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Publication Date


2021

DOI

10.1177/2333794x2111062439

Peer reviewed

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Global Pediatric Health
Volume 8: 1–8
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DOI: 10.1177/2333794X211062439
journals.sagepub.com/home/gph


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Abstract

Understanding modifiable factors related to breastfeeding initiation and duration is critical to increase breastfeeding rates. Maternal parenting confidence is a modifiable factor whose association with breastfeeding duration has not previously been investigated. In a retrospective cohort of 1023 mother-infant dyads, the association between maternal confidence and breastmilk feeding at 6 and 12 months of age were analyzed. The association of breastmilk frequency categories and maternal confidence score at 6 and 12 months was examined using multinomial logistic regression stratified by race, ethnicity, and adjusted for gestational age. We found that breastmilk feeding frequency at 6 months was negatively associated with the maternal confidence score. After stratification by ethnicity, the association was no longer significant. There was no association between human milk feeding frequency at 12 months and maternal confidence score at 12 months. Our results demonstrate the need for additional research to identify modifiable factors to increase breastfeeding rates.

Keywords

breastfeeding, maternal confidence, breast milk, infant feeding

Received July 8, 2021. Accepted for publication November 3, 2021.

Background

The health benefits of breastfeeding have been shown beneficial to both mother and infant. Breastfeeding has a dose-response benefit of reduced risk of acute otitis media, asthma, atopic dermatitis, diabetes, gastroenteritis, leukemia, obesity, necrotizing enterocolitis, severe lower respiratory tract infections, and sudden infant death syndrome.^{1,2} For mothers, the benefits of breastfeeding include decreased incidence of diabetes and cardiovascular disease,³ rheumatoid arthritis,⁴ and ovarian and breast cancers.⁵ Because of the immense benefits to both mother and infant, the American Academy of Pediatrics (AAP) recommends exclusive breastfeeding until 6 months of age for all infants.¹ While rates of breastfeeding initiation in our country have improved and currently are 83.2%⁶ we remain far from the AAP recommendation of exclusive breastfeeding at 6 months. According to the 2020 Breastfeeding Report Card, rates

of any and exclusive breastfeeding at 6 months in the United States is 58.3% and 25.6%, respectively.¹³ Given the benefits of breastfeeding and high rates of initiation, it is troublesome that many mothers do not reach their breastfeeding goals.

So, why are so many mothers the United States weaning early? Many factors are thought to be associated

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How confident do you feel in your parenting role? (Check appropriate box)

	Never	Seldom	Sometimes	Often	Always
1. I know when my baby wants me to play with him/her.					
2. I know how to take care of my baby better than anyone else.					
3. When my baby is cranky, I know the reason.					
4. I can tell when my baby is tired and needs to sleep.					
5. I know what makes my baby happy.					
6. I can give my baby a bath.					
7. I can feed my baby adequately.					
8. I can hold my baby properly.					
9. I can tell when my baby is sick.					
10. I feel frustrated taking care of my baby.					
11. I would be good at helping other mothers learn how to take care of their infants.					
12. Being a parent is demanding and unrewarding.					
13. I have all the skills needed to be a good parent.					
14. I am satisfied with my role as a parent.					

Figure 1. Maternal confidence scale.

with early weaning including lack of support for the mother-infant dyad from her family, healthcare team, employer, and more broadly, the society in which she lives.⁷ In general, the evidence has shown that mothers who are young, low income, single, or recently immigrated are vulnerable to poor breastfeeding outcomes.⁸ Personal factors that influence breastfeeding are thought to be related to maternal intention to breastfeed, interest, and confidence.⁹ Confidence in relation to intention to breastfeed has been shown in prior studies to be an important predictor of breastfeeding outcomes. In a study of premature infants less than 35 weeks, Wooldridge et al found that maternal confidence, using the Maternal Confidence Questionnaire (MCQ)¹⁰ was higher in mothers who exclusively breastfed, but that difference disappeared after the first 4 weeks of life.¹¹ A more recent study related the maternal breastfeeding self-efficacy (BFSE) score to the Maternal Self-Efficacy in the Nurturing Role Questionnaire (SENQR) and found that higher breastfeeding self-efficacy scores were related to higher maternal self-efficacy scores at 3 months post-partum.¹² However, that work was limited by its exclusion of women who never breastfed. No study, to our knowledge, has examined the long-term relationship between infant feeding and maternal parenting confidence up to 12 months of infant age. Therefore, the objective of our study was to examine the association between maternal confidence and breastmilk feeding frequency and duration in an ethnically diverse population. We hypothesized that any breastfeeding

would be associated with higher maternal confidence scores and that frequency and duration would be associated with greater maternal confidence in a dose-response fashion.

Methods

This study was part of the “The First 1000 Days of Life and Beyond” longitudinal cohort study which was designed to identify clinical, genomic, and environmental risk factors that may enhance our understanding of childhood health outcomes. The cohort participants were recruited from a large multicenter hospital system in a major metropolitan area of the United States. Our region of the United States has higher breastfeeding initiation, duration, and exclusivity of breastfeeding compared to the national data.⁶

The study reported in this manuscript is a cross-sectional study of 1023 children from the cohort in which parents had completed surveys when their child was 6 and 12 months. Women of the children were invited to participate in the cohort if they were pregnant with a singleton gestation, over 18 years of age, and willing to continue participation in a longitudinal survey. Participants were excluded from our analysis if the gestation was a multiple birth due to well described breastfeeding challenges in that population.¹⁴

Maternal confidence questions were based on the MCQ¹⁰ developed by Parker and Zahr (Figure 1). The tool consists of fourteen questions with answers on a

Likert 5-point scale (never . . . always). Scores range from 14 to 70 with a higher score indicating a higher degree of parenting confidence and ability to recognize the needs of the infant. Nutritional data were collected via the use of a food frequency questionnaire which was adapted from the Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System questionnaire.¹⁵ Breastfeeding and infant feeding practices data were asked with the following question, “In the past 7 days, how often was your baby fed each food listed below? Include feedings by everyone who feeds the baby and include snacks and night-time feedings.” For all liquid feeds (water, formula, direct breastfeeding, expressed breast milk, juice) responses were then grouped by frequency of breastmilk feeds. Breastmilk feeding frequency was categorized as Exclusive (100% breastmilk fed), Primarily (>80% breastmilk feeds), High partial (50%-79% breastmilk feeds), Medium partial (20%-49% breastmilk feeds), Low partial (5%-19% breastmilk feeds) and Token or comfort feeds (\leq 4% breastmilk feeds or no human milk).¹⁶ Demographic information including age, race, ethnicity, parity, household income, highest level of education, and maternal birth country was collected and described.

Recruitment for this study was from 2012 to 2016 with analysis of these data beginning in 2016. Informed consent was obtained by trained research study staff members. Data were collected at enrollment during pregnancy, 6 months of child age, and 12 months of child age by parental completion of an email or paper survey. Participant confidentiality was maintained by deidentification of protected health information and all study data and data were kept secure in a password encrypted database. Characteristics of the study cohort and continuous data of breastmilk frequency, breastmilk feeding categories and maternal confidence scores at 6 and 12 months were described as mean, standard deviations, and frequencies for continuous and categorical variables respectively. Furthermore, we compared demographic, clinical factors, maternal confidence, and breastmilk feeding practices between Hispanic and non-Hispanic White women. The decision to compare Hispanic and non-Hispanic White women was made as prior work has demonstrated stark differences in breastfeeding initiation and duration by race and ethnicity.^{17,18} Multinomial logistic regression analysis was performed to calculate odds ratios (ORs) with 95% confidence intervals (CIs) for association of the frequency of breastmilk feeds and the maternal confidence score at 6 and 12 months adjusting for gestational age. The association of the frequency of breastmilk feeds and the maternal confidence score was examined at 6 and 12 months stratified by ethnicity. Data were analyzed using SAS 9.4 software.¹⁹

Ethical Approval and Informed Consent

Prior to study enrollment, the institutional review board at the Inova Fairfax Hospital provided approval for this cohort study in March 2016 (IRB File # 15-1804). Informed consent was obtained from each participant prior to study enrollment.

Results

Of the 1023 mothers included, the average maternal age was 31.8 years, 361 were Hispanic, 662 were non-Hispanic White, and 65.4% were multiparous women (Table 1). About 61.5% and 35.6% of participants were giving their infant any human milk at 6 and 12 months respectively. Of these participants, 2.9% were exclusively breastfeeding at 6 months. At 12 months, 0.6% were exclusively feeding with breastmilk (no formula, milk, or juice) and complementary foods. The vast majority of participants who were breastfeeding at 6 and 12 months were offering token or comfort feeds (38.5% and 64.4%). Maternal confidence mean score at 6 months was 63.5 (\pm 4.4) and at 12 months was 63.2 (\pm 4.4). Demographic information, maternal confidence, and breastmilk feeding frequency and duration were compared between children of Hispanic and non-Hispanic White women. Ethnicity was identified as a confounding variable as Hispanic women had significantly higher confidence scores at 6 and 12 months and significantly lower breastmilk feeding frequency at 6 months when compared to non-Hispanic White women (Table 2).

The breastmilk frequency category of high-partial (50%-79% of liquid diet is breastmilk) and primarily (>80% breastmilk feeds) was significantly associated with a lower maternal confidence score at 6 months (high-partial OR 0.93 [95% CI 0.89-0.95] and primarily OR 0.94 [95% CI 0.90-0.98]). However, after stratification by ethnicity the association was no longer significant. At 12 months of age, the frequency of breastmilk feeds was not associated with the maternal confidence score at 12 months. Ethnicity was identified as a confounding variable as it was correlated to breastmilk frequency at 6 months (17.8 breastfeeds per week in Hispanic women vs 27.0 feeds per week in non-Hispanic White women, $P < .0001$) and maternal confidence at 6 months (65.4 in Hispanic women vs 62.4 in non-Hispanic White women, $P < .0001$).

Discussion

Maternal Confidence

We found that breastfeeding frequency and exclusivity was not associated with maternal confidence. To

Table 1. (a) Characteristics of Study Participants (by means).

Characteristics	All participants (n = 1023)
	Mean (\pm SD)
Breast milk frequency/week at 6M	23.8 (22.4)
Breast milk frequency/week at 12M	9.4 (14.7)
Maternal confidence at 6M	63.5 (4.4)
Maternal confidence at 12M	63.2 (4.4)
Mother's age	31.8 (4.7)

(b) Characteristics of Study Participants (by frequencies).

Characteristics	All participants (n = 1023)	All participants (n = 1023)
	Frequency	%
Breast milk frequency by category at 6M		
Exclusive	30	2.9
Primary	109	10.7
High partial	257	25.1
Medium partial	199	19.5
Low partial	34	3.3
Token or comfort feeds	394	38.5
Missing	0	0
Breast milk frequency by category at 12M		
Exclusive	6	0.6
Primary	17	1.7
High partial	132	12.9
Medium partial	173	16.9
Low partial	36	3.5
Token or comfort feeds	659	64.4
Missing	0	0
Gender of infant		
Male	504	49.3
Female	519	50.7
Missing	0	0
Parental concern about baby weight at 6M		
Missing	44	4.3
Missing	0	0
Any medical condition or disorder at 6M		
Missing	89	8.7
Missing	0	0
Is child regularly cared outside of home at 6M		
Missing	383	37.4
Missing	0	0
Parental concern about baby weight at 12M		
Missing	43	4.2
Missing	0	0
Diagnosed with medical condition or disorder at 12M		
Missing	69	6.7
Missing	0	0
Is child regularly cared outside of home at 12M		
Missing	424	41.5
Missing	0	0
Parity		
I	354	34.6
>I	669	65.4
Missing	0	0

(continued)

Table 1. (continued)

Characteristics	All participants (n= 1023)	All participants (n= 1023)
	Frequency	%
Race/Ethnicity		
Not Hispanic or Latino White	662	64.7
Hispanic or Latino	361	35.3
Missing	0	0
Household income		
<\$25 000	160	15.6
\$25 000-\$49 999	53	5.2
\$50 000-\$74 999	45	4.4
\$75 000-\$99 999	71	6.9
\$100 000-\$149 999	185	18.1
\$150 000-\$199 999	174	17.0
\$200 000-\$249 999	108	10.6
>\$250 000	87	8.5
Missing	140	13.7
Maternal education		
Completed less than the 11th grade	129	12.6
High school graduate/GED	115	11.3
Some college	61	6.0
Associates degree	36	3.5
Bachelor's degree	310	30.3
Master's degree	264	25.8
Doctorate/higher level of education	81	7.9
Missing	27	2.6
Maternal occupation		
Management, professional, and related occupations	508	49.7
Service occupations	99	9.7
Construction, maintenance, repair occupations	2	0.2
Agricultural occupations	1	0.1
Sales, office occupations	37	3.6
Homemaker	329	32.1
Missing	47	4.6

our knowledge, this is the largest study to examine the association of maternal confidence and breastmilk feeding frequency in infants up to 12 months. In a prior study (n=20), Wooldridge and Hall demonstrated that higher scores on the maternal confidence questionnaire predicted breastfeeding frequency in the first week of life. This relationship diminished by 4 weeks following delivery.¹¹ In addition, the relationship between maternal parenting confidence with use of the MCQ (Figure 1) and breastfeeding at 6 and 12 months had not been described. We explored the MCQ and its relationship to feeding practices because breastfeeding success, in particular exclusive breastfeeding, depends on prompt recognition of infant feeding cues. Maternal intention to breastfeed has

been demonstrated to be an important predictor of breastfeeding exclusivity and duration,^{20,21} and can be assessed with use of the Breastfeeding Self-Efficacy Scale (BSES).²² However, the breastfeeding self-efficacy scale asks mothers about intention to breastfeed, not parenting behaviors. While we had theorized that breastfeeding mothers would have more confidence in parenting, we have found no association between these two aspects of raising an infant.

Maternal Ethnicity

In our study population, we found ethnicity was a confounding factor in the relationship between breastfeeding and maternal confidence. Prior qualitative work by

Table 2. (a) Characteristics of Study Cohort by Hispanic and Non-Hispanic White Women.

Characteristics	Race/ethnicity, mean (\pm SD)		P-value
	Non-Hispanic white (n = 662)	Hispanic (n = 361)	
Breast milk frequency/week at 6M	27.0 (21.8)	17.8 (22.2)	<.0001
Breast milk frequency/week at 12M	10.3 (14.8)	7.7 (14.2)	.007
Maternal confidence at 6M	62.4 (4.3)	65.4 (3.9)	<.0001
Maternal confidence at 12M	62.3 (4.2)	65.0 (4.4)	<.0001
Maternal age	32.8 (3.8)	29.9 (5.5)	<.0001
Gestational age	38.7 (1.6)	38.6 (1.6)	.6

(b) Characteristics of Study Cohort by Hispanic and Non-Hispanic White Women.

Characteristics	Race/ethnicity, frequency, and %				P-value
	Non-Hispanic white (n = 662)		Hispanic (n = 361)		
Gender of infant					
Male	335	50.6	169	46.8	.2
Female	327	49.4	192	53.2	
Parental concern about baby weight at 6M	27	4.1	17	4.7	.4
Any medical condition or disorder at 6M	72	10.9	17	4.7	.009
Is child regularly cared outside of home at 6M	296	44.7	87	24.1	<.0001
Parental concern about baby weight at 12M	25	3.8	18	5.0	.2
Diagnosed with medical condition or disorder at 12M	60	9.1	9	2.5	.0005
Is child regularly cared outside of home at 12M	320	48.3	104	28.8	<.0001
Parity					
I	275	41.5	78	21.6	<.0001
>I	387	58.5	283	78.4	

McLemore et al²³ showed that Black and Hispanic women have high confidence in parenting practices. However, it is unknown how race and ethnicity contributes to parenting confidence. Hispanic women in our population had higher confidence and lower rates of breastfeeding. US national data from the National Immunization Survey demonstrated that breastfeeding rates in US Hispanic women have increased and that US Hispanic women have higher rates of breastfeeding initiation and duration than all other groups.²⁴ This trend, however, was not reflected in our participants. One potential explanation for low breastfeeding rates in Hispanic women in our population could be secondary to the degree of acculturation of the participants. Prior work has demonstrated that with increasing acculturation, breastfeeding rates decline in Hispanic women.²⁵ In our population, 42% of participants were born outside of the US, compared to national trends of 13.6% of the US population being foreign-born,²⁶ which may have contributed to disparities in breastfeeding rates compared to national data.

Limitations

Our study is limited by its generalizability, as a majority (54.2%) of our participants were high income earners (more than \$100 000 income per year) and had obtained their bachelor's degree (more than 60%) or higher. Because our study was a retrospective cohort, it is challenging to make direct inference between maternal confidence and breastfeeding practices at 6 and 12 months. Furthermore, due to survey design, whether a child was directly breastfed at the breast versus receiving expressed breastmilk through bottle feeding could not be differentiated. Data was collected by parental reported rather than by observation, which may be less reliable.

Conclusion

Our study demonstrates that maternal confidence is not related to breastfeeding frequency or duration. The lack of association between maternal confidence and breastfeeding frequency and duration up to the 12th month

demonstrates the need for additional research to pinpoint modifiable factors that ultimately link breastfeeding women together in an effort to promote increased breastfeeding rates.

Authors' Note

This work was presented as a poster at the American Academy of Pediatrics National Conference and Exhibition in October 2018.

Acknowledgments

Our research group Inova Hospital expresses its appreciation all participants in "The First 1000 Days of Life and Beyond" longitudinal cohort study based in the Inova Health System in Falls Church, Virginia. We also thank Fairfax County which has supported institutional research projects with annual funding from its Contributory Fund (Fund 10030).

Author Contributions

Adrienne Hoyt-Austin contributed to the conception and design of this work, drafted, critically revised, and gave final approval to the manuscript, and agrees to be accountable for all aspects of this work.

Sahel Hazrati contributed to the design, acquisition, and analysis of this study. She drafted, critically revised, and gave final approval to the manuscript, and agrees to be accountable for all aspects of this work.

Shruti Berlin contributed to analysis, critically revised the manuscript, final approval, and agrees to be accountable for all aspects of this work.

Karen Bodnar contributed to the conception and design of the study, analysis, and interpretation. She critically revised the manuscript, gave final approval, and agrees to be accountable for aspects of this work.

Suchitra Hourigan contributed to the design, conception, acquisition, analysis, and interpretation of this work. She critically revised manuscript, give final approval, and agrees to be accountable for all aspects of this work.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research project was supported by an internal research seed grant. In addition, authors of this work are supported in part by the National Institute of Child Health and Human Development under award number K23HD099240, the Ruth L. Kirschstein National Research Service Award under award number T32HP30037, and the National Center for Advancing Translational Sciences National Institutes of Health under award number UL1 TR001860. The contents of this publication are

solely the responsibility of the authors and do not represent the official views of the National Institutes of Health.

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