	77 (15.3)	425 (84.7)	97 (15.1)	545 (84.9)
3–4	1,339 (57.3)	368 (27.5)	103 (10.6)	868 (89.4)	141 (10.5)	1,198 (89.5)
5 or more	354 (15.2)	106 (29.9)	28 (11.3)	220 (88.7)	42 (11.9)	312 (88.1)
Marital status						
Married	1,766 (75.6)	439 (24.9)	137 (10.3)	1,190 (89.7)	197 (10.5)	1,668 (89.5)
Not married	420 (18.0)	117 (27.9)	55 (18.2)	248 (81.8)	84 (17.8)	387 (82.2)
Missing	149 (6.4)	58 (38.9)	16 (17.6)	75 (82.4)	0 (0.0)	0 (0.0)
Race or ethnicity						
White	1,901 (81.4)	476 (25.0)	170 (11.9)	1,255 (88.1)	234 (11.9)	1,725 (88.1)
African American	103 (4.4)	35 (34.0)	6 (8.8)	62 (91.2)	10 (9.3)	97 (90.7)
Hispanic	149 (6.4)	45 (30.2)	15 (14.4)	89 (85.6)	21 (14.1)	128 (85.9)
Other	119 (5.1)	40 (33.6)	10 (12.7)	69 (87.3)	16 (13.2)	105 (86.8)
Missing	63 (2.7)	18 (28.6)	7 (15.6)	38 (84.4)	0 (0.0)	0 (0.0)
Maternal age						
18 to younger than 24	390 (16.7)	131 (33.6)	61 (23.6)	198 (76.4)	81 (20.7)	310 (79.3)
24 to younger than 28	589 (25.2)	162 (27.5)	51 (11.9)	376 (88.1)	72 (12.2)	518 (87.8)
28 to younger than 32	632 (27.1)	155 (24.5)	50 (10.5)	427 (89.5)	66 (10.5)	567 (89.5)
32 or older	720 (30.8)	163 (22.6)	46 (8.3)	511 (91.7)	61 (8.5)	660 (91.5)
Missing	4 (0.2)	3 (75.0)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)
Parity						
>1	1,588 (68.0)	426 (26.8)	105 (9.0)	1,057 (91.0)	152 (9.4)	1,463 (90.6)
1	694 (29.7)	171 (24.6)	97 (18.5)	426 (81.5)	129 (17.8)	592 (82.2)
Missing	53 (2.3)	17 (32.1)	6 (16.7)	30 (83.3)	0 (0.0)	0 (0.0)
Education						
Less than high school	46 (2.0)	16 (34.8)	6 (20.0)	24 (80.0)	10 (19.8)	41 (80.2)
High school	327 (14.0)	92 (28.1)	36 (15.3)	199 (84.7)	54 (14.8)	312 (85.2)
1–3 years of college	897 (38.4)	267 (29.8)	93 (14.8)	537 (85.2)	140 (14.5)	825 (85.5)
College or postgraduate	906 (38.8)	176 (19.4)	54 (7.4)	676 (92.6)	76 (8.0)	876 (92.0)
Missing	159 (6.8)	63 (39.6)	19 (19.8)	77 (80.2)	0 (0.0)	0 (0.0)
Employment						
Employed full time	705 (30.2)	157 (22.3)	69 (12.6)	479 (87.4)	103 (12.7)	707 (87.3)
Employed part time	264 (11.3)	61 (23.1)	24 (11.8)	179 (88.2)	37 (12.7)	258 (87.3)
Full-time homemaker	719 (30.8)	196 (27.3)	45 (8.6)	478 (91.4)	81 (9.8)	750 (90.2)
Other	329 (14.1)	92 (28.0)	34 (14.3)	203 (85.7)	59 (14.8)	340 (85.2)
Missing	318 (13.6)	108 (34.0)	36 (17.1)	174 (82.9)	0 (0.0)	0 (0.0)
Occupation						
Not employed	828 (35.5)	232 (28.0)	55 (9.2)	541 (90.8)	101 (10.3)	884 (89.7)
Professional specialty	329 (14.1)	62 (18.8)	23 (8.6)	244 (91.4)	41 (9.8)	377 (90.2)
Managerial	144 (6.2)	25 (17.4)	16 (13.4)	103 (86.6)	25 (13.4)	162 (86.6)
Administrative support	208 (8.9)	55 (26.4)	28 (18.3)	125 (81.7)	52 (18.2)	232 (81.8)
Sales	93 (4.0)	27 (29.0)	8 (12.1)	58 (87.9)	15 (12.7)	102 (87.3)
Technical	239 (10.2)	61 (25.5)	22 (12.4)	156 (87.6)	47 (13.5)	297 (86.5)
Missing	494 (21.2)	152 (30.8)	56 (16.4)	286 (83.6)	0 (0.0)	0 (0.0)

Data from the Infant Feeding Practices Study II. Imputed counts are rounded for display purposes. WIC, Women, Infants, and Children.

they received was helpful (26.1% vs. 55% “Yes, very much”) in response to “The breastfeeding help solved the problem/made it better,” $p < 0.001$). Women who met criteria for disrupted lactation were also less likely to report favorable feelings about having breastfed (58.4% vs. 87.9% favorable, $p < 0.001$), and fewer women with disrupted

lactation reported that they were likely to breastfeed again if they had another child (78.9% vs. 92.2% likely to breastfeed again, $p < 0.001$).

We then measured the association between postpartum depressive symptoms, defined as EPDS score ≥ 13 at 2 months postpartum, and both disrupted lactation and early,

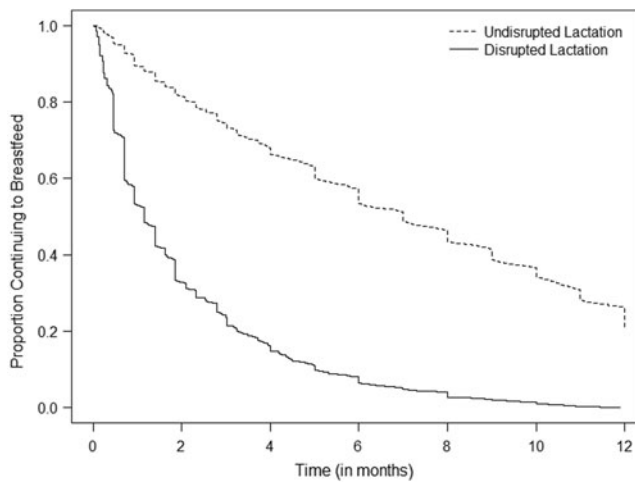


FIG. 1. Proportion of women continuing to breastfeed over the child's first year, by disrupted lactation status.

undesired weaning (Table 3). Among women with depressive symptoms at 2 months (EPDS ≥ 13), 19 per 100 women (95% CI 18–21) met criteria for disrupted lactation, compared with 11 per 100 women (95% CI 10–12) with EPDS < 13 (adjusted odds ratio [OR] 1.7, 95% CI 1.1–2.7). Moreover, among women with depressive symptoms at 2 months, 56 per 100 women (95% CI 55–58) reported early, undesired weaning, compared with 44 per 100 women (95% CI 42–46) without depressive symptoms. In both unadjusted multinomial logistic regression models and multivariable-adjusted models, depression symptoms at 2 months were associated with an increased odds of early, undesired weaning compared with the referent category, breastfeeding ≥ 12 months.

We similarly modeled the association between maternal pregravid BMI and both disrupted lactation and undesired, early weaning (Table 3). The prevalence of disrupted lactation was lowest among normal BMI women (9/100 women, 95% CI 8, 10), with higher prevalence among overweight (13/100 women, 95% CI 12, 14) and obese women (14/100, 95% CI 13, 16). These associations persisted with adjustment for sociodemographic confounders (adjusted OR overweight vs. normal weight: 1.6, 95% CI 1.1, 2.3; obese vs. normal weight: 1.7, 95% CI 1.2, 2.6). Undesired, early weaning was

also more prevalent among women with a pregravid BMI that was underweight (43/100 women, 95% CI 42, 45), overweight (47/100 women, 95% CI 45, 48), or obese (51/100 women, 95% CI 49, 52), compared with women who were normal weight prior to pregnancy (39/100 women, 95% CI 38, 41). In multinomial logistic regression models adjusting for demographic variables, the odds of early, undesired weaning vs. our referent category of breastfeeding ≥ 12 months were increased for women with obese vs. normal pregravid BMI (adjusted OR 1.5, 95% CI 1.1, 2.1).

In models mutually adjusting for depression symptoms, BMI, and sociodemographic confounders, both maternal depression symptoms and BMI remained independently associated with disrupted lactation (data not shown).

Discussion

In a longitudinal cohort study of US women, we found that nearly half of mothers reported early, undesired weaning. One in 8 mothers (12/100 women, 95% CI 11, 13) reported early, undesired weaning attributed to difficulties with latch, pain, and milk supply, a constellation of symptoms that we used to define “disrupted lactation.” We found higher prevalence of disrupted lactation among young, unmarried, nonprofessional women without a college degree. Both obesity and maternal depression symptoms were associated with increased odds of disrupted lactation, independent of sociodemographic confounders. These associations suggest that both socioeconomic constraints and psychobiological mechanisms may contribute to a woman's capacity to achieve her breastfeeding intentions.

Our results confirm and extend earlier work regarding the prevalence and risk factors for lactation difficulties. Neifert *et al.* followed 319 primiparous women who were motivated to breastfeed.³¹ When women with prior breast surgery were excluded, 13.1% had insufficient milk production. In a secondary analysis of participants in Project Viva,³² 67 of 495 mothers (13.5%) reported early introduction of formula or weaning at less than 3 months due to problems with milk production.

We found that maternal obesity was associated with early, undesired weaning, consistent with observational studies reporting lower initiation, delayed lactogenesis, and reduced duration of breastfeeding among women who are overweight

TABLE 2. PREVALENCE OF WEANING CATEGORIES AND OF DISRUPTED LACTATION

	n ^a	Prevalence ^b (95% CI) ^a	Intended breastfeeding duration (months), median (Q1, Q3) ^c	Achieved breastfeeding duration (months), median (Q1, Q3) ^a
Disrupted lactation	280	12 (11,13)	7.0 (6.0,12.0)	1.2 (0.5,2.8)
Undisrupted lactation	2,055	88 (87,89)	10.0 (6.0,12.0)	7.0 (2.8,12.0)
Early, undesired	1,055	45.2 (43.6,46.8)	9.0 (6.0,12.0)	2.7 (0.9,5.4)
Early, desired	484	20.7 (19.4,22.0)	9.1 (6.0,12.0)	5.0 (2.2,8.5)
Expected, undesired	86	3.7 (3.1,4.3)	6.0 (3.1,8.2)	8.0 (5.6,10.0)
Expected, desired	277	11.8 (10.8,12.9)	6.1 (6.0,11.0)	10.0 (7.0,12.0)
Breastfed ≥ 12 months	434	18.6 (17.4,29.8)	12 (12,18)	$> 12^d$

^aEstimates, based on multiple imputation.

^bPrevalence estimate per 100 breastfeeding women and 95% CI, using multiple imputation for missing outcome data.

^cReported intention.

^dUnknown values (known to be greater than 12 months); cannot impute, owing to lack of true values.

CI, confidence interval; Q, quartile.

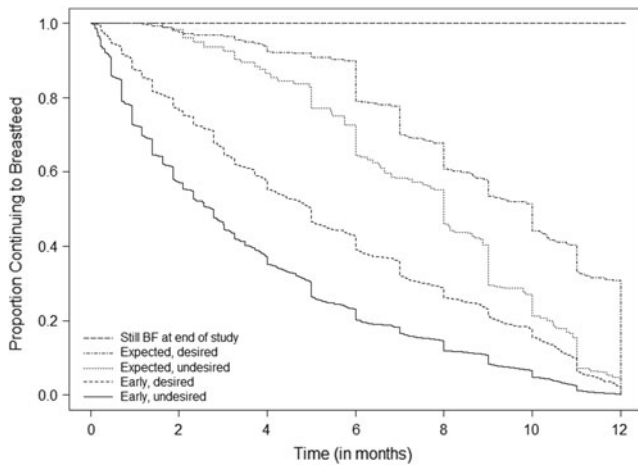


FIG. 2. Proportion of women continuing to breastfeed over the child’s first year of life, by weaning status.

or obese.^{13,14,18} Overweight BMI has also been associated with differences in prolactin response to suckling,¹⁷ and insulin resistance is associated with both low milk supply and differences in the milk fat layer transcriptome,¹⁹ suggesting that biological as well as sociocultural factors may affect breastfeeding success among overweight women. We also found higher rates of perceived lactation dysfunction among women with postpartum-depression symptoms. Postpartum depression is associated with reduced breastfeeding duration,^{15,16,33–36} and neuroendocrine mechanisms may underlie this association.^{12,21} Moreover, reduced maternal sensitivity³⁷ in the setting of depression may also contribute to breastfeeding difficulties.

The Surgeon General’s Call to Action asserts that most lactation problems can be solved with access to appropriate care.¹¹ We found that two-thirds of women with disrupted lactation sought help from a health professional, but only one in four reported that the assistance they received solved the problems or made it better. This lack of resolution may be due to true physiologic dysfunction, or it may reflect the paucity of evidence-based recommendations for lactation management and the uneven quality of lactation training for health professionals in the United States.³⁸ Increasing access to high-quality lactation care may improve breastfeeding outcomes.

Strengths of our study include prospective assessment of breastfeeding intention to define early weaning, our large sample size, and our use of multiple imputation to reduce bias due to differential loss to follow-up. However, our findings must be interpreted in the context of the study design. We measured the prevalence of early, undesired weaning in the context of perceived lactation dysfunction. Multiple barriers to breastfeeding, such as poor maternity care practices,^{10,39} uneven training for health professionals,^{38,40} lack of access to postpartum support⁴¹ and maternity leave,⁵ and return-to-work requirements,⁴² can affect whether a woman is able to achieve her breastfeeding goals. The prevalence of disrupted lactation “in a perfect world” is therefore likely to be lower than 12%. On the other hand, the IFPS II sample was largely Caucasian, educated, and well off. Given the direct association between low socioeconomic status and breastfeeding difficulties in our sample and in other studies,⁴³ our analysis

TABLE 3. ASSOCIATION OF MATERNAL BMI AND DEPRESSIVE SYMPTOMS WITH DISRUPTED LACTATION AND WITH EARLY, UNDESIRE WEANING

	Total		Disrupted lactation		Early, undesired weaning		MV ^c -adjusted	
	n	n	Prevalence ^a (95% CI)	OR ^b (95% CI)	n	Prevalence ^a (95% CI)	OR ^d (95% CI)	OR ^d (95% CI)
Total	2,335	280	12.0 (11.0,13.0)	1.00 (ref.)	1,055	45.2 (43.6,46.8)	1.00 (ref.)	1.00 (ref.)
EPDS < 13	2,114	238	11.3 (10.3,12.2)	1.88 (1.21,2.91)	931	44.0 (42.5,45.6)	1.86 (1.21,2.88)	1.72 (1.10,2.68)
EPDS ≥ 13	221	43	19.3 (18.0,20.5)	1.71 (1.15,2.54)	124	56.2 (54.6,57.7)	1.32 (0.50,3.48)	1.26 (0.92,1.73)
Underweight BMI	60	8	12.9 (11.9,14.0)	1.44 (0.42,2.00)	26	43.2 (41.7,44.8)	1.32 (0.50,3.48)	1.20 (0.41,3.49)
Normal BMI	831	75	9.0 (8.1,9.9)	1.00 (ref.)	326	39.2 (37.7,40.1)	1.00 (ref.)	1.00 (ref.)
Overweight BMI	742	97	13.0 (12.0,14.1)	1.52 (1.06,2.17)	348	46.9 (45.3,48.4)	1.23 (0.91,1.66)	1.26 (0.92,1.73)
Obese BMI	702	101	14.4 (13.3,15.5)	1.71 (1.15,2.54)	356	50.7 (49.1,52.2)	1.58 (1.16,2.60)	1.53 (1.10,2.12)

^aData taken from the Infant Feeding Practices Survey II. Prevalence estimate and 95% CI per 100 women, using multiple imputation for missing data.
^bOR from logistic regression for disrupted lactation vs. referent group that did not meet criteria for disrupted lactation (n = 2,055).
^cMV-adjusted models include WIC status, marital status, race/ethnicity, maternal age, parity, and education.
^dOR from multinomial regression for early, undesired weaning vs. referent group with breastfeeding ≥ 12 months (n = 434).
 BMI, body mass index; EPDS, Edinburgh Postnatal Depression Scale; MV, multivariable; OR, odds ratio.

may underestimate the prevalence of disrupted lactation in the general population.

Our use of self-report measures is both a strength and a limitation of our study. Use of self-reported data provides a framework for assessing disrupted lactation in epidemiologic studies. Moreover, this approach quantifies the proportion of women who attribute their early, undesired weaning to physiologic dysfunction. However, we were not able to validate self-report against clinical assessment. Perception of insufficient milk supply is common,⁴⁴ and such perception is correlated with low parenting self-efficacy.⁴⁵ Of note, a recent study found that parenting magazines targeting low-income women were more likely to focus on difficulties with breastfeeding than was a magazine targeting high-income women.⁴⁶ Thus, self-report of problems with breastfeeding may reflect societal constraints that systematically undermine women's confidence in their ability to breastfeed, and disrupted lactation may reflect both socioeconomic disadvantage and psychobiologic dysfunction. To determine the true prevalence of early, unplanned weaning due to lactation dysfunction would require a prospective, longitudinal study that included clinical assessment of each mother-infant dyad. This analysis is intended to lay the groundwork for such prospective studies.

Our analysis of risk factors for disrupted lactation is also limited by constraints of the IFPS II study. Maternal height and weight were obtained by self-report, and underreporting of pregravid BMI may have led to misclassification, potential biasing our results. Moreover, in the IFPS II, perinatal mood was assessed at 2 months postpartum, when 75% of women with disrupted lactation had already weaned. We therefore cannot determine whether preexisting mood symptoms contributed to breastfeeding problems or whether breastfeeding problems contributed to depression symptoms. However, given that one in five women with depression symptoms met criteria for disrupted lactation, health professionals who care for mothers and infants should be prepared to assess and manage both breastfeeding difficulties and perinatal mood symptoms.

Conclusions

Our results suggest that one in eight women experience early, undesired weaning that they attribute to difficulties with the physiology of breastfeeding. These findings challenge assertions that every mother can breastfeed. As Marianne Neifert has written: "The bold claims made about the infallibility of lactation are not cited about any other physiologic processes. A health care professional would never tell a diabetic woman that 'every pancreas can make insulin' or insist to a devastated infertility patient that 'every woman can get pregnant.' The fact is that lactation, like all physiologic functions, sometimes fails because of various medical causes" (p. 278).⁴⁷

Neither the International Classification of Diseases (ICD)-9 nor the ICD-10 provides a diagnosis code for early, undesired weaning attributed to lactation dysfunction. Agalactia, derived from Latin and Greek roots to signify "absence of milk," is subdivided in ICD-10 into primary complete (O92.3), partial (O92.4), and secondary, elective, or therapeutic agalactia (O92.5), with "Failure of lactation" as a synonym. In this article, we use the term "disrupted

lactation" to describe early, undesired weaning attributed to lactation dysfunction. However, this term may not capture the impact of disrupted lactation on a woman's postpartum experience. In our clinical work with breastfeeding mothers, we regularly encounter women who have taken extraordinary measures to breastfeed. Women visit multiple specialists, ingest countless herbal preparations, and endure every-hour pumping regimens, supplemental nursing systems, and topical ointments in an effort to establish a normal breastfeeding relationship. For these mothers, disrupted lactation constitutes a "lactastrophe." When we have shared that word with scores of struggling mothers we have cared for, they have uniformly endorsed it as a fitting description of their experience. We therefore propose "lactastrophe" as a descriptor for emotional distress in the setting of disrupted lactation.

Our study's design did not allow us to disentangle socio-demographic factors from biological determinants of early, undesired weaning attributed to physiologic problems. However, the prevalence of disrupted lactation in a contemporary setting underscores the need to increase access to high-quality lactation support. In addition, research is needed to determine underlying causes, compare the efficacy and effectiveness of prevention and treatment strategies, and disseminate best practices among those who care for mother-infant dyads. Such efforts may ultimately enable a larger proportion of women to achieve their infant-feeding goals.

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