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Breastfeeding Initiation in the Context of a Home Intervention to Promote Better Birth Outcomes

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Abstract

Objective: This secondary analysis examined breastfeeding initiation rates and factors related to initiation in a sample of multiparous women with a history of a prior preterm birth.
Subjects and Methods: Data for a subsample of women ($n=130$) were derived from a randomized clinical trial testing a home visit intervention to improve birth outcomes. The subsample included women who gave birth to an infant greater than 35 weeks of gestation. All participants received standard prenatal care. Intervention participants ($n=73$) also received home visits by certified nurse-midwives. Visits were guided by protocols to improve factors associated with poor birth outcomes and maternal and infant health. Descriptive and logistic regression analyses were used, controlling for factors previously associated with breastfeeding.
Results: Although 85% of women reported an intention to breastfeed, only 65% reported initiating breastfeeding at 48 hours postpartum. After controlling for race, income, marital status, smoking, and age, higher maternal education and lower pregravid body mass index were associated with higher rates of initiation (odds ratio [OR] = 1.30, $p=0.010$ and OR = 0.94, $p=0.007$, respectively). Lower levels of depressive symptoms (OR = 0.95, $p=0.039$) and higher levels of prenatal stress (OR = 1.11, $p=0.042$) increased the likelihood of initiating breastfeeding. No difference between groups emerged, although women in the intervention group with more home visit time were more likely to report breastfeeding ($p=0.007$).
Conclusions: Modifiable risk factors were associated with rates of breastfeeding initiation. It may be possible to use protocols delivered via nurse-midwife home visits within a global intervention to increase breastfeeding initiation.

Introduction

American women are initiating breastfeeding at ever-increasing rates. Between 1997 and 2009, the rate of new mothers who reported breastfeeding increased from 47.8% to 77%.[1] This jump in breastfeeding initiation has made achieving the goal of 82% set by Healthy People 2020 within our reach.[2–4] Sociodemographic factors may impact whether a woman initiates breastfeeding or not.[5,6] Low-income and younger (<20 years old) African-American women have the lowest rates of breastfeeding initiation among all women (37% and 30% respectively),[3] whereas married women and multiparous women are more likely to initiate breastfeeding.[7,8] Health factors and behaviors such as smoking, depressive symptoms, and being overweight or obese have been linked with lower rates of breastfeeding initiation.[7–12] Prior studies have primarily focused on postpartum depressive symptoms and maternal–child outcomes, with limited works evaluating the relationship between prenatal mood and breastfeeding.[13] Only recently have possible relationships between prenatal maternal psychosocial factors—such as depressive symptoms, stress, and anxiety—and breastfeeding emerged.[10,13] Findings, however, are inconsistent. Some results suggest that women with higher prenatal depressive symptoms are less likely to plan and/or initiate breastfeeding,[13–15] whereas others report no association with breastfeeding initiation, but rather an association with a shorter duration of breastfeeding.[16,17]

From recent meta-analyses and systematic reviews, four types of programs have been related to higher breastfeeding initiation.[18–21] These include educational sessions, lay support, Baby-Friendly Hospital status, and Baby-Friendly training of hospital staff. The primary component of the most influential interventions is the provision of individualized support and education.[20]

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Despite the abundance of studies to support interventions that encourage breastfeeding initiation, there is limited work related to the impact of these interventions on specific groups of mothers, such as multiparous women. Given that approximately 60% of infants in the United States are born to women in their second or later pregnancies,[22] directing interventions toward multiparas is important to achieve the Healthy People 2020 goal. Furthermore, most efforts to promote breastfeeding do not consider the social, psychosocial, and health factors that may encourage or hamper breastfeeding initiation. To further refine our intervention efforts, we must better understand the combined impact these factors have on breastfeeding initiation. This report presents findings from a secondary analysis to investigate whether enhanced prenatal care via nurse-midwife home visits increased breastfeeding initiation. We examined breastfeeding initiation rates and factors related to breastfeeding initiation in a subsample of multiparous women participating in a randomized clinical trial.

Subjects and Methods

Study design

Data for this secondary analysis were collected in a larger study testing a system of care designed to improve birth outcomes in pregnant women with a history of a preterm birth (i.e., increase the gestational age of the infant in the current study from a prior preterm birth and improve maternal and infant health indicators). The main study used a prospective, randomized experimental design composed of two groups: control (standard prenatal care) and intervention (standard prenatal care augmented with home visits conducted by a nurse-midwife). This larger study recruited from a population of multiparous women who were receiving prenatal care with a provider (physician or nurse-midwife) at a university medical center in the Southeastern United States from April 2007 through January 2010. Eligible women had to be less than 24 weeks of gestation, have a history of a preterm birth (i.e., live birth >20 weeks and <37 weeks of gestation), speak and read English, live within 90 miles of the medical center, be willing to accept nurse home visits, and be willing to be randomly assigned to a study group. The study was approved by the Vanderbilt University Institutional Review Board.

The intervention component of the main study incorporated home visits that were guided by standardized protocols. The protocols were designed to decrease malleable risk factors associated with preterm birth and were based on current evidence for effective behavioral and supportive interventions. These protocols guided the nurse home visits and augmented standard prenatal care through 48 hours postpartum. A series of at least four home visits included assessment and intervention for depressive symptoms, maternal infections, dental health, stress, substance use, reproductive life planning, domestic violence, smoking, breastfeeding, and internatal care (e.g., well-woman gynecologic care, nutrition, and exercise). Each protocol was designed to direct the initial evaluation and continued assessment of each factor throughout the prenatal period. Based on each assessment, a plan for intervention was developed, which included standard health education information related to the factor, referral sources as needed, and follow-up actions for the participant and/or nurse interventionist. Study protocols and the individual needs of each participant determined the number of additional home visits.

Specific to the breastfeeding protocol, the nurse interventionist assessed a woman's breastfeeding history, reasons for not breastfeeding and/or discontinuing, and any difficulties that the participant may have previously experienced. Depending on a woman's responses and her immediate plan to breastfeed her current infant, the nurse interventionist was prompted to address standard health education regarding breastfeeding (e.g., benefits, risks of not breastfeeding, and plans to address previous difficulties). This standardized approach was followed by the nurse interventionist working with each woman to address her individual concerns that impeded previous breastfeeding, such as inverted nipples. If a woman reported that she was not interested in breastfeeding, the protocol directed the nurse interventionist to continue to engage the client in a supportive, nonjudgmental manner and to continue to address plans for infant feeding, including breastfeeding, at each successive visit.

Sample

The sample used for this secondary analysis was limited to women who delivered an infant who was greater than 35 weeks of gestation and spent the postpartum period exclusively in the normal newborn nursery ($n=130$). Younger premature infants and infants admitted to the neonatal intensive care unit were excluded to control for medical factors that may have influenced the women's ability to initiate breastfeeding.

Procedure

For the current study, we derived de-identified data from the main study database. All participants in the main study completed standardized interviews during the prenatal course and at 48 hours postpartum. The interviews included standardized measures used in previous perinatal research and practice to assess several psychosocial, behavioral, and environmental risk factors associated with maternal–child health outcomes. The nurse interventionists completed the measures with participants in the intervention group at scheduled home visits, whereas participants in the control group completed the interviews via phone interviews conducted by trained research assistants. For the purpose of this secondary analysis, sociodemographic data collected at the baseline interview were used, along with measures of psychosocial risk factors (i.e., depressive symptoms, stress) that were collected later in pregnancy, closer to time of delivery, at approximately 30 and/or 34 weeks gestation.

Study measures

Personal and sociodemographic characteristics used in this study include maternal age, identified ethnic group, marital status, household income, and level of education. Maternal body mass index (BMI) (kg/m^2) was calculated from each woman's self-reported height and prepregnancy weight using the Centers for Disease Control and Prevention calculator.[23]

Breastfeeding history and intention. At baseline, all participants were asked a set of questions about their prior experience with breastfeeding and intention to breastfeed this

infant. At the 48-hour postpartum interview, participants were asked how they were currently feeding their infant. Women who indicated that they were solely breastfeeding (including pumping) and/or reported both breastfeeding and formula feeding were coded as having initiated breastfeeding, whereas women who indicated only formula feeding were coded as not initiating breastfeeding. Women who reported not initiating breastfeeding their infant were asked an additional forced choice question for the reason that they did initiate breastfeeding.

Depressive symptoms. Depressive symptoms were measured with the 20-item Center for Epidemiologic Studies-Depression Scale (CES-D).[24] Using a 4-point scale ranging from rarely or none of the time (0) to most or all of the time (3), respondents are asked to rate symptoms experienced during the prior week. A score is computed by reversing the ratings for the four positive items and then summing the ratings of all items, resulting in scores ranging from 0 to 60. A cutoff score of 16 is commonly used to distinguish those who are highly symptomatic.[25,26] High internal consistency for the CES-D has been reported, ranging from 0.84 to 0.90.[24,26,27] Cronbach's α for the CES-D scores in the sample used for this study was 0.92.

Maternal social stressors. Maternal social stressors during pregnancy were assessed with a modified version of the 11-item Prenatal Psychosocial Profile,[28,29] which uses a 4-point scale ranging from "not bothered at all" (0) to "bothered a great deal" (3) to assess 18 potential socioenvironmental stressors. We modified the scale to assess specific worries (e.g., worries about food and worries about shelter) that were originally grouped as single questions (e.g., worries about food, shelter, and transportation). Thus, our version of the scale had 18 items. The summed item scores create an index of stress with higher scores reflecting higher levels of stress. The range of possible scores is 0–54. Cronbach's α for the scores in this study was 0.79, similar to that in other studies.[30]

Data analysis

All statistical summaries and analyses were conducted using SPSS version 20 software (SPSS, Inc., Chicago, IL). Frequency distributions resulting in counts and percentages were used to summarize the nominal and ordinal participant characteristics. To test for differences in those characteristics between the group of mothers who had initiated breastfeeding at 48 hours postpartum and the group who did not, χ^2 tests of independence were used. Years of age were summarized via mean and SD; however, years of education and all other continuous study measures had slightly to severely skewed distributions. Therefore, those were summarized using medians and the 25^{th}–75^{th} interquartile range (IQR). Between-group comparisons for continuous variables were conducted using Mann–Whitney tests. Tests of differences among rates of past, planned, and 48-hour breastfeeding used χ^2 tests of independence. Single variable (or unadjusted) associations (odds ratios [ORs]) of study variables with breastfeeding at 48 hours postpartum were generated using univariate logistic regression. Although the sample is small for a rigorous test of adjusted associations, one was conducted by including all of the study variables in a single multiple regression analysis. A p value of 0.05 was used for determining statistical significance.

Results

Summaries of the sample demographic characteristics, stressful life events, and depressive symptoms are presented in Table 1. On average, the women were approximately 27 years of age with a median education level of high school. Approximately half reported household incomes less than or equal to $25,000 in the past year. Reflecting the population from which the sample was recruited approximately, 65% were white. Half of the women reported a prepregnancy BMI that defined them as either overweight or obese ($\geq 25\ kg.m^2$). There were no statistically significant differences between the groups in these characteristics with the exception of the prenatal stress measure ($p = 0.001$). Greater stress was reported by the women in the intervention group (Table 1).

Past, planned, and observed breastfeeding

A majority of the 130 women in the subsample (control, $n = 40$ [70.2%]; intervention, $n = 46$ [63.0%]; $p = 0.392$) had breastfed in the past, and 85% ($n = 111$) intended to breastfeed again. The proportion of women in the intervention group intending to breastfeed was much higher than the control group. Almost 92% of the intervention group and 77% of the

Table 1. Sample Characteristics ($N = 130$)

Characteristic	*Total* (n = *130)*	*Control* (n = *57)*	*Intervention* (n = *73)*	p *value*
Race black/African-American	45 (34.6)	17 (29.8)	28 (38.4)	0.309
Income <$25,000 (past year?)	66 (50.8)	30 (52.6)	36 (49.3)	0.707
Married (baseline)	63 (48.5)	28 (49.1)	35 (47.9)	0.894
Any smoking prenatally	23 (17.7)	10 (17.5)	13 (17.8)	0.969
Age (years)[a]	27.5 (5.3)	28.3 (5.2)	26.9 (5.4)	0.117
School years completed[b]	12.0 (12, 15)	12.0 (12, 15)	12.0 (12, 15)	0.717
Depressive symptoms (CES-D Scale)[b]	10.0 (20, 27)	9.0 (5, 18)	11.0 (5, 21)	0.796
Prenatal social stressors (PPP Scale)[b]	22.0 (20, 27)	21.0 (18, 24)	24.0 (20, 29)	0.001
Pregravida BMI (kg/m^2)[b]	25.1 (21, 32)	25.6 (20, 35)	25.0 (22, 31)	0.641

Data are number (%) unless indicated otherwise.
[a]Mean (standard deviation) values.
[b]Median (interquartile range).
BMI, body mass index; CES-D, Center for Epidemiologic Studies-Depression; PPP, Prenatal Psychosocial Profile.

Table 2. Past, Planned, and 48-Hour Breastfeeding by Study Group ($N=130$)

		Actual breastfeeding at 48 hours postpartum					
		Total		*Control*		*Intervention*	
Breastfeeding history	*Intention to breastfeed*	*No* (n = *46*)	*Yes* (n = *84*)	*No* (n = *23*)	*Yes* (n = *34*)	*No* (n = *23*)	*Yes* (n = *50*)
No	No	15 (11.5)	0 (0.0)	9 (15.8)	0 (0.0)	6 (8.2)	0 (0.0)
	Yes	19 (14.6)	10 (7.7)	6 (10.5)	2 (3.5)	13 (17.8)	8 (10.9)
Yes	No	2 (1.5)	2 (1.5)	2 (3.5)	2 (3.5)	0 (0.0)	0 (0.0)
	Yes	10 (7.7)	72 (55.4)	6 (10.5)	30 (52.6)	4 (5.5)	42 (57.5)

Data are number (%).

control group intended to breastfeed ($p=0.019$). At 48 hours postpartum, only 64.6% ($n=84$) of the total sample were breastfeeding (control, $n=34$ [59.6%]; intervention, $n=50$ [68.5%]; $p=0.295$). The most common reasons that mothers reported not initiating breastfeeding included having heard negative things about breastfeeding (18.7%), illness (16%; self or the infant), past negative experiences (13%), having to care for other children (5.3%), and going back to work (4%). Detailed summaries of breastfeeding history, intention, and actual breastfeeding at 48 hours postpartum by study group are given in Table 2.

Variable associations with 48-hour breastfeeding

Associations of the study variables with breastfeeding at 48 hours postpartum are summarized in Table 3. Before controlling for the correlations among the multiple independent variables, single-variable analyses indicated that African-American women were less likely to initiate breastfeeding than white women (OR = 0.36, $p=0.007$), as were women with higher pregravid BMI levels ($p=0.027$) (no breastfeeding, median = 26.0 kg/m^2, IQR = 21–35 kg/m^2; breastfeeding, median = 25.1 kg/m^2, IQR = 21–29 kg/m^2). The likelihood of initiating breastfeeding was greater with increasing age (OR = 1.12, $p=0.004$) (no breastfeeding, median = 25.0 years, IQR = 22–28 years; breastfeeding, median = 29.0 years, IQR = 24–33 years) and education level (OR = 1.60, $p<0.001$) (no breastfeeding, median = 12.0 years, IQR = 11–12 years; breastfeeding, median = 14.0 years, IQR = 12–16 years). Study group assignment did not contribute to breastfeeding initiation.

In this small sample, after controlling for known associations among the independent variables, maternal education and pregravid BMI levels remained statistically significant

Table 3. Unadjusted and Adjusted Associations with 48-Hour Breastfeeding ($N=130$)

	Analysis				
		Single variable			
Characteristic	*Frequency* [n *(%)*]	*OR*	*95% CI*	p	*Multivariate* p
Study group					
Control[a]	34 (59.6)				
Intervention	50 (68.5)	1.47	0.71–3.03	0.296	0.547
African-American					
No[a]	62 (72.9)				
Yes	22 (48.9)	0.36	0.17–0.76	0.007	0.247
Annual income					
≤ $25,000[a]	30 (45.5)				
> $25,000	54 (84.4)	0.15	0.07–0.35	0.154	0.093
Married					
No[a]	39 (58.2)				
Yes	45 (71.4)	1.80	0.86–3.73	0.117	0.093
Smoking					
No[a]	73 (68.2)				
Yes	11 (47.8)	0.43	0.17–1.07	0.068	0.161
Pregravida BMI		0.95	0.90–0.99	0.027	0.007
Age (years)		1.12	1.04–1.21	0.004	0.672
Education (years)		1.60	1.28–2.01	< 0.001	0.010
Prenatal social stress (PPP scale)		1.01	0.94–1.07	0.887	0.042
Depressive symptoms (CES-D scale)		0.97	0.94–1.00	0.076	0.039

For the multivariate model: $\chi^2_{(df=10)}=46.46$, $p<0.001$.

[a]Referent category for the variable in the logistic regression models.

BMI, body mass index; CES-D, Center for Epidemiologic Studies-Depression; CI, confidence interval; OR, odds ratio; PPP, Prenatal Psychosocial Profile.

(OR = 1.30, $p = 0.010$ and OR = 0.94, $p = 0.007$, respectively). In addition, increased levels of prenatal stressors (OR = 1.11, $p = 0.042$) and decreased numbers of depressive symptoms (OR = 0.95, $p = 0.039$) increased the likelihood of initiating breastfeeding (Table 3).

Within-intervention group: post hoc analysis

Women within the intervention group received nurse home visits; however, length of time in the study and contact with the nurse-midwife differed for each participant. Therefore, an analysis of the association of nurse-midwife contact with initiation of breastfeeding within the intervention group was conducted. No statistically significant differences emerged between the participants who had initiated breastfeeding and those who had not in terms of the total length of time in the study ($p = 0.647$). Median prenatal time in the study for those who had initiated breastfeeding was 23 weeks (minimum, 12 weeks; maximum, 33 weeks), whereas for those who had not it was 22 weeks (minimum, 15 weeks; maximum, 31 weeks). A closer examination of total time spent in home visits revealed participants who initiated breastfeeding had experienced considerably more time with the nurse-midwife interventionist in home visits per 4 weeks of time (median, 80 minutes; IQR, 54–99 minutes) than did participants who were not breastfeeding at 48 hours postpartum (median, 52 minutes; IQR, 42–67 minutes) ($p = 0.007$).

Discussion

Our findings add further understanding of how social, psychosocial, and health factors relate to breastfeeding and provide new insight for future interventions to promote breastfeeding initiation, in particular with multiparous women. Our work suggests that the duration of prenatal home visits by nurse-midwives is associated with increasing the likelihood of multiparous women initiating breastfeeding. Breastfeeding initiation rates were not statistically significantly different between the control and intervention groups; however, within the intervention group, women who had longer visits were more likely to initiate breastfeeding than women who spent less time with a nurse-midwife. This finding supports prior findings that individualized, informal breastfeeding interventions are the most effective in increasing initiation rates.[20] Women who had greater contact with their nurse interventionist may have had more opportunity to establish a relationship that was supportive of their decision to initiate breastfeeding. More work is needed to better understand what components of the longer visits had the most impact on breastfeeding initiation and how this may relate to the subsequent duration of breastfeeding. Although breastfeeding was one protocol that the nurse-midwives addressed, considerable time was also spent discussing multiple contributors to the participant's health such as nutrition, emotional concerns, and the pregnancy itself. Focus on such issues, rather than discussion of breastfeeding per se, might have influenced the choice to breastfeed. Future studies should be developed that can measure and control for the "dose" of the intervention for specific risk factors to enable investigators to identify what features of this intervention may have the most influence on breastfeeding.

As we hypothesized, several psychosocial factors were found to be associated with breastfeeding initiation. Of interest was the unexpected finding that higher levels of prenatal social stressors were associated with breastfeeding initiation. To date, there is limited evidence of the relationship of perceived stress in the prenatal period and breastfeeding initiation.[10] The timing of our assessment may have influenced women's reports of their stressors. We collected these data once, at about 30 weeks of gestation. Responses may be indicative of the hectic daily nature of women's lives, or the overall stress of pregnancy. It is also possible that women in our study may have been more inclined to initiate breastfeeding because many had previously experienced benefits of breastfeeding that include increased physical and psychological health.[31] Previous reports suggest a strong association between continued breastfeeding and lower self-reported stress levels in the postpartum period.[31] Thus, within our sample, higher reports of perceived stress may not necessarily be a negative indicator. Women may just be acknowledging the numerous stressors they are facing, as part of a positive adaptive response, helping them begin to prepare for the transition of a new infant being born.

Women who reported lower depressive symptoms were also more likely to have initiated breastfeeding, which is consistent with other findings in the literature.[10,15] Although our study did confirm a significant relationship between prenatal depressive symptoms and breastfeeding initiation, more work is needed to further explain other factors that may be confounding, mediating, or moderating this relationship. This would help to explain the conflicting findings of no relationship in some reports.[13] Similar to reports of stress levels, timing of assessment may play a role in this relationship. Depressive symptoms were assessed later in the pregnancy (at either 30 or 34 weeks of gestation), after women had already spent considerable time in the study. Our analysis did not take into account the "dose" or aspects of the intervention that may have occurred or examine trends over time. Elucidating this detail should be included in future efforts.

Finally, our findings support previous reports that modifiable health factors, such as those that might impact pregravid BMI, may also influence women's breastfeeding initiation. Focused interventions that address individual and home environmental factors that impact women's weight, and thus overall health, may lead to higher rates of breastfeeding initiation. As expected, most women who had previously breastfed chose to initiate breastfeeding. Those few who chose not to breastfeed this infant may have had concerns regarding return to work, caring for other young children at home, or negative past breastfeeding experiences.[32,33] The use of secondary data limited our ability to explore specific concerns. More in-depth inquiry is needed to better understand specific concerns and barriers that can be addressed in future interventions.

Limitations

This report is a secondary analysis. The eligibility criteria for the main study sample limit the generalizability of results to mothers with a prior preterm birth. Although this sample provides a unique perspective on multiparas' breastfeeding initiation, generalization of the findings to primiparous and multiparous women without a prior preterm birth cannot be assumed. Furthermore, although encouragement of breastfeeding was a component of the intervention, it was not a primary outcome for the main study, nor was this study an

independent investigation of that outcome. By the very nature of a randomized control trial, something is being systematically offered (or administered) to one subset of the participants and not to the other. We attempted to control for this by including the intervention as a variable in the regression analysis. Nevertheless, the possible unintended effects and/or bias (as applied to this secondary analysis) are largely unknown. Within the intervention group, the finding that there may be a critical amount of time spent in visits that may encourage women's breastfeeding initiation, however, provides new direction for the advancement of current or future interventions.

Conclusions

This study identified two factors that appear to influence breastfeeding initiation in multiparous women: lower levels of depressive symptoms and higher levels of prenatal psychological stressors. Reaching the Healthy People 2020 goal of seeing 82% of infants breastfed is within reach, although efforts to understand factors associated with breastfeeding and how health professionals can support breastfeeding initiation must continue. Lastly, study findings suggest prenatal home visits by nurse-midwives may be a particularly useful intervention to support breastfeeding initiation.

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Disclosure Statement

No competing financial interests exist.

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