

BREASTFEEDING PRACTICES, PROGRAM EFFICACY, AND REASONS FOR
BREASTFEEDING DISCONTINUATION FOR LOW-INCOME WOMEN ENROLLED IN A
PEER COUNSELING BREASTFEEDING SUPPORT PROGRAM

By

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ABSTRACT

BREASTFEEDING PRACTICES, PROGRAM EFFICACY, AND REASONS FOR BREASTFEEDING DISCONTINUATION FOR LOW-INCOME WOMEN ENROLLED IN A PEER COUNSELING BREASTFEEDING SUPPORT PROGRAM

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BACKGROUND: Breastfeeding reduces risk for a myriad of health conditions in both infant and mother. Risk of many adverse health outcomes is higher and breastfeeding rates are lower in the low-income population compared to the general population. Peer counseling breastfeeding support programs have demonstrated efficacy in improving breastfeeding initiation, duration, and exclusive duration among low-income women. However, there is little information on how program factors are associated with participant characteristics, breastfeeding outcomes and reasons women in these programs discontinue breastfeeding.

OBJECTIVE: To understand factors inherently affecting breastfeeding outcomes; to identify program components associated with improved breastfeeding outcomes; and to identify reasons for breastfeeding discontinuation in a population of low-income women enrolled in a peer counseling breastfeeding support program; in order to identify effective strategies for improving breastfeeding outcomes in these programs.

METHODS: Demographic, breastfeeding, and program information was prospectively collected for 12,923 women enrolled in Michigan State University Extension's Breastfeeding Initiative Program from 2005 until 2011. Participants were described according to breastfeeding status at program entry and exit using chi-square tests, one way ANOVA and logistic regression. Cox Proportional Hazard Regression model was utilized to examine the association between program components and breastfeeding outcomes in 5,886 prenatal enrollees. Chi-square tests and

Kruskall-Wallis ANOVA were utilized to explore the associations between reason for breastfeeding discontinuation and infant age at weaning and participant characteristics for 7,942 participants who discontinued breastfeeding while enrolled in the program.

RESULTS: Postnatal enrollees had longer breastfeeding duration than prenatal enrollees ($F < 0.001$). Women who withdrew from the program while breastfeeding were demographically similar to those who discontinued breastfeeding prior to one year, although they breastfed for significantly longer at exit (mean \pm SD: 27.8 ± 14.8 weeks and 15.7 ± 13.3 weeks respectively; $p < 0.001$). For each additional home, phone, and other peer counselor contact there was a significant reduction in the hazard of discontinuing any breastfeeding by six months [HR (95% CI): 0.90 (0.88, 0.92); 0.89 (0.87, 0.90); and 0.93 (0.90, 0.96) respectively] and exclusive breastfeeding by three months [HR (95% CI): 0.92 (0.89, 0.95); 0.90 (0.88, 0.91); and 0.93 (0.89, 0.97) respectively]. Participants receiving greater than optimal in-person and less than optimal phone contacts had a reduced hazard of any and exclusive breastfeeding discontinuation compared to those who were considered to have an optimum quantity of contacts [HR (95% CI): 0.17 (0.14, 0.20) and 0.28 (0.23, 0.35) respectively]. The most common reasons reported for discontinuing breastfeeding were “Mother’s Preference” (39%) and “Low Milk Supply” (21%), and reasons differed by age of infant weaning ($p < 0.001$).

CONCLUSIONS: When delivering program protocols, it is important to recognize the varying needs of individual participants. Identifying participants who are at higher risk of undesirable breastfeeding outcomes, reaching participants using the most effective methods, and delivering curriculum that addresses common reasons for discontinuation may serve to improve breastfeeding outcomes for low-income women enrolled in peer counseling programs.

To mothers who, against the odds, make it work.

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KEY TO ABBREVIATIONS

AAP	American Academy of Pediatrics
BFI	Breastfeeding Initiative
CDC	Centers for Disease Control and Prevention
DHHS	Department of Health and Human Services
EBF	Exclusive Breastfeeding
IBCLC	International Board Certified Lactation Consultants
IFPS	Infant Feeding Practices Survey
PC	Peer Counseling
PRAMS	Pregnancy Risk Assessment and Monitoring System
US	United States
USCB	United States Breastfeeding Committee
USDA	United States Department of Agriculture
WHO	World Health Organization
WIC	Special Supplemental Program for Women, Infants, and Children

CHAPTER ONE: INTRODUCTION

Lactation is a unique and integral aspect of the mammalian experience. As mammals, human beings have the ability to provide safe, customized nutrition to our young exclusively and then with complementary foods during the first stages of life. Before the nineteenth century, breast milk was virtually the only method of feeding by which the infants would have probable chance of survival. With the advent and marketing of formula throughout the nineteenth and twentieth centuries came the perspective that science could transcend nature in the ability to successfully nourish infants. This standpoint came with great costs in infant morbidity and mortality. As production methods became safer, formula rose in popularity until after World War II, when it became the standard method of infant feeding in the United States (US), and these circumstances set the stage for the lack of societal breastfeeding support that we experience today (Baumslag & Dia, 1995; Wolf, 2003).

Though it has become clear that formula cannot replicate the complex and dynamic nature of breast milk, the stage has been set in the US in which formula and bottle feeding is regarded as the norm and breastfeeding, the deviation from the norm. Indeed, even public health messages that promote breastfeeding extol the benefits of breastfeeding as though formula feeding is the norm, rather than describing the dangers of formula feeding compared to the norm of breastfeeding.

Breastfeeding promotion is becoming an ever increasingly visible public health goal for organizations such as the World Health Organization (WHO), American Academy of Pediatrics (AAP), and the Special Supplemental Program for Women, Infants, and Children (WIC). These

efforts have resulted in an upsurge in breastfeeding rates (Centers for Disease Control and Prevention [CDC] Breastfeeding Report Card, 2013) as women are educated as to how they can provide the best start for their infants. However, there is inadequate societal support for women who want to breastfeed in the US, and this often disproportionately affects low-income women.

The US has none of the mandates of other developed countries regarding paid maternity leave or even any maternity leave beyond twelve weeks postpartum (United States Department of Labor, 2014). This lack of support has a particular impact on low-income women who cannot afford to miss being paid for an extended period of time (Rojjanasrirat & Sousa, 2010). The frequent consequences of these circumstances is women returning to work well before breastfeeding is established, resulting in formula supplementation or breastfeeding cessation (Racine, Frick, Guthrie, & Strobino, 2009). Low-income women are also disproportionately affected by returning to work, since the work environments for low-income workers are often less conducive to pumping or bringing an infant to work (Hedberg, 2013). Though these practices may be viable for women with private workspaces, they are more unrealistic for women working in education or the restaurant industry (Rojjanasrirat & Sousa, 2010). The Affordable Care Act mandates that women be given time and a private place to pump in their workplaces (United States Breastfeeding Committee [USBC], 2013), but low-income women may feel that advocating for their rights to pump/breastfeed may endanger their employment (Rojjanasrirat & Sousa, 2010).

In the US, breastfeeding is considered aberrant by many. Though it is socially acceptable for billboards and magazines in grocery stores to showcase women's breasts, women breastfeeding in public may be considered inappropriate. The perspective that breasts are primarily for sexual purposes may be expressed by men in the low-income population

(Henderson, McMillan, Green, & Renfrew, 2011), and low-income women are more likely to not initiate or discontinue breastfeeding because their male partner wants them to (Wojcicki et al., 2010).

This lack of support for breastfeeding is additionally noted in the hospital setting in which women, including low-income women, are often separated from their infants soon after birth and given formula to take home “just in case”, which undermines the belief in their ability to effectively provide for their children (Hedberg, 2013). If a low-income woman experiences breastfeeding difficulties in the early postpartum period as so many women do, she may not have the funds or transportation to access a Lactation Consultant, and may not feel that she can relate to the professionals providing this service (Gross et al., 2009).

In short, low-income women are at a disadvantage when it comes to initiating and maintaining breastfeeding, which can be a difficult, relentless practice even in the most optimal situations. This state of affairs is evident in the low breastfeeding rates observed in the low-income population in the US (CDC Pediatric Nutrition Surveillance, 2012; CDC National Immunization Survey, 2014) and is especially problematic considering the higher rates of adverse health conditions in this population that may be prevented by breastfeeding (Smedley, Stith, & Nelson, 2003; Braveman, Cubbin, Egerter, Williams & Pamuk, 2010). Though all breastfeeding mothers require education, support, and encouragement, these needs are particularly essential for low-income mothers in order to overcome social inequities that may predispose low-income mothers to premature breastfeeding discontinuation. In order to address these needs, breastfeeding peer counseling (PC) programs were created throughout the 1980’s and 1990’s (Rossman, 2007). A pioneer in this effort was Michigan State Extension’s Breastfeeding Initiative Program, founded in 1993. In this and other similar programs, women

are recruited from the low-income community and trained to provide breastfeeding education, support, and encouragement to peers in their geographic areas. Today, PC programs are an essential aspect of breastfeeding promotion for low-income women in the WIC program using the Loving Support Model based on programs such as the Breastfeeding Initiative Program (Pat Benton, personal communication, February, 13, 2014), and the federal government has earmarked 60 million dollars for WIC PC programs in Fiscal Year 2014 (Catalog of Federal Domestic Assistance, 2014). Meta-analyses have revealed that breastfeeding education and support delivered by peers or lay persons is more effective than that delivered by professionals (Renfrew, McCormick, Wade, Quinn, & Dowswell, 2012; Gross, et al., 2009; Gross, et al., 2011).

PC programs have consistently demonstrated efficacy in improving breastfeeding outcomes, including initiation, duration, and exclusive duration in the low-income population (Jolly et al., 2012; Britton, McCormick, & Renfrew 2007), yet detailed evaluation of PC programs is lacking. **The objective of this dissertation was to understand factors inherently affecting breastfeeding outcomes, to identify program components associated with improved breastfeeding outcomes, and to identify reasons for breastfeeding discontinuation in a population of low-income women enrolled in a peer counseling breastfeeding support program in order to identify effective strategies for improving breastfeeding outcomes in these programs.** Once it is understood how breastfeeding support programs can be tailored to individual participant needs, breastfeeding outcomes may improve for low-income mothers enrolled in PC programs. Also, evidence-based recommendations will allow for increased efficiency and development of policies to expand PC programs during periods of resource constraints. The objective of this dissertation was accomplished through three specific aims:

- 1. To describe program participants and breastfeeding duration according to (1) timing of program enrollment (prenatal vs. postnatal) and (2) breastfeeding status at program exit (discontinued breastfeeding, exited program while breastfeeding, and completed one year program).**
- 2. To investigate how program components—both individually and in combination—were associated with timing of any breastfeeding and exclusive breastfeeding discontinuation in prenatal enrollees.**
- 3. To describe the self-reported reasons for discontinuing breastfeeding among women who received PC support by infant age at weaning and participant characteristics.**

The contribution of this research is significant because it allows for design of PC programs that are effective, efficient, and tailored to the individual needs of low-income breastfeeding mothers in order to improve breastfeeding outcomes. This research will set a precedent for examination of PC programs themselves in contrast to the status quo, which is to report overall outcomes but not to scrutinize the impact of program factors and efficacy of program components. Though reports of overall outcomes are valuable, there is often considerable selection bias since those receiving PC may have higher intent to breastfeed compared to the general WIC-eligible population. Studies that have controlled for breastfeeding intent have demonstrated increased breastfeeding initiation, duration, and EBF duration with PC programs, but scale of impact and program protocols vary widely between studies (Olson, Haider, Vangel, Bolton, & Gold, 2010; Anderson, Damio, Young, Chapman, & Perez-Escamilla, 2005; Chapman, Damio, Young, & Perez-Escamilla, 2004; Arlotti, Cottrell, Lee, & Curtin, 1998; Kistin, Abramson, & Dublin, 1994). Currently, the PC model describes programs

with protocols ranging from few telephone calls to intensive hospital and home support. Also, protocols vary between program participants according to individual needs and resources available. Thus, it is difficult to distinguish which aspects of a program are contributing to improved breastfeeding outcomes. Since success of these programs has been established in the low-income population (Jolly et al., 2012; Britton et al., 2007), the next step is to examine how specific program components may differentially affect breastfeeding outcomes in order to increase the efficacy and efficiency of these programs. Also, the goal of PC programs is to help women reach their breastfeeding goals, yet there is little detail on the reasons women in these programs discontinue breastfeeding, especially at specific times, thus preventing implementation of effective measures to prevent discontinuation.

Improved breastfeeding outcomes may be translated into lower risk of many adverse health conditions associated with not breastfeeding, and may contribute to decreasing risk of these conditions in the low-income population, which has higher prevalence of many of these adverse health conditions. Decreasing health risks not only contributes to higher quality of life in disadvantaged populations, it may also decrease health care costs for those receiving public health care assistance. The information gleaned in this research will allow for design of PC programs that are effective at increasing breastfeeding duration and EBF duration in low-income women.

The second chapter of this manuscript details the topics discussed here: Breastfeeding, breastfeeding in the low-income population, and PC programs. The body of the manuscript contains three chapters (three, four, and five) that each addresses one of the specific aims described above. Chapter six is the conclusion of this manuscript including implications for practice.

CHAPTER TWO: LITERATURE REVIEW

Benefits of Breastfeeding

Breastfeeding confers many benefits to both infant and mother. Breast milk provides all nutrition that is necessary for an infant in the first six months of life (WHO, 2014). It contains hormones, antibodies and fatty acids that are ideal for infant growth and development (Van't Land, Boehm, & Garssen, 2010; Carlson, 2009; Savino & Liguori, 2008). Compared with infants who are formula fed, breastfed infants have lower risk of allergies, asthma, lower respiratory and ear infections, gastrointestinal tract infections, Inflammatory Bowel Disease, Celiac Disease, Types 1 and 2 Diabetes, obesity, Childhood Leukemia and Lymphoma, and Sudden Infant Death Syndrome (Johnston, Landers, Noble, Szucs, & Viehmann, 2012; Van't Land, et al., 2010; Ip, Chung, Raman, Trikalinos, & Lau, 2009; Duijts, Ramadhani, & Moll, 2009). Mothers who breastfeed have decreased postpartum blood loss, more rapid involution of the uterus, decreased risk of postpartum depression, and increased child spacing due to lactational amenorrhea. Breastfeeding also benefits mothers by decreasing risk of breast and ovarian cancers, Type 2 Diabetes, metabolic syndrome, hypertension, hyperlipidemia, cardiovascular disease, and myocardial infarction (Johnston, et al., 2012; Kelishadi & Farajian, 2014; Ip, et al., 2009; Stuebe, 2009). For many of these conditions, there is a dose-response reduction in risk according to duration and intensity of breastfeeding (Johnston, et al., 2012; Duijts, et al., 2009; Scariati, Grummer-Strawn, & Fein, 1997). In addition, breastfeeding encourages bonding between infant and mother, reduces environmental waste, and costs less than formula feeding. Because of these benefits, the WHO recommends that infants are exclusively breastfed until six month of ages, and breastfed with appropriate complementary foods until two years of age or beyond (WHO,

2014). These recommendations are mirrored by the AAP, which recommends exclusive breastfeeding for six months, and breastfeeding with complementary foods for one year or longer as mutually desired by mother and infant (Johnston, et al., 2012). In the US, the Healthy People objectives for 2020 include 81.9% breastfeeding initiation, 60.6% of babies breastfed until at six months, and 34.1% of babies breastfed at least one year. In addition, the objectives include that 46.2% of babies that are exclusively breastfed (EBF) through at least three months, and 25.5% of babies are EBF for at least six months (US Breastfeeding Committee [USBC], Healthy People 2020: Breastfeeding Objectives, 2013).

Breastfeeding in Low-Income Women

Breastfeeding rates in the low-income population are below the national average. In 2011, the breastfeeding initiation rate for children from low-income households (<185% of the US Poverty Rate) was 66.3%. In this population, 26.0% of infants were breastfed until six months, and 17.9% were breastfed until one year. Additionally, 10.8% of low-income infants were EBF for three months, and 6.3% were EBF for six months (CDC Pediatric Nutrition Surveillance, 2012). These values are well below the national average of 76.5% breastfeeding initiation, 49.0% of babies that were breastfed at six months, and 27.0% that were breastfed at one year. National rates for EBF were 37.7% and 16.4% at three months and six months respectively (CDC National Immunization Survey, 2014).

Many barriers prevent low-income mothers from initiating or maintaining breastfeeding and EBF. These barriers include lack of access to breast pumps, employment situations in which breastfeeding or pumping is not feasible, and a culture in which formula feeding is the norm (Hedberg, 2013). Unfortunately, though breastfeeding rates are lower in the low-income

community, the benefits of breastfeeding are crucial in this population since infant morbidity and mortality are inversely related to socioeconomic status (Smedley, et al., 2003, Braveman, et al., 2010).

Peer Counseling Programs

In order to address these challenges and provide support and advice for breastfeeding mothers, PC programs have been implemented throughout the US and globally. Typically, peer counselors are women from the community who have had a successful personal breastfeeding experience and are trained to provide breastfeeding support and education to their peers in order to improve breastfeeding outcomes (Chapman, Morel, Anderson, Damio, & Perez-Escamilla, 2010). Peer counselors often come from a similar background and socioeconomic status as their participants, and can, therefore, effectively provide practical advice and emotional support based on shared experiences and cultural barriers. Peer counselors encourage women to breastfeed, validate women's experiences and feelings, and provide information and advice regarding breastfeeding, including on technical issues such as latching and positioning (Rossman, 2007). In a qualitative meta-synthesis of professional and peer support, the authors describe successful and detrimental experiences of women enrolled in this type of support. The authors discuss that an authentic presence, a facilitative style, and continuity of care were most beneficial to breastfeeding women. These methods are embodied under the PC, but not necessarily the professional, model (Schmied, Beake, Sheehan, McCourt, & Dykes, 2011). Studies in which authors have examined efficacy in both professional and peer models have demonstrated equal or improved breastfeeding outcomes in low-income participants enrolled in PC programs compared

with low-income participants receiving professional breastfeeding services (Renfrew, et al., 2012; Gross, et al., 2009; Gross, et al., 2011).

Efficacy of Peer Counseling Programs

Overview

A 2007 Cochrane Review (Britton, et al.) of breastfeeding support models revealed that interventions delivered by lay support, including peer counselors, significantly reduced the risk of breastfeeding discontinuation at last study assessment (RR= 0.86, 95% CI: 0.76, 0.98), however this benefit did not extend beyond four months postpartum. In studies examining EBF, risk of cessation at last study assessment was also significantly decreased in participants receiving lay support (RR= 0.72, 95% CI: 0.57, 0.90), and this effect was primarily significant before three months postpartum (RR= 0.42, 95% CI: 0.31, 0.57). There was, however, significant heterogeneity among the studies examined in terms of populations served, peer counselor training, standard program protocols, and program delivery. In a 2010 review, the authors concluded that, overwhelmingly, randomized controlled trials assessing efficacy of PC programs demonstrated increased rates of breastfeeding initiation, duration, and EBF duration in participants. In addition, women in PC programs had increased lactational amenorrhea, a condition that contributes to increased spacing between children, and infants had lower risk of diarrhea (Chapman, et al.). A recent meta-analysis of the peer support model elucidated that the risk of not breastfeeding was reduced by 30% and 7% in low/middle- income and high income countries respectively. The risk of not EBF was reduced by 37% in low/middle- income countries and 10% in high-income countries (Jolly, et al., 2012).

Although PC programs have been implemented with a variety of populations, findings from international studies and those of higher income populations within the US may not be applicable to the low-income population in the US due to differences in cultural beliefs and access to health care and public programs. This review will focus primarily on findings of PC programs for low-income communities within the US.

When interpreting findings concerning PC program success, it is important to define and consider measures of breastfeeding success. “Initiation” refers to the incidence of an infant being fed from the breast at least one time. Though this factor is necessary in assessing breastfeeding success, it may not be an adequate measure of the positive health benefits being conferred to the infant and mother, as significant reduction in disease may be unlikely to occur from minimal breastfeeding. In order to be classified as “not initiated”, an infant would have to have been fed formula only. A more descriptive measure of benefits conferred is “breastfeeding duration”. This factor depicts a more accurate measure of the quantity of breast milk consumed by the infant, but even with this measure, intake is still highly variable considering a mother breastfeeding her child once each day would be categorized similarly to a mother feeding her infant breast milk only. The most descriptive measure of breast milk intake, then, is “exclusive breastfeeding duration”, which is the length of time an infant is given only breast milk without supplementation and, thus, is a measurement of breastfeeding intensity. However, since EBF is only recommended for six months, a combination of outcomes is ideal, including duration combined with EBF duration. The success of PC programs should be interpreted within the context of these measures.

Evaluation of Peer Counseling Program Success

All of the literature regarding PC programs in low-income communities includes measurement of breastfeeding initiation, and many articles report this measure only. In a 2009 analysis of the Maryland WIC program (Gross, et al.), breastfeeding initiation rates were compared between women who received different breastfeeding services according to the resources offered at local WIC agencies. The services compared included Standard Care (up to three prenatal breastfeeding lessons), Lactation Consultant services (participant had access to a Lactation Consultant upon request), and PC (about eight telephone calls from a peer counselor throughout her postnatal period). The results demonstrated that both the Lactation Consultant and PC groups had higher initiation rates compared to the Standard Care group, but were not significantly different from each other. This finding has positive implications for breastfeeding support, since participants in the PC group had higher, if not significantly higher, breastfeeding initiation compared to those receiving services from than professionals, who require more pay (OR= 1.74, 95% CI: 1.62, 1.86 for PC group vs. OR= 1.33, 95% CI: 1.18, 1.37 for Lactation Consultant group). Still, this study is inherently flawed since 45% of the sample registered postnatally. Though the results control for infant age at certification, it is not logical to include postnatal participants, since the only measure occurs at birth (very few women initiate breastfeeding well after delivery). Indeed, multiple studies have demonstrated improved breastfeeding outcomes for postnatal enrollees, due to the fact that postnatally enrolled women have typically already started breastfeeding, or have a strong intent to breastfeed in the very near future, and have often breastfed for the duration leading to enrollment (Bolton, Chow, Benton, & Olson, 2009; Gross, et al., 2011, Jolly, et al., 2012). Thus, there is selection bias for postnatal enrollees, and analyses including both of these groups should stratify according to timing of

enrollment. This need is further demonstrated in a 2009 descriptive analyses of a breastfeeding support program in Michigan (Bolton, et al.). In this analysis of more than 5,000 women, only approximately 90% of the prenatal enrollees initiated breastfeeding compared to approximately 99% of the postnatal enrollees ($p < 0.001$). However, the authors demonstrate that differences between the groups extended beyond initiation to duration, and postnatal enrollees had an average duration of breastfeeding approximately four weeks longer prenatal enrollees. This finding implies that participants who enroll at different times may be inherently different, and, indeed, in Bolton's paper, postnatal enrollees were older, more highly educated, more likely to be White, and more likely to have had previous breastfeeding experience.

A study of the Tennessee WIC program comparing breastfeeding initiation rates of those receiving PC vs. those who did not receive PC had an added advantage of only analyzing women who were seen by the health department prenatally. Women who received PC had a significantly higher odds of initiating breastfeeding (OR= 2.43, 95% CI: 1.23, 4.67) and breastfeeding at six weeks (OR= 2.78, 95% CI: 2.08, 9.51) compared to women who did not receive PC. It is not clear, however, if all participants were women who intended to breastfeed, and, therefore, if success in the PC group simply captured differences in intent among the participants (Shaw & Kaczorowski, 1999).

The Texas Department of State Health Services utilized the Infant Feeding Practices Survey (IFPS) to retrospectively determine the effects of PC services prenatally, in the hospital, and postnatally on breastfeeding initiation. The authors concluded that women receiving PC during each of these periods were significantly more likely to initiate breastfeeding compared to those who did not receive peer counselor contacts during these periods (OR for participants receiving contacts during all of these periods compared to those receiving no contacts: 2.00, 95%

CI: 1.44, 2.76). Unfortunately, this was a cross-sectional study in which women were asked to recall contacts with peer counselors when their infants were one year old, and this may have introduced recall bias (Campbell, Wan, Speck, & Hartig, 2013).

In an analysis of PC programs in the Missouri WIC Program, breastfeeding initiation rates were compared between agencies that did or did not offer PC services (Yun, et al., 2010). The participant pool in this study was very large (n=29,881), and the authors stratified results for prenatal vs. postnatal enrollment. The authors described that both crude results and those adjusted for significant demographic characteristics revealed significantly higher breastfeeding initiation rates for participants attending an agency offering PC (OR=1.18, 95% CI:1.00, 1.40) compared to those enrolled in counties not offering PC for *prenatal enrollees only*. As we would expect, this relationship was not demonstrated in those enrolling postnatally. Additionally, it appears that participants in the “intervention” group, that is those attending a WIC clinic *offering* PC, did not necessarily receive PC, contributing to a potentially large level of misclassification.

Another study compared duration rates in low-income rural women in Iowa between counties in which the WIC clinics offered or did not offer PC. Women attending clinics in counties offering PC had higher initiation and duration rates at two, four, eight, and twelve weeks postpartum ($p < 0.001$) compared to those in counties without PC. Unfortunately, the sample size was small (72 in PC group; 20 in control group), and the authors did not control for time of enrollment (Schafer, Vogel, Viegas, & Hausafus, 1998).

In an analysis of low-income, Native American WIC participants enrolled in a PC program in Utah, participant breastfeeding outcomes were compared to historical controls. Participants were recruited prenatally and included women who intended to or did not intend to

breastfeed as well as those who were undecided. The only significant difference in breastfeeding outcomes between these groups was increased rates breastfeeding rates in the intervention group at three months ($p = 0.05$), but there was no significant difference in initiation rates or total duration ($p = 0.07$ and 0.08 respectively). This study may have been underpowered due to small sample size ($n = 63$ for PC group and $n = 65$ for control group) (Long, Funk-Archuleta, Geiger, Mozar, & Heins, 1995).

In a study of low-income African American women in Baltimore, researchers compared breastfeeding outcomes between participants enrolled in WIC clinics offering Standard Care or PC. Strengths of this study included participation of African American women with a range of breastfeeding intents who were all enrolled in the program before 24 weeks gestation. In the clinic offering PC, 62% of women initiated breastfeeding and 38% were still breastfeeding at 7-10 days compared to 26% initiation and 14% breastfeeding at 7-10 days in the Standard Care clinic. Unfortunately, statistical significance was not given for these differences, and the authors state that “at enrollment, nearly twice as many women intended to breastfeed in... intervention clinics compared to the control clinic”, but there was no adjustment for this variable. Also, 55% of the women enrolled in this intervention were lost to follow-up, creating a large potential for bias in the results, since it is unclear how breastfeeding rates in those lost to follow-up would compare to those who remained in the study (Caulfield, et al., 1998).

A 2011 study (Gross, et al.) demonstrated increased initiation, duration, and EBF duration in a group of women receiving PC compared to a Standard Care group and a group counseled by a Lactation Consultant. There were major limitations to this study: breastfeeding information was collected retrospectively at infant certification to WIC, and only 43% of infants were certified by two weeks. It is unclear whether mothers received lactation services prenatally

or after certification and, thus, whether participation in a specific group logically predicted breastfeeding outcomes, especially initiation. This limitation may be the cause of the absence of differences between groups concerning proportions of mothers who discontinued breastfeeding before certification. Also, infants certifying after one month of age were the most likely to have been EBF regardless of group. Thus, participants who had the most breastfeeding success, that is, those who breastfed and EBF for at least one month, did not do so as a result of the program.

The validity of findings regarding breastfeeding outcomes in PC programs is limited by selection bias; most reported findings originated from public programs in which randomization of subjects into PC programs is not practical or ethical. Rather, enrollment is largely limited to participants who have a prenatal interest in breastfeeding or who have already initiated breastfeeding and feel they need additional postnatal support. It is not surprising, then, that breastfeeding success is higher in participants enrolled in these programs in comparison to the general low-income population. Three studies have compensated for this bias by utilizing a quasi-experimental design. Other studies utilized randomized controlled trials, in which authors randomly assigned participants to control or breastfeeding support groups. Because there are few randomized controlled studies in which authors analyze PC programs for the low-income population, a study utilizing a higher-income population is also discussed.

Quasi-Experimental and Randomized Controlled Trials

A quasi-experimental study design was utilized by Olson, et al. (2010). The sample in this analysis consisted of prenatally enrolled, low-income women desiring PC breastfeeding services. Because services were limited, not all women were able to receive PC support, and the

authors compared the intervention group of those receiving PC support with those desiring, but not receiving, PC support. The authors demonstrate significantly increased breastfeeding initiation ($p < 0.001$) and duration rates in the intervention group at three ($p = 0.002$) and six months ($p = 0.008$) of age, as well as increased total duration (7.8 weeks for the intervention group vs. 5.7 weeks for the control group, $p < 0.001$). The differences in breastfeeding rates at nine and twelve months were not significant.

A similar study was conducted by Kistin, et al. (1994), in which the authors compared breastfeeding outcomes in a group receiving PC compared to a group of participants who desired, but were unable to receive, PC. The intervention group had significantly increased initiation rates compared to the control group (93% vs. 70%) and significantly longer mean breastfeeding duration (15 weeks vs. eight weeks), and mean EBF duration (eight weeks vs. four weeks). Unfortunately, the sample in this analysis was small with only 53 subjects in the intervention group and 49 in the control group, limiting generalizability to the greater population. Also, though the author states that 90% of women in the target population (women delivering at a particular hospital in the Chicago area) were low-income, she does not disclose actual income levels of subjects in the study, which may limit application to the low-income community. In addition, the authors do not differentiate between prenatal and postnatal participants in the analysis. Finally, the authors in this study state that record keeping was “inconsistent”, inhibiting analyses of a dose-response effect of PC.

A quasi-experimental study of a similar design, involving women who desired a PC and who were or were not matched with one, was also conducted with WIC participants in North Florida (Arlotti, et al., 1998). A strength of this study was that it included only women who intended to breastfeed and included only one woman who did not breastfeed. Also, the authors

controlled for many significant factors including other breastfeeding support and mothers' career plans; the model utilized described ~56% of the variance in breastfeeding duration. Participants in the PC group breastfed for two weeks longer than the control group, but this was not statistically significant. Participants in the PC group had 2.61 weeks longer EBF duration compared to the control group ($p < 0.05$). Unfortunately, this study had significant limitations including >25% attrition rate and a very small sample size (just 18 participants in each group). Also, though both prenatal and postnatal women were recruited, results were not adjusted or stratified for this variable in the analyses.

In a well-conducted 2002 study (Dennis, Hodnett, Gallop, & Chalmers), participants who initiated breastfeeding were recruited while in the hospital and randomly assigned to standard breastfeeding services or PC in addition to standard services. Compared to the control group, the PC group had significantly higher breastfeeding rates at four, eight, and twelve weeks. At each time point, there was an increased proportion of women EBF in the PC group. This study, however was not targeted toward low-income women, and less than 20% of the population had household incomes “<\$39,999” per year.

In a commonly cited 2004 study conducted by Chapman, et al., low-income, predominantly Latina (80%) women who intended to breastfeed were recruited prenatally and randomized into a group receiving standard breastfeeding care postnatally, or standard care and PC. The PC program protocol was described in detail and included one prenatal home visit, daily visits from PC while the participant was in the hospital, and three postnatal home visits including one within 24 hours of discharge. Unfortunately, the study was short staffed and only 53% of women in the intervention group received a prenatal home visit, but approximately half of those who didn't receive a home visit did receive a prenatal phone contact. Approximately 25% of

women were lost to follow-up during the postnatal period. The women in the PC group had a significantly reduced risk of not breastfeeding at birth (RR= 0.39, 95% CI: 0.18, 0.86) and at three months postpartum (RR= 0.78, 95% CI: 0.61, 1.00), but results were not significant at one or six months postpartum. EBF was not measured. In a study from the same research group and PC program (Anderson, et al., 2005), the design was similar, but the intervention had an even higher intensity: Women were offered three prenatal, daily hospital, and nine postnatal home visits. This ideal, however, was not actualized for many of the participants, and only approximately 64% of participants were still receiving home visits at six weeks. Though initiation rates were higher in the PC group, breastfeeding rates were not significantly higher at three months (RR= 1.26, 95% CI: 0.93, 1.70). A strength of this study was measurement of EBF; though rates were not significantly higher in the PC group at hospital discharge, they were significantly higher at one, two, and three months postpartum (Relative Probability = 3.89, 17.24, and 14.93 between intervention and control groups respectively). Interestingly, the authors also measured lactational amenorrhea and incidence of infant diarrhea, and found that mothers in the control group were more likely to have their menses return at three months (RR= 1.4, 95% CI: 1.03, 1.90) and were more likely to have had an infant with at least one diarrheal episode (RR= 2.15, 95% CI: 1.16, 3.97). Though the findings from this intervention are promising, it may not be feasible to replicate the intensity of the program due to resource constraints.

A recent randomized controlled trial of PC breastfeeding support for low-income women targeted the overweight/obese population (Chapman, et al., 2013). In this trial, the control group had access to PC services, though the PC services offered in the intervention group were more intensive and comprehensive. Though participants in the intervention group had greater

utilization of PC services, there were relatively few improvements in breastfeeding outcomes compared with the control group. Participants in the intervention group did have significantly higher odds of any breastfeeding (OR: 3.76, 95% CI: 1.07, 13.22) and breastfeeding intensity (OR: 4.47, 95% CI: 1.38, 14.50) at two weeks postpartum and their infants had lower odds of hospitalization through six months postpartum (OR: 0.24, 95% CI: 0.07, 0.86). There were, however, no differences in EBF rates throughout the six month trial, and the participants in the control group actually had higher rates of any breastfeeding from three to six months. The authors concluded that PC may not be sufficient to address the source of low breastfeeding rates in the low-income overweight/obese population. It would have been helpful to compare these groups to a control group to determine if the lower level of PC may have been effective in improving breastfeeding outcomes compared to women who did not receive PC in this overweight/obese population.

Initiation may not be an adequate measure of breastfeeding success, especially since many low-income women discontinue breastfeeding within the first week postpartum. Initiation is largely a measure of breastfeeding intention (Caulfield, et al., 1998). Any breastfeeding duration and EBF duration for those who initiate breastfeeding may be stronger indications of a PC program's impact on breastfeeding outcomes. Thus, programs measuring only initiation, especially within populations including postnatal enrollees, may not be adequate evidence for the efficacy of PC breastfeeding support programs. Evaluations of PC programs must differentiate between prenatal and postnatal enrollees in order to report accurate data.

Summary

Though the quasi-experimental and randomized controlled studies examining the effect of PC programs on breastfeeding outcomes in low-income women generally support the hypothesis that these programs are effective, results are variable regarding the extent of program success. This may be due to a variety of factors including heterogeneity of the populations examined and of the programs themselves. Though some PC programs in the US utilize the Loving Support model developed through the United States Department of Agriculture (USDA) Food and Nutrition Service, the model is implemented in different ways depending on the training of the PCs and resources of the individual programs. There are few standardized protocols for PC training or for PC programs themselves (Bronner, Barber, Vogelhut, & Resnik, 2001; Chapman, et al., 2010; Kaunonen, Hannula, & Tarkka, 2012). While some programs utilize telephone-only support, others employ extensive home visiting and other one-on-one contacts, and quantity of required/recommended contacts is variable. Also, many of the programs are flexible according to the needs of the mothers and discretion of the peer counselors, so there may be heterogeneity in services received even within a program. Though meta-analyses and reviews attempt to summarize effects of these programs, this may not be a logical approach since there is wide variation between programs (Britton, et al., 2009). It may be more helpful for program/policy makers to examine which components of PC programs improve breastfeeding outcomes in order to suggest efficacious protocols for these programs.

Peer Counseling Program Components and Breastfeeding Outcomes

As previously discussed, the policies and procedures for implementing PC programs vary considerably. This may be beneficial since different participants have different needs; a primary attribute of PC programs is that they attempt to address women's needs on an individual level. Still, heterogeneity between and within programs inhibits comparisons of breastfeeding outcomes between and within programs. Differences in breastfeeding outcomes may be due to variations between populations, which are not alterable, or they may be due to varying policies and procedures; some programs rely on telephone support, while others implement hospital, clinic, and home visits. The targeted quantity of each of these types of contacts is typically addressed in the methods sections of the studies discussed, but many papers state that this target is rarely actualized but do not account for variation in program implementation when reporting findings. A 2010 review of PC programs by Chapman, et al. concluded that there is a need to better define “prenatal, perinatal, and postnatal service delivery modes (phone, hospital/clinic based, home visits)” and “dosage needed (number of contacts...) for achieving specific breastfeeding outcomes (breastfeeding initiation, any breastfeeding and EBF duration)”.

The relationship between quantity or frequency of contacts between the participant and peer counselor and subsequent breastfeeding outcomes is complex; though frequent contacts could indicate increased support and encouragement, they may also indicate a participant with increased difficulties who is more likely to discontinue breastfeeding. A meta-analysis by Jolly, et al. (2012) concluded that higher intensity PC programs (≥ 5 planned contacts) had a significantly positive impact on breastfeeding duration compared to low-intensity programs (< 5 planned contacts) ($p = 0.02$), but this effect was not demonstrated with EBF duration.

A 2012 Cochrane meta-analysis of breastfeeding support (Renfrew, et al., 2012) elucidated that programs offering face-to-face support were more effective at improving EBF rates compared to programs offering phone or combined phone and face-to-face support (RR for discontinuing EBF by six months: 0.81, 95% CI: 0.75, 0.88), though the differences did not persist for rates of any breastfeeding. The authors concluded that future trials should analyze the impact of program components “including training, timing, and intensity of the intervention, and the differential impact on different population.”

In spite of the conclusions concerning inefficacy of telephone support programs by Renfrew, et al. (2012), a PC program offering exclusively telephone support demonstrated significantly higher breastfeeding and EBF rates at four, eight, and twelve weeks compared to breastfeeding mothers randomly assigned to standard breastfeeding care (Dennis, et al., 2002). This study did not target low-income women. Another randomized, controlled, telephone-based trial aimed toward adolescent mothers (socioeconomic status not reported) following hospital birth likewise reported success: EBF was increased from a median of 10 days in the control group to a median of 35 days in the intervention group ($p < 0.004$). The median total breastfeeding duration also increased from 35 days in the control group to 75 days in the intervention group; however, this was not statistically significant ($p = 0.26$), possibly due to small sample size. An important limitation to this study was the high attrition rate: Only 46 of 78 participants were followed to the end of the study (Meglio, McDermott, & Klein, 2010).

Very few studies have considered how quantity and type of contacts affect breastfeeding outcomes for populations receiving PC services. A randomized controlled trial of PC care demonstrated no relationship between frequency of peer counselor/participant interactions and

extent of breastfeeding at four, eight, and twelve weeks postpartum, but this study was not targeted to low-income women (Dennis, et al., 2002).

Since individual studies examining a dose-response relationship between peer counselor/participant contacts and breastfeeding outcomes in the US are largely missing from the literature, it is necessary to refer to one such study set in peri-urban Mexico. In this clustered, randomized, community-based intervention, the authors compared breastfeeding outcomes between a control group (n=34), an intervention group receiving three prenatal and postpartum home visits from a peer counselor (n=52), and an intervention group receiving six prenatal and postpartum home visits from a peer counselor (n= 44). Because of the concern of low EBF rates in Hispanic women, EBF duration was the primary outcome of interest, followed by total breastfeeding duration and incidence of infant diarrhea. At two weeks postpartum, 24% of the control group, 62% of the three visit group, and 80% of the six visit group were still EBF. At three months, 12% of the control, 50% of the three visit group, and 67% of the six visit group were EBF. These differences were significant over time ($p < 0.001$), and there was a significant difference in EBF rates between the three and six visit groups ($p = 0.015$), though the difference seemed to be established by two weeks postpartum. Unfortunately, the authors collapsed the intervention groups in the secondary analyses to obtain more power (Morrow, et al., 1999). These results cannot necessarily be generalized to Hispanic women living in the US, since foreign-born Hispanic women have different breastfeeding practices than Hispanic women born in the US (Sparks, 2011; Chapman & Perez-Escamilla, 2013). This study suggests that there is a dose-response relationship between peer counselor/participant home visits and EBF, though it did not provide enough information to conclude if this relationship persists for any breastfeeding duration.

There is a significant and important gap in the PC program literature regarding program components that may improve breastfeeding outcomes, including for low-income populations living within the US. Efficacy and efficiency of PC programs are contingent on implementing policies and procedures that are evidence-based.

Reasons for Breastfeeding Discontinuation

The goal of PC programs is to help women continue to breastfeed, yet there is little detail on the reasons women in these programs discontinue breastfeeding. While some studies have examined the reasons why women discontinue breastfeeding, few have correlated these reasons with timing of discontinuation or examined how these associations differ according to maternal and infant characteristics. Also, there is often a large proportion of women who are lost to follow-up in these programs, and the reasons these women discontinue breastfeeding go undocumented, which biases results. Examination of these associations is necessary so that effective interventions can be tailored to address discontinuation in populations at risk, such as the low-income population.

Though few studies quantitatively describe the reason for breastfeeding discontinuation among low-income women, qualitative studies contribute an in-depth understanding of the barriers low-income women experience that may contribute to later cessation. In a qualitative article from 2000, Raisler documents the breastfeeding experiences of 42 low-income women enrolled in WIC and PC programs. Though many positive experiences were discussed and women extolled the role of their peer counselors in their efforts to breastfeed, the participants also describe many barriers to breastfeeding. These included physicians' orders to discontinue

breastfeeding, usually due to the mothers' taking antibiotics, and difficulty resuming activities at home, school, and work. Multiple women described lack of time and space to pump at work as a major barrier to EBF and any breastfeeding, especially since multiple mothers had erratic schedules and worked more than one job. Some of the new mothers also described the necessity to wean in order to seek employment. A concern for personal modesty was echoed by nearly every participant, and these concerns originated from the mothers themselves, as well as from negative looks and comments from family, friends, co-workers, and strangers. Many mothers also explained that WIC providing formula contributed to higher incidence of formula feeding and that they would have been more likely to breastfeed if formula was not provided. Though it is uncertain whether these reasons directly impacted timing of breastfeeding cessation, it stands to reason that these barriers contributed to difficulties leading to cessation.

In a mixed methods study by Wojcicki, et al. (2010), the authors interviewed 363 women who had recently delivered a healthy newborn (51% of whom were WIC participants) to assess attitudes toward breastfeeding. Compared to higher income women, WIC participants were more likely to believe that breastfeeding could be embarrassing or difficult to do in public ($p = 0.02$), breastfeeding was difficult to maintain because someone else was caring for the child ($p < 0.001$), and breastfeeding was painful and uncomfortable ($p = 0.02$). WIC participants were also more likely to not initiate or to stop breastfeeding if their husband or partner did not support breastfeeding ($p = 0.03$).

Authors of a study examining breastfeeding discontinuation in low-income Canadian women concluded that weaning was predicted, in order of greatest to least affect, by breast and/or nipple pain, insufficient milk supply, baby refusing the breast, mother being too busy, baby being too fussy, and mother being too tired or returning to work or school (Simard, et al.,

2005). In a small ethnographic study of rural, low-income women in North Carolina (n=30), the authors concluded that the most common reason given for discontinuing breastfeeding was inadequate milk supply, followed by infant health problems, discomfort, and employment (Flower, Willoughby, Cadigan, Perrin, & Randolph, 2008).

The ultimate goal of understanding reasons for discontinuation is to implement policies that reduce barriers for breastfeeding women, such as laws that protect public breastfeeding. More realistically, recognition of barriers leading to breastfeeding discontinuation may be utilized to design educational curriculum for breastfeeding mothers that anticipates and addresses reasons for discontinuation before they occur. This method may be of particular benefit in the PC model since peer counselors advise and support breastfeeding mothers throughout the prenatal and postpartum periods, and, therefore, may be in a position to address these issues as they arise: For instance, peer counselors may help women anticipate pain and discomfort in the late prenatal period, but may wait to address pumping in the workplace until just before the mother returns to work.

In order for these curricula to be applicable, it is important to recognize that women are more likely to discontinue breastfeeding for different reasons at different points in their breastfeeding experience. In a nationally representative sample (spanning all income levels), authors analyzing the IFPS found that in months one and two postpartum, the most frequent reasons for discontinuing breastfeeding were difficulties with the infant nursing, concern about milk supply, and mother wanting to leave the infant or have someone else feed the infant. In months three to five postpartum, concerns about milk supply and wanting to leave the infant persisted, but wanting to leave the infant was tied to returning to work. Also, the reason “infant weaned self” was introduced at three to five months postpartum. “Infant weaned self” became

the most common reason for discontinuation from six to twelve months, in addition to “infant was old enough”. Concerns about milk supply persisted into this period. The authors concluded that, statistically, the reasons for stopping breastfeeding were associated with age of the infant (Kirkland & Fein, 2003). Unfortunately, this sample consisted primarily of married, white, middle-class Americans; results may not be generalized to the low-income population since barriers vary greatly between these populations especially in regard to work environment and social support.

In a second version of the IFPS, concerns that the infant was not satisfied by breast milk alone remained one of the primary reasons for discontinuation regardless of infant age. The most frequently given reasons were examined under the context of demographic variables, and mothers with an income <185% of the poverty index (mothers who were WIC-eligible) were significantly more likely to discontinue because “Breast milk alone did not satisfy my baby” compared to those with a household income >350% of the poverty index, though timing of discontinuation within this demographic group was not explored. For the entire study group, an additional key reason for weaning in the first and second months was “Baby had trouble sucking and latching on”. In addition to concerns with milk supply, the other central reason for discontinuing in the third to eighth month was the infant began to wean him or herself. Beginning at nine months of age, the infant self weaning remained a primary reason, and “my baby began to bite” was introduced as an important reason (Li, Fein, Chen, & Grummer-Strawn, 2008).

The IFPS was also conducted as a one year longitudinal study from a nationally representative sample of prenatally enrolled WIC participants who had a newborn infant enrolled in WIC (McCann, Baydar, & Williams, 2007). Participants were interviewed at months one,

three and five postpartum to examine problems mothers had with breastfeeding, though these reasons may or may not have resulted in breastfeeding discontinuation. In the month one interview, 36% of mothers reported problems with their breast milk, including insufficiency (34%), and 55% of women reported problems with breasts or breastfeeding including sore nipples (38%), infant choking while breastfeeding (20%), and cracked nipples (17%). In month three, problems with milk decreased, with 27% of women reporting problems with breast milk (25% reported milk insufficiency) and 29% reporting problems with breasts or breastfeeding (10% sore nipples, 19% infant choking while breastfeeding). The proportion of women reporting breastfeeding issues decreased again at five months postpartum, at which time only 16% of women reported problems with milk, including 15% who reported milk insufficiency, and only 16% reported problems with breasts or breastfeeding. Though these results are helpful in examining the proportion of low-income women who experience breastfeeding problems, the results are not adjusted for any demographic characteristics and, generally, only reveal that women who continued to breastfeed until five months experienced fewer issues as time progressed. The authors did not differentiate reasons according to race/ethnicity, nor did they report other common reasons for breastfeeding discontinuation including return to work/school and lack of social support.

The Pregnancy Risk Assessment and Monitoring System (PRAMS) is a collection of population-based data concerning attitudes and experiences before, during, and shortly after pregnancy. Authors analyzing this data set described reasons for breastfeeding discontinuation according to timing of infant weaning, though the longest period considered was “> 4 weeks”. Of the women who discontinued before one week (n= 1105), the most commonly cited reasons were sore nipples, concerns with milk supply, and infant having difficulty. Those who

discontinued after four weeks cited that it was time to stop and that school/work commitments prevented them from continuing. Unfortunately, these findings did not target the low-income population, and income level of participants was not addressed (Ahluwalia, Morrow, & Hsia, 2005).

There is a significant gap in the literature regarding reasons for breastfeeding discontinuation, and especially for reasons according to time of discontinuation. This gap is particularly evident for the low-income population, which has higher risk of premature breastfeeding discontinuation. Elucidation of reasons for breastfeeding discontinuation according to timing of infant weaning in the low-income population could be utilized effectively within a PC program, since peer counselors correspond with women throughout their prenatal and postpartum breastfeeding experiences.

Breastfeeding Discontinuation & Race/Ethnicity

Reasons for breastfeeding discontinuation may vary by race/ethnicity due to differences in cultural beliefs and practices. Though Hispanic mothers tend to have more breastfeeding success compared with non-Hispanic White and non-Hispanic Black mothers, breastfeeding rates are still below Healthy People 2020 goals for all groups. Hispanic women may have more breastfeeding success due to cultural influences and these same influences may contribute to reasons for discontinuation in this population. In a cross-sectional survey of Maryland WIC mothers (n= 515), Spanish-speaking Hispanic mothers were more likely to discontinue breastfeeding due to perception of inadequate milk supply and infant refusal of the breast compared to White and Black participants (Hurley, Black, Papas, & Quigg, 2008).

A survey of Maryland WIC participants revealed that African American mothers were more likely to discontinue breastfeeding due to “Breast discomfort or pain” and “Had to return to work” compared to Hispanic and White mothers (Hurley, et al., 2008). In a qualitative study of 15 African American mothers in the southeastern US who were breastfeeding or had recently breastfed, the authors describe that mothers were worried about the logistics of breastfeeding when going back to work, including breastfeeding in public, pumping at work, and lack of a support system (Lewallen & Street, 2010). All of these reasons may be related to a lack of a breastfeeding role-models or social support to help women overcome these issues (Hurley, et al., 2008). In 2010 qualitative study of low-income, Black women by Alexandar, Dowling, and Furman (2010), pregnant women were asked “What would stop you from breastfeeding?” Frequent responses included difficulty with work or school arrangements, concerns about pain and biting, and aversion to breastfeeding. These concerns were echoed in a qualitative study of 253 postpartum African American spanning all income levels in Florida, in which mothers who choose not to breastfeed discussed fear of pain, time constraints, returning to school or work, and discomfort with the idea of breastfeeding as reasons for not initiating the practice (Cottrell & Detman, 2013). The fact that these reasons were cited even before the infant was born is evidence of the pervasiveness of perceived barriers toward breastfeeding present within the low-income Black community.

Though every mother is different and should not be stereotyped according to her race or ethnicity, ignoring cultural differences inhibits implementation of interventions that may be effective for individuals who are members of these cultural groups.

CHAPTER THREE:

PRIORITIZATION OF RESOURCES FOR PARTICIPANTS IN A PEER COUNSELING BREASTFEEDING SUPPORT PROGRAM

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Abstract

Background: Peer counseling (PC) breastfeeding support programs have demonstrated efficacy in increasing breastfeeding duration in low-income women.

Objectives: To describe program participants and breastfeeding duration in a PC program according to (1) timing of enrollment (prenatal vs. postnatal) and (2) breastfeeding status at program exit (discontinued breastfeeding, exited program while breastfeeding, and completed one year program) to improve understanding of how these groups differ and how services might be optimized when resources are limited.

Methods: This study is a secondary analysis of data from low-income women enrolled in a PC breastfeeding support program. Participant characteristics and breastfeeding duration were described using Chi-square tests, ANOVA and logistic regression.

Results: Postnatal enrollees had longer breastfeeding duration than prenatal enrollees ($F < 0.001$), and were more likely to be older, married, more educated, and have prior breastfeeding experience (each variable $p < 0.01$). Women who withdrew from the program while breastfeeding were more demographically similar to those who discontinued breastfeeding prior to one year, than to those who continued in the program breastfeeding for one year, though they breastfed for

significantly longer at exit (mean \pm SD: 27.8 \pm 14.8 weeks) compared to women who discontinued breastfeeding while in the program (15.7 \pm 13.3 weeks) ($p < 0.001$).

Conclusion: It may be advantageous for peer counselors to direct fewer resources to later postnatal enrollees and more to prenatal or early postnatal enrollees and to focus on supporting women at high risk of discontinuation rather than on retaining women who choose to withdraw from the program while breastfeeding.

Background

Breastfeeding confers many benefits to both infant and mother. Compared with children who are formula fed, children who are breastfed have lower risk of allergies, asthma, Type 1 and Type 2 diabetes, obesity, lower respiratory and ear infections, and Sudden Infant Death Syndrome (Van't Land, et al., 2010; United States Department of Health and Human Services [DHHS] Office on Women's Health, 2011). Breastfeeding also benefits the mother by decreasing risk of breast and ovarian cancers, Type 2 diabetes, and postpartum depression (DHHS Office on Women's Health, 2011). Accordingly, the American Academy of Pediatrics recommends that infants are breastfed with appropriate complementary foods until one year of age or beyond (Johnston, et al., 2012). Despite these recommendations, US breastfeeding rates are only 27.0% for any breastfeeding at one year, and rates are even lower in the low-income population with 17.9% of low-income breastfeeding at one year (CDC National Immunization Survey, 2014; CDC Pediatric Nutrition Surveillance, 2012).

Many barriers prevent low-income mothers in the US from initiating or maintaining breastfeeding, including lack of role models and support, concerns with pain, and work environments in which breastfeeding or pumping is not feasible (Hedberg, 2013). In order to address these challenges and provide support and advice for breastfeeding mothers, PC programs have been implemented throughout the US and globally. Peer counselors are women from the community who have successfully breastfed and are trained to provide breastfeeding support and education to their peers in order to improve breastfeeding outcomes, including breastfeeding duration (Chapman, et al., 2010).

PC programs have proven effective in increasing breastfeeding duration in low-income women both in the US and globally (Jolly, et al., 2012; Renfrew, et al., 2012). Many studies have demonstrated increased breastfeeding duration rates among those receiving PC compared to those not receiving PC (Gross, et al., 2011; Olson, et al., 2010; Caulfield, et al., 1998; Schafer, et al., 1998; Kistin, et al., 1994). Despite these positive outcomes and their implications for long term health prevention, breastfeeding support programs may be a target for budget reductions, and several studies of PC programs have noted resource constraints resulting in potential participants who were not able to be served (Olson, et al., 2010; Kistin, et al., 1994; Arlotti, et al., 1998).

Most studies of PC programs do not document how breastfeeding duration varies according to time of enrollment, though this factor has proven significant in predicting breastfeeding outcomes (Jolly, et al., 2012; Gross, et al., 2011; Bolton, et al., 2009). Ignoring time of enrollment over-emphasizes the impact of PC programs on breastfeeding duration since success preceding enrollment is not an effect of the program, and those enrolling postnatally have already demonstrated the ability to initiate and maintain breastfeeding. Additionally, many

studies describing PC programs have a large proportion of losses to follow-up during the program, not allowing for examination of their risk for breastfeeding discontinuation. Thus, there is a need to describe participants and their breastfeeding duration in relation to how they enter the program (i.e. their time of enrollment), and how they leave the program (i.e. their breastfeeding status when they stop receiving PC support services).

The objective of this study was to describe program participants in one PC program and their breastfeeding duration in relation to their time of enrollment and breastfeeding status at exit. These results will provide understanding of how these groups differ and suggest prioritization of services when resources are limited in PC programs. We addressed this objective through two specific aims:

To examine differences in demographic characteristics and breastfeeding duration according to

1. time of enrollment; and
2. breastfeeding status at program exit.

Methods

Breastfeeding Initiative Program

The BFI Program, a collaboration of Michigan State University Extension and the Michigan Department of Community Health's WIC program, aims to provide breastfeeding education, support and encouragement to low-income women using the PC model. In the BFI program, PCs are recruited by community Extension and WIC agencies and are required to have

transportation, a high school degree, and a positive breastfeeding experience. Peer counselors receive basic breastfeeding training at hire and on-going education regarding lactation issues, breastfeeding support, home visiting methods, and maternal and infant nutrition. Peer counselors have access to program Lactation Consultants for technical assistance as needed. The goal of the BFI is to help each enrolled mother meet her own personal breastfeeding goal. Peer counselors aim to have at least one prenatal in-person contact followed by monthly phone calls up until delivery. If the policy is established in the local hospital, the Peer counselors may visit the participant in the hospital following delivery. The Peer counselors aim to call participants within two days following delivery and have at least one home visit as soon as possible after hospital discharge and another during the first month postpartum. The typical protocol is to call participants weekly during the first month postpartum and monthly through the first year of breastfeeding.

Women are eligible for the BFI program if they are WIC-eligible and most participants are referred by their local WIC agency. Depending on the time of referral, women may be enrolled prenatally or postnatally and remain in the program until they discontinue breastfeeding, choose to withdraw from the program, or the infant reaches one year of age.

Peer counselors collect maternal demographic information, infant characteristics, and breastfeeding duration prospectively upon enrollment, at birth, and at program completion. Infant birth information for postnatal enrollees is collected retrospectively at enrollment. At each contact, the participant is asked if she is still breastfeeding her infant. If she is not, the mother is asked the last date she provided breast milk to her infant to determine breastfeeding duration. She is then exited from the program. Women who breastfeed for one year are also exited from the program and their breastfeeding duration is censored at one year. Women may choose to

withdraw from the program while breastfeeding. In this case, the last date of contact with the peer is the last known date of breastfeeding, and duration is censored at this point for participants who choose to withdraw from the program. Data entry is completed by BFI staff. This study is a secondary data analysis of the data collected during a six year period from October 2005 through September 2011.

Variable Specification for Breastfeeding Status at Time of Enrollment & Program Exit

Breastfeeding duration was calculated by subtracting the infant's date of birth from the last date the mother noted breastfeeding the infant or from the date of the last contact with the peer counselor, for those who withdrew from the program while breastfeeding.

Participants were categorized by time of enrollment including prenatal, within four weeks postnatal (early postnatal), and over four weeks postnatal (late postnatal). Prenatal enrollees typically enrolled for general breastfeeding education and support. Early postnatal enrollees may or may not have already initiated breastfeeding, and enrolled for general breastfeeding support or for specific breastfeeding challenges. Late postnatal enrollees had initiated or in some cases had already well-established breastfeeding upon enrollment and typically enrolled for specific breastfeeding concerns such as returning to work or infant biting.

Participants were further categorized according to breastfeeding status at program exit and grouped as follows: discontinued breastfeeding prior to one year; withdrew from the program (or were lost to follow-up) while still breastfeeding; or were still breastfeeding at the end of the maximum program participation length of one year.

Data Analysis

All data analyses were conducted using STATA 12.0 statistical software. Chi-square tests were utilized to determine if maternal or infant characteristics were associated with time of enrollment and breastfeeding status at program exit. Breastfeeding duration was analyzed as a continuous variable with ANOVA and Bonferonni post-hoc tests. For time of enrollment analysis, logistic regression was used to determine the odds ratio (95% CI) of breastfeeding at multiple time points to examine the relationships between group inclusion and breastfeeding duration. Variables that were significantly related to breastfeeding duration at a $p < 0.2$ level in univariate regression were included in multivariable regression. An alpha level of 0.05 was set to denote statistical significance.

The Institutional Review Boards at Michigan State University and The Michigan Department of Community Health approved analysis of the Breastfeeding Initiative's program data.

Results

Time of Enrollment

Maternal and infant characteristics by time of enrollment are described in **Table 1**. We included non-Hispanic Whites, non-Hispanic Blacks and Hispanic participants in these analyses. Participants in other race/ethnicity categories ($n = 272$), those had unknown race/ethnicity ($n = 221$) and those who were missing data for race/ethnicity ($n = 151$) were excluded from race/ethnicity analysis but included in all other analyses (i.e. missing pairwise but not listwise).

Similarly, a large number of participants did not provide their marital status (n= 1,642), but were still included in analyses.

The majority of mothers were 20-29 years old, had at least a high school diploma or its equivalent, were non-Hispanic White, unmarried, lived in a small city or rurally, had at least one other child in the household (a proxy for primiparity), did not have prior breastfeeding

Table 1. Characteristics of Participants by Enrollment Status

	Total (n=12923)^a	Prenatal Enrollees (n=5884)	≤4 Weeks Postnatal Enrollees (n=5149)	>4 Weeks Postnatal Enrollees (n=1890)	χ^2^b p-value
Maternal Age, Years ^c					
<20	2736 (21.4)	1548 (26.6)	947 (18.7)	241 (12.9)	< 0.001
20-29	7105 (55.7)	3184 (54.6)	2874 (56.7)	1047 (56.0)	
≥30	2925 (22.9)	1095 (18.8)	1248 (24.6)	582 (31.1)	
Education					
< High School Diploma	3029 (23.8)	1428 (24.6)	1214 (24.0)	387 (20.7)	0.003
≥ High School Diploma or Equivalent	9708 (76.2)	4377 (75.4)	3850 (76.0)	1481 (79.3)	
Race/ Ethnicity					
White, Non-Hispanic	7213 (58.7)	3446 (61.1)	2867 (59.1)	900 (50.3)	< 0.001
Black, Non-Hispanic	3366 (27.4)	1578 (28.0)	1198 (24.7)	590 (33.0)	
Hispanic	1705 (13.9)	618 (11.0)	787 (16.2)	229 (16.8)	
Marital Status					
Single/ Unmarried Couple	7245 (64.2)	3588 (69.4)	2770 (61.7)	887 (54.8)	< 0.001
Married	4036 (35.8)	1584 (30.6)	1719 (38.3)	733 (45.3)	
Residence					
Cities/Towns < 50,000 and Rural	8602 (66.6)	4118 (70.0)	3475 (67.5)	1009 (53.4)	< 0.001
Cities/Suburbs of Cities > 50,000	4321 (33.4)	1766 (30.0)	1674 (32.5)	881 (46.6)	
# Other Children in Household					
0	3494 (27.0)	2900 (49.3)	456 (8.9)	138 (7.3)	< 0.001
≥ 1	9429 (73.0)	2984 (50.7)	4693 (91.1)	1752 (92.7)	
Previous Breastfeeding Experience					
No	8780 (67.9)	4331 (73.6)	3359 (65.2)	1090 (57.7)	< 0.001
Yes	4143 (32.1)	1553 (26.4)	1790 (34.8)	800 (42.3)	
Gestational Age					
Premature (<37 weeks)	1464 (11.3)	631 (10.7)	566 (11.0)	267 (14.1)	< 0.001
Full Term	11459 (88.7)	5253 (89.3)	4583 (89.0)	1623 (85.9)	
Birth Weight					
<2500 g	1256 (9.8)	539 (9.2)	482 (9.4)	235 (12.4)	< 0.001
≥ 2500 g	11667 (90.2)	5345 (90.8)	4667 (90.6)	1655 (87.6)	

^a n for individual variables may vary due to missing or incomplete data

^b Chi-square test was used to compare categorical variables between enrollment types

^c Variables presented as n(%)

experience, and had infants who were full term and/or a healthy birth weight. All variables examined were significantly associated with time of enrollment at a $p < 0.01$ level.

Of the enrollment groups, prenatal enrollees were the most likely to be under twenty years of age, had the highest proportion of non-Hispanic White participants, and were the least likely to be married, have at least one other child in the household, and have had prior breastfeeding experience. Late postnatal enrollees were the most likely to be over thirty years of age, non-Hispanic Black or Hispanic, and married.

For those who enrolled postnatally, the mean (\pm SD) infant age at enrollment was 1.6 (\pm 1.0) weeks for early postnatal participants and 9.8 (\pm 7.5) weeks for late postnatal participants. Valid breastfeeding duration was available for 12,308 participants (98.8%). For those who initiated breastfeeding, mean breastfeeding durations (\pm SD) were 21.3 (\pm 18.4) weeks, 23.8 (\pm 18.1) weeks, and 34.6 (\pm 15.9) weeks for prenatal, early postnatal, and late postnatal enrollees respectively (One way ANOVA: $F < 0.001$; all groups significantly different from each other at $p < 0.001$ level). Unadjusted and adjusted odds ratios for breastfeeding rates at specific time points are presented in **Table 2**. Compared to the prenatal enrollment group, both the early and late postnatal enrollment groups were more likely to be breastfeeding at every time point through six months in unadjusted and adjusted models.

Breastfeeding Status at Exit

A majority of the program participants (64.1%) discontinued breastfeeding while in the program (Mean \pm SD time in the program postnatally was 15.7 \pm 13.3 weeks), 18.1% of participants withdrew from the program while breastfeeding, and 17.8% remained enrolled and breastfeeding for one year (**Figure 1**). A majority of the participants (60.1%) remained in the

program breastfeeding for three months, and 40.3% remained in the program breastfeeding for six months.

Table 2. Odds Ratios (95% CI) for Breastfeeding Duration by Time of Enrollment

	Prenatal Enrollees (n= 5,884)	≤4 weeks Postnatal Enrollees (n= 5,149)		>4 weeks Postnatal Enrollees (n= 1,890)	
		Unadjusted	Adjusted ^a	Unadjusted	Adjusted
Breastfeeding Duration	Referent				
Initiation		17.0 (11.2, 25.6)***	22.0 (13.7, 35.4)***	50.0 (16.0, 155.7)***	50.8 (16.2, 159.8)***
3 months		1.3 (1.2, 1.4)***	1.3 (1.2, 1.4)***	5.9 (5.1, 6.8)***	5.8 (4.9, 6.8)***
6 months		1.2 (1.2, 1.4)***	1.2 (1.0, 1.3)**	3.3 (2.9, 3.6)***	3.0 (2.7, 3.5)***
12 months		1.1 (1.0, 1.3)*	1.0 (0.9, 1.1)	2.5 (2.2, 2.9)***	2.3 (2.0, 2.7)***

^aAdjusted for maternal age, education, race/ethnicity, marital status, residence, presence of other children in the household, previous breastfeeding experience, and infant gestational age and birth weight

*p< 0.05; **p< 0.01; ***p< 0.001

Maternal and infant characteristics according to breastfeeding status at exit are described in **Table 3**. All maternal and infant characteristics were significantly associated with breastfeeding status at program exit. Those who withdrew from the program while breastfeeding were similar in terms of maternal age, education, marital status, presence of other children in the household, and gestational age and birth weight of the infant to those who discontinued breastfeeding. Participants who completed the program were the least likely to be under the age of twenty and the most likely to be over the age of thirty ($p < 0.001$). Those who completed the one year program were also the most likely to have at least a high school education ($p < 0.001$), to be married ($p < 0.001$), and to have had previous breastfeeding experience ($p < 0.001$).

Valid breastfeeding duration was available for 12,279 (99.0%) of participants who had valid breastfeeding status at exit. The mean breastfeeding duration (\pm SD) was 15.7 (\pm 13.3) weeks for those who discontinued breastfeeding while in the program and 27.8 (\pm 14.8) weeks at program exit for those who withdrew from the program while breastfeeding ($p < 0.001$).

Discussion

The objective of this study was to describe characteristics of PC program participants and breastfeeding duration according to timing of enrollment and breastfeeding status at program exit. Our goal was to understand how participants in these groups differ in PC programs and suggest prioritization of services when resources are limited. To our knowledge, this is one of the first studies to examine participant characteristics and breastfeeding duration of those enrolled in PC breastfeeding support by time of enrollment and the first study to examine these factors by breastfeeding status at PC program exit.

Figure 1. Flow Chart for Breastfeeding Status at Program Exit

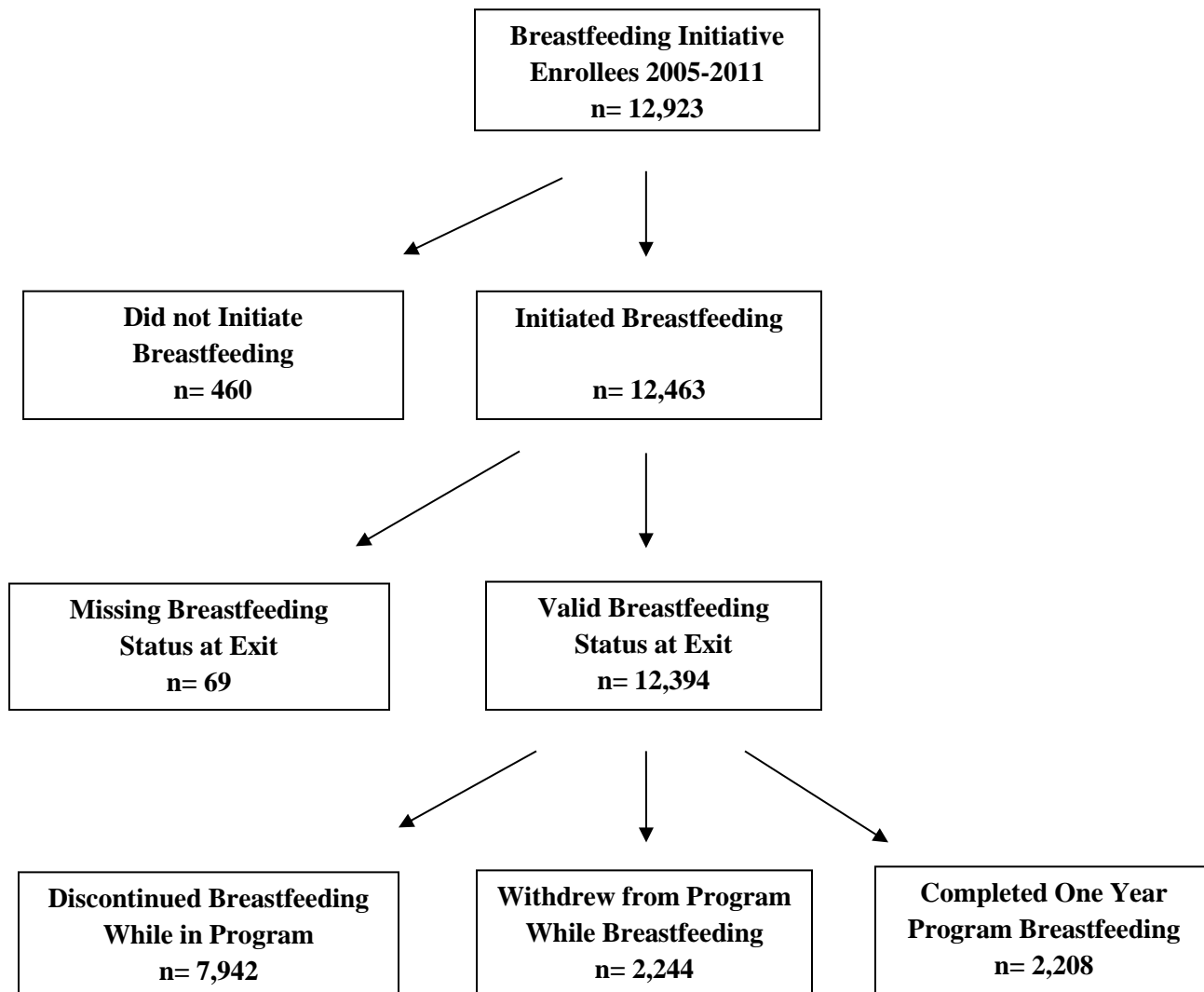


Table 3. Characteristics of Participants by Breastfeeding Status at Exit

	Total (n= 12394)^a	Discontinued Breastfeeding Before One Year (n=7942)	Withdrew While Breastfeeding (n=2244)	Completed One Year Program (n= 2208)	χ^2^b p-value
Maternal Age, Years ^c					
<20	2564 (20.9)	1837 (23.4)	466 (21.2)	261 (12.0)	<0.001
20-29	6823 (55.7)	4402 (56.0)	1221 (55.6)	1200 (55.0)	
≥30	2856 (23.3)	1626 (20.7)	510 (23.2)	720 (33.0)	
Education					
< High School Diploma	2868 (23.5)	1938 (24.8)	543 (24.6)	387 (17.8)	<0.001
High School Diploma or Equivalent	9345 (76.5)	5887 (75.2)	1669 (75.5)	1789 (82.2)	
Race/ Ethnicity					
White, Non-Hispanic	6901 (58.6)	4580 (60.3)	1123 (53.5)	1198 (57.9)	< 0.001
Black, Non-Hispanic	3206 (27.2)	2002 (26.3)	653 (31.1)	551 (26.6)	
Hispanic	1663 (14.1)	1018 (13.4)	323 (15.4)	322 (15.6)	
Marital Status					
Single/ Unmarried Couple	6877 (63.6)	4671 (66.6)	1262 (64.4)	944 (51.5)	< 0.001
Married	3930 (36.4)	2342 (33.4)	699 (35.7)	889 (48.5)	
Residence					
Cities/Towns < 50,000 and Rural	8219 (66.3)	5275 (66.4)	1438 (64.1)	1506 (68.2)	0.014
Cities/Suburbs of Cities > 50,000	4175 (33.7)	2667 (33.6)	806 (35.9)	702 (31.8)	
# Other Children in Household					
0	3247 (26.2)	2247 (28.3)	583 (26.0)	417 (18.9)	< 0.001
≥ 1	9147 (73.8)	5695 (71.7)	1661 (74.0)	1791 (81.1)	
Previous Breastfeeding Experience					
No	8348 (67.4)	5587 (70.4)	1498 (66.8)	1263 (57.2)	< 0.001
Yes	4046 (32.6)	2355 (29.7)	746 (33.2)	945 (42.8)	
Gestational Age					
Premature (<37 weeks)	1255 (10.1)	859 (10.8)	202 (9.0)	194 (8.8)	0.003
Full Term	11139 (89.9)	7083 (89.2)	2042 (91.0)	2041 (91.2)	
Birth Weight					
<2500 g	1057 (8.5)	735 (9.3)	184 (8.2)	138 (6.3)	< 0.001
≥ 2500 g	11337 (91.5)	7207 (90.8)	2060 (91.8)	2070 (93.8)	

^a n for individual variables may vary due to missing or incomplete data^b Chi-square test was used to compare categorical variables between enrollment types^c Variables presented as n(%)

Time of Enrollment

In this population, women who enrolled more than four weeks postpartum had significantly longer breastfeeding duration compared to women who enrolled prenatally or during the early postpartum period. One reason for this is based on the categories themselves; on average, participants in the late postnatal group had breastfed for approximately two months before entering the program, a period in which there are high rates of breastfeeding discontinuation in the low-income community (Sparks, 2011), and this initial success cannot be attributed to the program. Women in the late postnatal group were also more likely to have demographic characteristics associated with longer breastfeeding duration, including higher levels of education, married relationship status and previous breastfeeding experience. Women in the prenatal group were more likely to have characteristics associated with shorter breastfeeding duration, and this is consistent with previous findings (Bolton, et al., 2009; Sparks, 2011; Yun, et al., 2010). Though differences in breastfeeding outcomes persisted after adjustment for significant participant characteristics, differences between groups may extend to residual factors.

Women enrolling later postnatally likely enrolled in the program for a specific issue that needed addressing, such as guidance on breastfeeding when returning to work, rather than for general breastfeeding support. It may be advantageous for peer counselors to address these specific issues with the late postnatal mothers and leave subsequent contact to the discretion of the mother, especially if PC resources are limited. This would allow more time to focus on prenatal and early postnatal enrollees, who have characteristics associated with higher risk for early breastfeeding cessation.

Prenatal enrollment is often the idealized protocol of PC programs as it allows women to become familiarized with breastfeeding before birth and allows peer counselors to anticipate a mother's specific barriers. Comparatively, a mother who enrolls in the early postnatal period has demonstrated an increased intent to breastfeed since she has already initiated breastfeeding or is planning to do so in the immediate future. It is unclear if early postnatal enrollees would have benefited from prenatal enrollment, or if they would not have enrolled in the program if not for breastfeeding challenges. Even when breastfeeding rates were adjusted for participant characteristics, early postnatal enrollees demonstrated longer breastfeeding duration compared to prenatal enrollees. The increase in breastfeeding duration may have been a consequence of higher intent, and it would be advantageous for PC programs to measure this factor in the future. The prenatal group may encompass a broader group of women with varying levels of intent. It may be, then, that the program is successful in encouraging prenatal enrollees with low intent to attempt breastfeeding, although they may not breastfeed for long, thus reducing the average duration for this group. Therefore, trying to recruit mothers in the prenatal period may have more of an effect on those with lower intent compared to those with higher intent.

In agreement with previous studies, this study demonstrates that prenatal enrollees are characteristically different than postnatal enrollees and must be considered as a separate group when evaluating program efficacy (Jolly, et al., 2012; Gross, et al., 2011; Bolton, et al., 2009). It seems that there is self-selection occurring with time of enrollment, with higher risk participants enrolling earlier and lower risk participants enrolling later. This relationship occurs even between prenatal and early postnatal enrollees even though early postnatal enrollees were enrolling, on average, only 1.6 weeks postnatally. This study further demonstrates that even among postnatal enrollees, there is significant variation in breastfeeding duration. Prenatal

enrollment is often considered the idealized protocol of PC programs, and although this group demonstrated the highest likelihood of premature discontinuation, this may be an artifact of residual confounding from the participants' characteristics and intent rather than the prenatal enrollment itself.

Breastfeeding Status at Program Exit

Participants who did not complete the one-year program were more likely to have demographic characteristics associated with premature breastfeeding cessation compared to those who remained in the program breastfeeding for one year (Bolton, et al., 2009; Gross, et al., 2009; Flower, et al., 2008; Lynch, Bethel, Chowdhury, & Moore, 2012). Participants who withdrew while breastfeeding were characteristically more similar to those who discontinued breastfeeding than to participants who breastfed for one year. Participants who withdrew while breastfeeding breastfed about twelve weeks longer at program exit than participants who discontinued breastfeeding, and this is an underestimate of breastfeeding duration, since these women were theoretically still breastfeeding after program exit. It may be, then, that women in this group were more comfortable with breastfeeding and did not feel as though they needed further support. If a mother chooses to withdraw from the program while breastfeeding, it may be advantageous for the PCs to inquire if it would be acceptable for staff to follow-up with the participant in the future to determine how her breastfeeding went after withdrawal from the program in order to increase understanding of the women who are lost to follow-up. Regardless, it appears that women who withdraw while breastfeeding have lower risk of premature breastfeeding cessation and, in time of resource constraints, it may be beneficial for PCs to focus

their time and energy on retaining those who express interest in discontinuing breastfeeding, rather than retaining those who are choosing to withdraw while breastfeeding.

The results of this analysis are in agreement with previous literature defining mothers' demographic characteristics as predictors of breastfeeding duration for those enrolled in PC breastfeeding programs. It is our recommendation that, in the instance of restricted enrollment, women with the highest risk of breastfeeding discontinuation be prioritized as candidates for the PC program.

Strengths & Limitations

Though many studies have described participants in breastfeeding support programs, to our knowledge, none have examined characteristics by breastfeeding status at program exit and few have examined participants and program characteristics by time of enrollment. The data used in this analysis represents a large population of diverse, low-income women, and data was collected prospectively, which improves data accuracy. Additionally, in contrast to WIC programs which provide an array of services for women and infants, the BFI program is focused solely on breastfeeding education, support and encouragement and has had the resources to provide more extensive support compared with other PC programs.

Though specific groups may demonstrate certain patterns or characteristics, individuals within the groups may not, and it is important not to generalize assumptions according to group inclusion. The recommendations presented here are meant as guidelines for recognizing potential risk factors for breastfeeding discontinuation or program withdrawal and to prioritize enrollment, support, and PC resources.

Enrollment in the BFI program creates a selection bias in that only women who have the intent to breastfeed or are already breastfeeding choose to enroll in the program. Therefore, comparing breastfeeding rates for this program to the low-income population in general may be misleading. When examining participant and PC program data, it is important to remember the breastfeeding outcomes of those enrolling postnatally is not owed exclusively to inclusion in the program as women may have been breastfeeding for months prior to enrollment.

More studies are needed to examine how PC's characteristics and program components predict program success measured by participant satisfaction in addition to breastfeeding duration. Examination of these relationships would allow program facilitators to design programs that would optimize efficacy and efficiency.

Conclusion

Prenatal enrollees may represent a group of women with broader intent to breastfeed and more risk factors for premature cessation. Prenatal enrollees may be more likely to enroll for general breastfeeding support while later postnatal enrollees may be more likely to enroll for a specific issue and may only need assistance with that issue. It may not be necessary to invest significant resources on women enrolling later postnatally, as these women demonstrate longer breastfeeding durations. Resources may best be directed to prenatal and early postnatal enrollees. During periods of resource constraint in PC programs, it is advantageous to identify women who may be at the greatest risk of premature breastfeeding cessation. Although women who withdrew from the PC program while breastfeeding had demographic characteristics similar to those who discontinued breastfeeding, those who withdrew while breastfeeding still demonstrated

significantly longer breastfeeding duration. Therefore, PC resources may best be spent on focusing on women who indicate intent to discontinue rather than on women who discuss wanting to withdraw from the program while breastfeeding.

The 2011 Surgeon General's Call to Action to Support Breastfeeding and the 2010 Affordable Health Care Act recognize the importance of breastfeeding PCs to improve breastfeeding rates in the US. In order to accurately evaluate PC programs, it is necessary to evaluate participants separately according to their time of enrollment and breastfeeding status at program exit. This study contributes to the knowledge of variable breastfeeding outcomes according to breastfeeding status when women enter and leave a PC program. Without this knowledge, PC programs cannot be accurately examined for influence on breastfeeding outcomes, nor can they be developed to address the individual needs of participants. Attainment of this knowledge is critical to the development of effective, efficient PC programs that are tailored to the specific needs of participants.

CHAPTER FOUR:

IMPACT OF VARYING COMPONENTS OF A PEER COUNSELOR BREASTFEEDING SUPPORT PROGRAM ON BREASTFEEDING CESSATION IN LOW-INCOME WOMEN

Rozga, M.R., Kerver, J.M., Olson, B.H. (2014). Public Health Nutr. [Epub ahead of Print]

Abstract

Objective: Peer counseling (PC) programs have been shown to improve breastfeeding outcomes in populations at-risk for early discontinuation. Our objective was to describe associations between program components (individual and combinations) and breastfeeding outcomes (duration and exclusivity) in a PC program for low-income women.

Design: Secondary analysis of program data. Multivariable-adjusted Cox proportional hazards models were used to examine associations between type and quantity of peer contacts with breastfeeding outcomes. Types of contacts included in-person (hospital or home), phone, or other (e.g., mail, text). Quantities of contacts were considered “optimal” if they adhered to standard program guidelines.

Setting: Program data collected from 2005-11 in Michigan’s Breastfeeding Initiative PC Program.

Subjects: 5,886 low-income women enrolled prenatally.

Results: For each additional home, phone, and other PC contact there was a significant reduction in the hazard of discontinuing **any** breastfeeding by six months [HR (95% CI): 0.90 (0.88, 0.92); 0.89 (0.87, 0.90); and 0.93 (0.90, 0.96) respectively] and **exclusive** breastfeeding by three months [HR (95% CI): 0.92 (0.89, 0.95); 0.90 (0.88, 0.91); and 0.93 (0.89, 0.97) respectively]. Participants receiving greater than optimal in-person and less than optimal phone contacts had a reduced hazard of **any** and **exclusive** breastfeeding discontinuation compared to those who were

considered to have optimum quantities of contacts [HR (95% CI): 0.17 (0.14, 0.20) and 0.28 (0.23, 0.35) respectively].

Conclusions: Specific components of a large PC program appeared to have an appreciable impact on breastfeeding outcomes. In-person contacts were essential to improving breastfeeding outcomes, but defining optimal program components is complex.

Background

Breastfeeding reduces risk for a myriad of adverse health outcomes in both infant and mother (Johnston, et al., 2012; Van't Land, et al., 2010; Ip, et al., 2009; Stube, 2009).

Consequently, the American Academy of Pediatrics recommends six months of exclusive breastfeeding (infant consumes breast milk only with no regular consumption of other solids or liquids outside of necessary micronutrients or medications) and breastfeeding with appropriate complementary foods for one year or beyond (Johnston, et al., 2012). Most women in the US do not breastfeed for these recommended durations (CDC National Immunization Survey, 2014).

Rates are even lower in the low-income population (CDC Breastfeeding Rates by Sociodemographic Factors, 2013), which has higher risk of many of the health conditions prevented by breastfeeding (Braveman, et al., 2010; Smedley, et al., 2003). In order to improve breastfeeding rates in this population, many public health programs have implemented PC breastfeeding support programs. Breastfeeding education and support delivered by paraprofessionals has been shown to be at least as, if not more, effective as education and support delivered by health professionals (Gross, et al., 2009; Gross, et al., 2011; Renfrew, et al., 2012). Peer counselors are typically women recruited from the community who have had a

positive breastfeeding experience and are trained to provide breastfeeding support, education, and technical assistance to their peers (Chapman, et al., 2010; Rossman, 2007). This model has demonstrated efficacy in improving breastfeeding initiation rates, breastfeeding duration, and exclusive breastfeeding duration in the low-income population (Jolly, et al., 2012).

Procedures for implementing PC programs vary considerably. Heterogeneity between and within programs inhibits comparisons of the efficacy of program protocols on breastfeeding outcomes. To our knowledge, there are no studies in which the relationship between types and quantity of contacts and breastfeeding outcomes is investigated in the US. Jolly, et al. (2012) conducted a meta-analysis of PC programs and concluded that higher intensity PC programs (≥ 5 contacts planned) had a significantly increased positive effect on *any* breastfeeding duration compared to lower intensity programs (< 5 contacts planned), but this effect was not seen with *exclusive* breastfeeding duration (2012). A 2010 review of PC programs by Chapman, et al. concluded that there is a need to better define “prenatal, perinatal, and postnatal service delivery modes (phone, hospital/clinic based, home visits)” and “dosage needed (number of contacts...) for achieving specific breastfeeding outcomes.” A 2012 Cochrane review (Renfrew, et al.) elucidated that programs offering in-person support were more effective than programs offering phone or combined phone and face-to-face support.

The objective of this study was to investigate how program components—both individually and in combination—were associated with timing of *any* breastfeeding and *exclusive* breastfeeding discontinuation in 5,886 women prenatally enrolled in a PC breastfeeding support program. To realize the objective of this aim, we tested the hypotheses that 1) hospital visits improve breastfeeding outcomes, 2) home contacts improve breastfeeding outcomes to a greater extent than phone contacts, and 3) increased overall contacts improve

breastfeeding outcomes. This research contributes to the understanding of how individual and combinations of components of a PC program impact *any* breastfeeding and *exclusive* breastfeeding discontinuation and will allow, for the first time, evidenced-based design and adaptation of PC programs to increase efficacy.

Methods

The Breastfeeding Initiative Program

The BFI Program is operated through Michigan State University Extension and WIC, administered by the Michigan Department of Community Health and aims to provide breastfeeding education and support for low-income women using the PC model. The BFI was established in 1993. This and similar programs served as a template for the Loving Support Program practiced by WIC agencies (personal communication, Pat Benton, 2/13/2014). Participants are eligible for the BFI program if they are WIC-eligible (<185% of the poverty level), and most participants are recruited through their local WIC agencies.

Peer counselors are recruited from the community and are required to have a high school diploma, transportation, and a positive breastfeeding experience. Peer counselors receive basic breastfeeding and home visiting training, as well as ongoing education and support from International Board Certified Lactation Consultants (IBCLCs). Following program protocols developed by the state program leaders and consulting program IBCLCs, peer counselors aim to have at least one in-person contact with the participant in the prenatal period followed by monthly phone calls up until the baby's birth. Mothers may enroll at any time during the prenatal period. Additionally, peer counselors aim to visit participants in the hospital shortly after

delivery if this policy is established in the local hospital, and/or a phone call within two days following delivery, and/or at least one home visit as soon as possible after hospital discharge and another during the first month postpartum. The typical protocol is to call participants weekly during the first month postpartum and monthly through the first year of breastfeeding. Therefore, standard program guidelines call for 1-3 in-person contacts in the prenatal and early postnatal period. The standard quantity of phone contacts is dependent on the length of time the mother remains in the program and are as follows: 2-6 phone contacts for participants enrolled less than one month postpartum, 4-8 phone contacts for those enrolled 1-3 months postpartum, 7-11 phone contacts for those enrolled 4-6 months postpartum, 10-14 phone contacts for those enrolled 7-9 months postpartum, and 12-17 phone contacts for those enrolled over nine months postpartum. Participants remain enrolled in the program until they discontinue breastfeeding, choose to withdraw from the program while breastfeeding, or until the infant is one year of age.

Data Collection

Mothers' demographic characteristics were collected by the peer counselors at enrollment and infants' characteristics were collected at the first postpartum contact. At each postnatal visit, mothers were asked if they had introduced any solids or liquids to the infant other than breast milk to determine if the mothers had ceased *exclusive* breastfeeding. *Exclusive* breastfeeding was determined by subtracting the infant's date of birth from the date solids or liquids other than breast milk were introduced for mothers who initiated breastfeeding following delivery. *Any* breastfeeding duration was determined by subtracting infant's date of birth from the date the mother reported discontinuing breastfeeding at the first contact with the peer counselor after

discontinuation. For mothers who withdrew from the program while breastfeeding, *any* breastfeeding duration was censored at the last known date of breastfeeding. *Exclusive* breastfeeding duration was censored at the same date if the infant was exclusively breastfeeding at the time the mother withdrew from the program. The number and types of contacts were categorized as hospital (following delivery), home, phone, and other (which included mail, texts, or in-person contacts outside of the participant's home in a wide variety of settings including the WIC clinic, public venues, etc.). "Other" contacts encapsulated any form of non-standard contact between the peer counselor and participant. Data was entered into a database and inspected for inconsistencies and discrepancies by BFI staff. This study is a secondary analysis of the data collected for prenatal enrollees from October 2005 to September 2011, and was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects/patients were approved by the Institutional Review Board at Michigan State University. This study was considered exempt because all data was de-identified before it was used for research purposes.

Statistical Analysis

Stata 12.0 (StataCorp LP, College Station, TX, USA) was used for all statistical analyses. Participants were described according to their breastfeeding duration and compared using chi-square analysis. The survival analysis function was used to create survival curves demonstrating the probability of continuing breastfeeding for those who initiated breastfeeding. Cox Proportional Hazards Models were utilized to calculate hazard ratios (95% confidence interval) for predictors of *any* breastfeeding discontinuation (mother has ceased providing breast milk to

her infant) by six months postpartum and *exclusive* breastfeeding discontinuation (mothers has ceased providing *only* breast milk to her infant) by three months postpartum. This method allowed for the censoring of data, thereby permitting use of data from participants who withdrew from the program while breastfeeding (those who were lost to follow-up). The model building strategy was to test all individual variables using log rank tests and including all variables with $p < 0.2$ in the final multivariable-adjusted model.

To test the efficacy of the standard BFI Program protocol described above, chi-square tests were used to determine the likelihood of *any* breastfeeding for specific durations (< 1 month, 1-3 months, 4-6 months, 7-9 months, and >9 months) according to whether participants received an “optimal” quantity of in-person (hospital + home contacts) and phone contacts. A range of “optimal” phone contacts was included for each time period considered in order to accommodate variation in participant needs. In order to understand the role of the combination of contacts when controlling for demographic factors and censoring those who withdrew from the program while breastfeeding, we again utilized Cox regression. The primary predictor variable was the combination of contacts received from the peer counselor (optimum in-person/optimum phone, optimum in-person/< optimum phone, etc.), and results were adjusted for demographic variables included in the Cox Proportional Hazards Model above. This process was repeated using *exclusive* breastfeeding duration as the outcome variable.

For analysis of *exclusive* breastfeeding, values were considered invalid if duration exceeded seven months, was longer than breastfeeding duration, or if no date was entered for introduction of formula/solids or if this date was implausible (e.g. preceded date of birth).

Results

Participant Characteristics & Program Components

From 2005-2011, 5,886 women enrolled in the BFI Program prenatally. Of the 5,429 participants who initiated breastfeeding, 52.0% of women remained in the program breastfeeding for three months, and 33.5% remained in the program breastfeeding for six months, and 14.7% remained in the program breastfeeding for one year postpartum. While 68.0% of participants discontinued breastfeeding before one year, 17.3% withdrew from the program while breastfeeding, so we were not able to ascertain their time of breastfeeding discontinuation. Maternal and infant demographic characteristics for women prenatally enrolled who initiated breastfeeding are described in **Table 4**. The majority of participants 20-30 years of age, with a high school education, Non-Hispanic White, unmarried, living in small towns/cities or rurally, enrolled in WIC, and had a monthly income of \$800 or less and no prior breastfeeding experience. Participants eligible for, but not enrolled in, WIC were more likely to be Hispanic and less likely to be Non-Hispanic White (χ^2 ; $p < 0.001$), but were otherwise demographically similar to those enrolled in WIC. Compared to those who breastfed for at least one month, those who breastfed for less than one month were more likely to be younger, white, and unmarried, and were less likely to have a high school diploma or previous breastfeeding experience ($p < 0.001$ for each variable).

A small proportion of participants received a visit from the peer counselor while in the hospital after delivery (13.5%; $n = 795$). Participants received a mean (\pm SD) of 2.5 (± 2.5) home contacts (range: 0-26 contacts; IQR: 1, 3 contacts), 5.2 (± 4.4) phone contacts, and 1.1 (± 2.0) other contacts from their peer counselor (8.9 ± 6.5 total contacts). The mean length of time

participants were enrolled in the program was 31.3 (\pm 20.7) weeks, including a mean of 21.3 (\pm 18.4) weeks postnatally.

Compared to participants who were included in the *any* breastfeeding and *exclusive* breastfeeding analyses, participants with missing information (primarily from not providing information on specific demographic characteristics at enrollment) were more likely to be Non-Hispanic Black. Participants with missing information were more likely to not have a high school education and to live in a large city/suburb and have an infant who was premature and/or low birth weight. The differences in breastfeeding outcomes between those who were missing information and those who were not were generally relatively small.

Breastfeeding Duration

Within the study period, 92.2% of prenatal enrollees initiated *any* breastfeeding, and there was valid breastfeeding duration data for 99.3% of these participants (**Figure 2**). Participants who initiated breastfeeding breastfed for a mean (\pm SD) of 21.3 (\pm 18.4) weeks (IQR: 5.0, 37.6 weeks) while in the program. In general, the hazard of discontinuing *any* breastfeeding decreased as time progressed within the first year postpartum (**Figure 3**). Of the participants who initiated *any* breastfeeding, 77% were still breastfeeding at the end of the first month, 55% were breastfeeding at the end of three months, approximately 40% were breastfeeding at the end of six months, and 26% were still breastfeeding at one year. The unadjusted and multivariable-adjusted Cox Proportional Hazards Models describing the association between peer counselor contacts and risk of discontinuation is shown in **Table 5**.

Table 4. Participant Characteristics of Prenatal Enrollees by Any Breastfeeding Duration

	<1 month duration ^a (n=1,267)	≥1 month duration (n= 4,122)	χ^2 p-value
Maternal Age, years			
<20	432 (34.4) ^b	953 (23.4)	<0.001
20-30	659 (52.5)	2,255 (55.3)	
>30	165 (13.1)	872 (21.4)	
Education			
< High School Diploma	348 (27.7)	925 (22.8)	<0.001
High School Diploma or Equivalent	907 (72.3)	3,135 (77.2)	
Race/ Ethnicity			
White, non-Hispanic	867 (70.9)	2,296 (58.3)	<0.001
Black, non-Hispanic	269 (22.0)	1,150 (29.2)	
Hispanic	87 (7.1)	493 (12.5)	
Marital Status			
Single/ Unmarried Couple	885 (75.0)	2,348 (66.2)	<0.001
Married	295 (25.0)	1,198 (33.8)	
Monthly Income			
\$800 or less	661 (54.4)	2,089 (52.3)	0.20
\$801 or more	555 (45.6)	1,908 (47.7)	
Residence			
Towns and Cities < 50,000 and Rural	956 (75.5)	2,811 (68.2)	< 0.001
Cities and Suburbs of Cities >50,000	311 (24.6)	1,311 (31.8)	
Enrolled in WIC			
Yes	1,194 (94.2)	3,858 (93.6)	0.41
No	73 (5.8)	264 (6.4)	
# Other Children in Household			
0	687 (54.2)	1,966 (47.7)	<0.001
≥ 1	580 (45.8)	2,156 (52.3)	
Previous Breastfeeding Experience			
No	1,037 (81.9)	2,884 (70.0)	<0.001
Yes	230 (18.2)	1,238 (30.0)	
Infant Gender			
Male	641 (50.6)	2,105 (51.1)	0.77
Female	626 (49.4)	2,017 (48.9)	
Gestational Age			
Premature (<37 weeks)	109 (8.6)	325 (7.9)	0.41
Full Term	1,158 (91.4)	3,797 (92.1)	
Birth Weight			
<2500 g	1,177 (92.9)	3,858 (93.6)	0.38
≥ 2500 g	90 (7.1)	264 (6.4)	

WIC, Women, Infants, and Children Program

^a n for individual variables may vary due to missing or incomplete data^b Variables presented as n(%)

Figure 2. Flow Chart of Data Inclusion for Prenatal Enrollees in the Breastfeeding Initiative Program 2005-2011

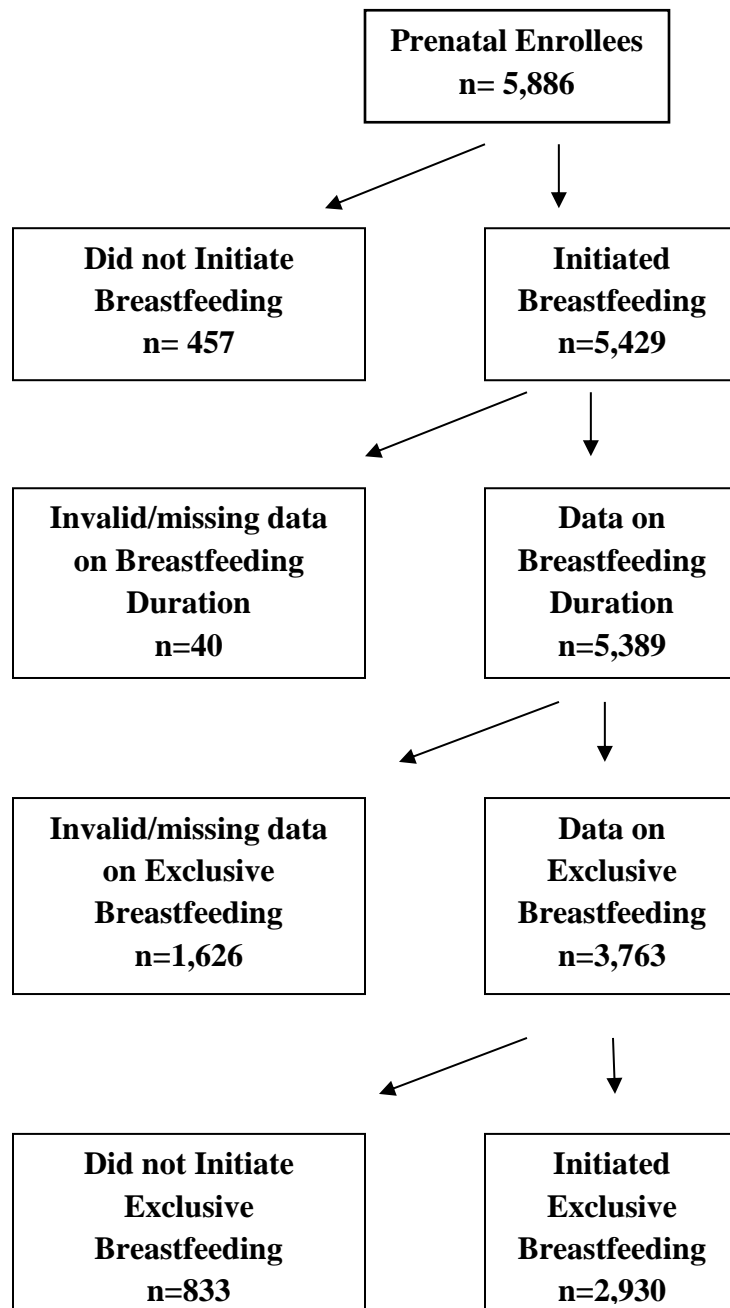


Figure 3. Kaplan Meijer Survival Curve Demonstrating Estimated Probability of Any Breastfeeding for Those Who Initiated Breastfeeding and Exclusive Breastfeeding for Those Who Initiated Exclusive Breastfeeding

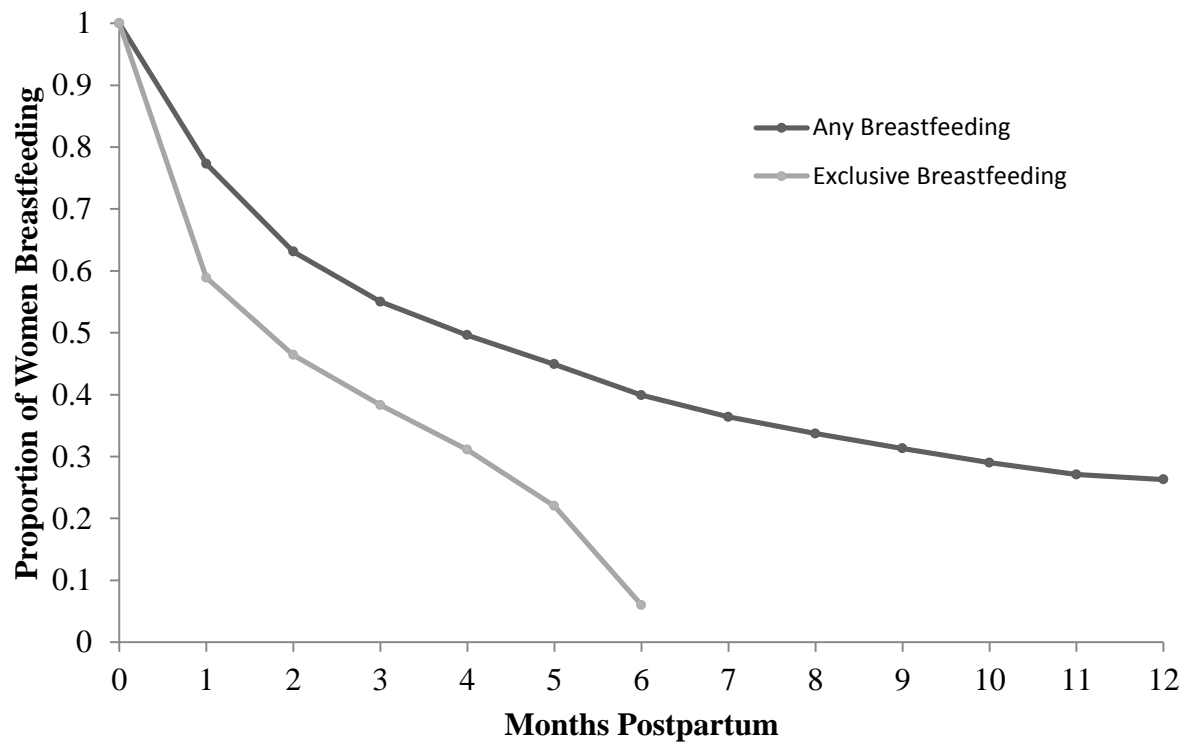


Table 5. Cox Proportional Hazards Models of Any Breastfeeding Discontinuation at Six Months Postpartum and Exclusive Breastfeeding at Three Months Postpartum

	Any Breastfeeding				Exclusive Breastfeeding			
	Model 1 ^a (n=5,388)		Model 2 ^b (n=4,437)		Model 1 ^a (n=2,930)		Model 2 ^b (n=2,459)	
	HR	95% CI	HR	95% CI	HR	95% CI	HR	95% CI
Program Components								
<i>Hospital Contact</i>								
0	1.0	-	1.0	-	1.0	-	1.0	-
≥1	0.92	0.83, 1.03	1.06	0.93, 1.20	0.89	0.78, 1.02	0.93	0.79, 1.10
<i>Home Contacts</i> ^c	0.90***	0.89, 0.92	0.90***	0.88, 0.92	0.92***	0.90, 0.93	0.92***	0.89, 0.95
<i>Phone Contacts</i>	0.90***	0.89, 0.91	0.89***	0.87, 0.90	0.90***	0.89, 0.95	0.90***	0.88, 0.91
<i>Other Contacts</i>	0.94***	0.91, 0.96	0.93***	0.90, 0.96	0.92***	0.89, 0.95	0.93***	0.89, 0.97
Maternal Characteristics ^c								
<i>Age (Years)</i>								
<20			1.0	-			1.0	-
20-30			0.92	0.84, 1.02			1.04	0.91, 1.19
>30			0.91	0.79, 1.04			1.06	0.89, 1.26
<i>Race/Ethnicity</i>								
Non-Hispanic White			1.0	-			1.0	-
Non-Hispanic Black			0.90	0.76, 1.01			1.06	0.87, 1.28
Hispanic			0.97	0.83, 1.14			0.92	0.74, 0.13
<i>Marital Status</i>								
Single/Unmarried Partner			1.0	-			1.0	-
Married			0.91	0.83, 1.00			0.89	0.79, 1.01
<i>Education</i>								
< High School Diploma			1.0	-			1.0	-
High School Diploma or Equivalent			0.90*	0.82, 1.00			0.95	0.82, 1.08
<i>Monthly Income</i>								
\$800 or less			1.0	-			1.0	-
\$801 or more			0.94	0.86, 1.02			0.96	0.86, 1.07
<i>Residence</i>								
Towns and Cities < 50,000 and Rural			1.0	-				
Cities and Suburbs of Cities >50,000			0.89	0.76, 1.03				

Table 5 (cont'd).

<i>Enrolled in WIC</i>								
No			1.0	-			1.0	-
Yes			0.89	0.74, 1.07			0.98	0.76, 1.26
<i># Other Children in Household</i>								
0			1.0	-			1.0	-
≥ 1			1.05	0.95, 1.15			1.06	0.94, 1.20
<i>Previous Breastfeeding Experience</i>								
No			1.0	-			1.0	-
Yes			0.78***	0.69, 0.87			0.83*	0.72, 0.97
<i>Infant Characteristics</i>								
<i>Birth Outcome</i>								
Full Term			1.0	-			1.0	-
Preterm			1.25**	1.07, 1.46			1.11	0.89, 1.40
<i>Birth weight</i>								
Normal			1.0	-			1.0	-
LBW			1.01	0.85, 1.20			0.99	0.78, 1.26

WIC, Women, Infants, and Children Program

^aResults adjusted for other types of contacts.

^bResults additionally adjusted for all variables listed and enrollment county

^c Home, phone, and other contacts treated as continuous variables

***p< 0.001

Of all maternal and infant characteristics tested, all were significant (based on our model-building criteria of $p < 0.2$) except infant sex in univariate models. Results varied little after adjustment for maternal and infant characteristics. There was no difference in the overall hazard ratio of breastfeeding discontinuation between women who received a peer counselor visit in the hospital and those who did not. Subsequent chi-square analysis revealed that, compared to mothers who did not receive a hospital visit, mothers who did receive a hospital visit from their peer counselor were more likely to breastfeed for at least one month (75.6% and 81.9% respectively; χ^2 : $p < 0.001$). All other types of peer counselor contacts, however, were highly significant (**Table 5**). For every one additional home contact the participant received, there was a 10% reduction in the hazard ratios of discontinuing breastfeeding by six months postpartum ($p < 0.001$). Similarly, for every one additional phone contact the participant received, there was an 11% reduction in the hazard ratio ($p < 0.001$), and every one additional “other” contact conferred a 7% reduction in the hazard ratio of discontinuation by six months postpartum ($p < 0.001$).

In the final multivariable-adjusted model, women who had at least a high school diploma or its equivalent (HR 95% CI: 0.90 (0.81, 1.00); $p < 0.05$), and previous breastfeeding experience (HR 95% CI: 0.78 (0.69, 0.87); $p < 0.001$) had a significantly reduced risk of discontinuing breastfeeding by six months postpartum. Mothers who had an infant who was premature had an increased hazard of discontinuing breastfeeding by six months postpartum (HR 95% CI: 1.25 (1.07, 1.46); $p < 0.01$). The likelihood ratio χ^2 score increased with the addition of the second model, demonstrating a more complete fit.

Exclusive Breastfeeding Duration

During this study period, valid data on exclusive breastfeeding was collected for 70% of women who initiated breastfeeding. Of those, 78% initiated *exclusive* breastfeeding (exclusively breastfed at least one day) (**Figure 2**). For those who initiated exclusive breastfeeding, mean (\pm SD) *exclusive* breastfeeding duration was 11.1 (\pm 9.8) weeks (IQR: 2.0, 20.9 weeks).

A survival curve was generated for *exclusive* breastfeeding for six months postpartum, as this is the recommended *exclusive* breastfeeding duration (**Figure 3**). Of the participants who initiated *exclusive* breastfeeding, approximately 60% were exclusively breastfeeding at the end of month one postpartum, 38% were *exclusively* breastfeeding at three months, and only 6% were *exclusively* breastfeeding at six months postpartum. The Cox Proportional Hazards Model with significant predictors of discontinuation of *exclusive* breastfeeding by three months postpartum is shown in **Table 5**. Of all maternal and infant characteristics tested, only residence and infant sex were not significant predictors of *exclusive* breastfeeding discontinuation in univariate analysis. Similar to the results for breastfeeding duration, there was little difference in the association of the types of contacts according to whether they were adjusted for maternal and infant characteristics. There was no variation in hazard according to whether the participant received a visit from her peer counselor while in the hospital. For every one increase in the home contacts received, there was an 8% decrease in the hazard of discontinuing *exclusive* breastfeeding by three months postpartum ($p < 0.001$), and the hazard was reduced by 10% for every additional phone contact ($p < 0.001$), and 7% for every additional other contact ($p < 0.01$).

The only maternal demographic characteristic that was a significant predictor of discontinuation in the final model was previous breastfeeding experience (HR 95% CI: 0.83

(0.72, 0.97); $p < 0.05$). The likelihood ratio χ^2 score increased with the addition of the second model, demonstrating a more complete fit.

Program Protocols

Percentages of participants breastfeeding for specified durations according to whether the participant received “optimal” in-person and phone contacts (described above) are described in **Table 6**. In general, the likelihood of breastfeeding for a longer duration decreased for those who received less than “optimal” or “optimal” in-person contacts, but increased for those receiving more in-person contacts than was considered optimal ($p < 0.001$). Conversely, the likelihood of breastfeeding for a longer duration tended to increase for those who received less than the “optimal” quantity of phone contacts, but decreased for those receiving an “optimal” quantity. The results for those receiving more phone contacts than was considered optimal were mixed, but there was less likelihood of breastfeeding for longer durations for those in this category ($p < 0.001$). These trends persisted for *exclusive* breastfeeding duration (**Table 7**). To explore whether results would be altered if those with unknown breastfeeding durations were eliminated (those who withdrew from the program while breastfeeding), the data was analyzed without these participants, and results were nearly identical (data not shown).

A vast majority of participants (92.2% of those with *any* breastfeeding and 91.2% of those with *exclusive* breastfeeding data) received five out of the nine potential combinations of program protocols (**Table 8**). Compared to women who received an “optimal” quantity of both in-person and phone contacts, those who received the other most common protocols had a reduced hazard of discontinuing *any* breastfeeding by six months postpartum and *exclusive*

Table 6. Any Breastfeeding Duration According to Receipt of “Optimum” BFI Program Protocols (%)^a

	<1 month (n= 1,267)	1-3 months (n= 1,688)	4-6 months (n= 862)	7-9 months (n=328)	>9 months (n= 1,244)	χ^2 p-value
In-person Contacts^b						
< Optimal	6.8	5.8	2.8	5.2	2.7	< 0.001
Optimal	80.6	74.2	69.4	67.7	56.9	
> Optimal	12.6	20.0	27.8	27.1	40.4	
Phone Contacts^c						
< Optimal	17.1	43.3	67.1	83.8	75.2	< 0.001
Optimal	74.4	46.5	27.2	16.2	18.9	
> Optimal	8.5	10.3	7.8	0	5.9	

BFI, Breastfeeding Initiative

^aBased on BFI Program guidelines for scheduled prenatal phone contacts and home visit, early postnatal hospital and home visits, and postnatal phone contacts.

^bIn-person contacts include visits in the hospital after delivery and home visits. “Optimal” is defined as 1-3 contacts regardless of time in program.

^cThe “Optimal” quantity of phone contacts is dependent on time in program: <1 month= 2-6 contacts; 1-3 months= 4-8 contacts; 4-6 months= 7-11 contacts; 7-9 months= 10-14 contacts; >9 months= 12-17 contacts.

Table 7. Exclusive Breastfeeding Duration According to Receipt of “Optimum” BFI Program Protocols (%)^a

	<1 month (n= 1,180)	1-3 months (n= 841)	> 4 months (n= 908)	χ^2 p-value
In-person Contacts^b				
< Optimal	7.0	5.1	2.5	< 0.001
Optimal	72.6	66.7	53.2	
> Optimal	20.3	28.2	44.3	
Phone Contacts^c				
< Optimal	34.6	51.5	68.5	< 0.001
Optimal	56.4	37.8	25.1	
> Optimal	9.0	10.6	6.4	

BFI, Breastfeeding Initiative

^aBased on BFI Program guidelines for scheduled prenatal phone contacts and home visit, early postnatal hospital and home visits, and postnatal phone contacts.

^bIn-person contacts include visits in the hospital after delivery and home visits. “Optimal” is defined as 1-3 contacts regardless of time in program.

^cThe “Optimal” quantity of phone contacts is dependent on time in program: <1 month= 2-6 contacts; 1-3 months= 4-8 contacts; 4-6 months= 7-11 contacts; 7-9 months= 10-14 contacts; >9 months= 12-17 contacts.

Table 8. Cox Proportional Hazard of Discontinuing Any Breastfeeding by Six Months and Exclusive Breastfeeding by Three Months According to BFI Program Protocol

Contacts with Peer Counselor		Any Breastfeeding Adjusted ^a (n=4,077)		Exclusive Breastfeeding Adjusted ^b (n=2,231)	
In-Person ^c	Phone ^d	HR	95% CI	HR	95% CI
Optimal	< Optimal	0.29***	0.26, 0.32	0.50***	0.44, 0.57
Optimal	Optimal	1.0	-	1.0	-
Optimal	> Optimal	0.83*	0.69, 0.98	0.86	0.67, 1.10
> Optimal	< Optimal	0.17***	0.14, 0.20	0.28***	0.23, 0.35
> Optimal	Optimal	0.53***	0.44, 0.63	0.56***	0.45, 0.71

BFI, Breastfeeding Initiative; WIC, Women, Infants, and Children Program

^aResults adjusted for mother's age, race/ethnicity, marital status, education, income level, WIC enrollment, residence, presence of other children in the household, previous breastfeeding experience, enrollment county, and infant birth outcome and birth weight

^bResults adjusted for mother's age, race/ethnicity, marital status, education, income level, WIC enrollment, presence of other children in the household, previous breastfeeding experience, enrollment county, and infant birth outcome and birth weight

^cIn-person contacts include visits in the hospital after delivery and home visits. "Optimal" is defined as 1-3 contacts regardless of time in program.

^dThe "Optimal" quantity of phone contacts is dependent on time in program: <1 month= 2-6 contacts; 1-3 months= 4-8 contacts; 4-6 months= 7-11 contacts; 7-9 months= 10-14 contacts; >9 months= 12-17 contacts.

*p<0.05, **p<0.01, ***p< 0.001

breastfeeding by three months postpartum in both the unadjusted and adjusted models. In line with the previous results, the lowest hazard of discontinuation occurred for those who received greater than “optimal” in-person contacts and less than “optimal” phone contacts ($p < 0.001$ for *any* and *exclusive* breastfeeding), followed by those who received “optimal” in-person contacts and less than “optimal” phone contacts ($p < 0.001$ for *any* and *exclusive* breastfeeding).

Discussion

The objective of this study was to investigate and understand how individual and combinations of program components were associated with *any* breastfeeding and *exclusive* breastfeeding discontinuation. For *any* breastfeeding, hazard of discontinuation was the highest in the first two months, and leveled off at approximately six months. The rates for *exclusive* breastfeeding, conversely, decreased sharply in the first month and began to decline steeply again at four months, an age at which previous research has demonstrated many women begin introducing solids to their infants (Clayton, Li, Perrine, & Scanlon, 2013). The rates for *any* and *exclusive* breastfeeding in this study were higher than those seen in the general low-income population in Michigan, in which only 8.5% of women breastfeed until one year and only 5.9% of women *exclusively* breastfeed for six months (CDC Pediatric Nutrition Surveillance, 2012). It is possible this reflects both an increased intent to breastfeed among participants enrolling in the program and the BFI Program intervention itself.

In agreement with prior findings, women who were married, had more education and previous breastfeeding experience were at lower risk of breastfeeding discontinuation, both in the comparison of those discontinuing breastfeeding before one month with those who breastfed

at least one month, and in the adjusted regression models (CDC National Immunization Survey, 2014; Bolton, et al., 2009; Tenfelde, Finnegan, Miller, & Hill, 2012). In contrast to prior findings, however, age and race were not significant predictors of risk of discontinuation in the final models (CDC National Immunization Survey, 2014; Tenfelde, et al., 2012; Jones, Kogan, Singh, Dee, & Grummer-Strawn, 2011). This may be an effect of a more complete model which included program protocols to explain outcomes. In an analysis of predictors of *exclusive* breastfeeding in the general population, ethnicity was a significant predictor, but race was not (Jones, et al., 2011). The lack of differences between race/ethnicity groups is surprising, but the results suggest that a peer counselor program can be effective in eliminating racial/ethnic disparities in breastfeeding rates in low-income populations through the use of increased support and education. A majority of the participants (71.4%) in this study had the same race/ethnicity as their peers, but this factor was not a significant predictor of breastfeeding duration or EBF duration in preliminary analysis.

To our knowledge, this is the first individual study to examine the relationship between quantity and types of contacts between peer counselors and participants and breastfeeding outcomes (duration and exclusivity) in the US. Counter to our first hypothesis, those who received a contact from their peer counselor while in the hospital did not have a significantly decreased risk of discontinuation compared to those who did receive a contact. Measurement of whether a participant received a hospital contact may not be an accurate reflection of her experience with breastfeeding support and education while in the hospital, as many hospitals employ IBCLCs or other breastfeeding professionals to assist mothers postpartum. The data did demonstrate, however, that women who received a visit from their peers while in the hospital were more likely to breastfeed for at least one month, though this was a small proportion of the

population. The period immediately following delivery is a crucial time for establishing successful breastfeeding. However, mothers may not access health services, such as peer counseling, until after this period. Although peers in the BFI program aim to visit mothers in their homes as soon after delivery as possible, this ideal may not be actualized; further investigation into the impact of a hospital visit from the peer counselor after delivery on breastfeeding outcomes is needed.

Consistent with our additional hypotheses, each of the other types of contacts did have a significant impact on breastfeeding success. The reduction in risk for additional home visits is in agreement with a randomized controlled trial in peri-urban Mexico, in which the authors demonstrated increased exclusive breastfeeding success in participants receiving six home visits compared to those receiving three or no visits (Morrow, et al., 1999). Home, phone, and other contacts all had similar relationships with the reduction in risk of *any* breastfeeding discontinuation by six months postpartum and *exclusive* breastfeeding discontinuation by three months postpartum. Though it is tempting to infer that phone contacts were as effective as home contacts at decreasing risk, this is not supported by prior literature (Renfrew, et al., 2012). More likely, the similar relationships may signify that peer counselors were able to deliver support and education by the appropriate types of contacts at the appropriate times postpartum. It must also be recognized that phone contacts are the most highly correlated with *any* breastfeeding duration ($r = 0.41$; $p < 0.001$) and *exclusive* breastfeeding duration ($r = 0.39$; $p < 0.001$) as phone contacts become the primary method of contact in the later postpartum period; in general, the longer a participant stays in the program breastfeeding, the more phone contacts she receives. Home contacts, conversely, typically occur in the prenatal and early postnatal period and are not necessarily dependent on length of time in the program.

The relative importance of home contacts compared to phone contacts is demonstrated in the analyses concerning “optimal” program protocols. In general, greater in-person contacts and fewer phone contacts were associated with more beneficial breastfeeding outcomes. These results are consistent with a Cochrane review of PC programs that concludes that face-to-face contacts are more efficacious than phone contacts (Renfrew, et al., 2012). The protocols of this program were determined by breastfeeding professionals. It may be advantageous, however, to reconsider the quantity and types of contacts that are considered “optimal”, as those receiving “optimal” contacts, both in-person and phone, were the most likely to breastfeed for less than one month. This may be, in part, due to the higher likelihood of women in this group being younger, unmarried, and having a lower education and no prior breastfeeding experience, all of which are risk factors, and may extend to residual confounders, for early termination (CDC National Immunization Survey, 2014; Bolton, et al., 2009; Tenfelde, et al., 2012). There were no differences in infant gestational age or birth weight between those who breastfed less than a month and those who breastfed at least one month that would explain shorter breastfeeding durations. Considering the trends across time periods, however, these findings warrant further investigation into program protocols that result in improved breastfeeding outcomes. Although increased home visits seem to result in longer *any* breastfeeding and *exclusive* breastfeeding duration, offering more in-person contacts may not be practical for many programs due to the high cost and potential liability of home visiting. This data demonstrates that phone contacts can be effective if not over-utilized but reinforces the importance of including home visiting in peer counseling breastfeeding support programs.

Strengths & Limitations

The data utilized in this study were collected prospectively throughout the participants' breastfeeding experience, thus decreasing risk of recall bias. The large sample size in this study increases both reliability and generalizability to other low-income prenatal enrollees in PC breastfeeding support programs. Using Cox Proportional Hazard Regression allowed for the valid use of participant information for those who withdrew from the program while breastfeeding, or were lost to follow-up, thus reducing risk of bias from eliminating this select proportion of the population.

The data utilized in this study was collected for the purposes of a public program rather than for research use. One important limitation was the wide variety of contacts summarized in the "other" category, which ranged from texts and mailings to visits in the WIC clinic or impromptu meetings in the community. Though the variety of communications in this category makes it difficult to draw specific conclusions, it is evident that this type of contact was impactful. This is most likely because these contacts were tailored to the specific needs of the individual participants, a crucial tenant of PC breastfeeding support programs. In addition, there was a large proportion of women (30%) for which there was not reliable exclusive breastfeeding duration data. This was due, in part, to low documentation of this variable in the early study period, which increased by over 25% by the end of the study period. Though the rates of *exclusive* breastfeeding are much higher in this population compared to the low-income population in Michigan in general (CDC Pediatric Nutrition Surveillance, 2012), this is consistent with the higher rates of *any* breastfeeding noted, for which there is near complete data.

Though examining the effects of protocols is necessary for program evaluation, in the case of a peer counseling breastfeeding support program, the results must be interpreted with caution. Though most types of contacts did show a benefit in reducing risk of *any* and *exclusive* breastfeeding discontinuation, it must be kept in mind that the quantity and types of contacts are not only dependent on program protocols, but also on the needs of the participants and the discretion of the peer counselors. Therefore, a participant with more breastfeeding problems, who may be at higher risk of breastfeeding discontinuation, may actually receive more contacts from her peer counselor than a woman for whom breastfeeding is going smoothly and is at low risk of discontinuation. Additionally, this analysis only describes the impact of the quantity, rather than the quality, of contacts between the peers and participants. Though peers receive consistent training, it is likely that some peers are more effective than others. At the time of this analysis, the BFI program typically employed one peer counselor in each county, and results were adjusted for enrollment county. Thus, differences in the quality of program implementation were indirectly controlled.

Conclusions

Peer counseling breastfeeding support programs have been shown to improve breastfeeding outcomes in the low-income population, though program protocols and the degree of efficacy have largely been heterogenous in nature. This study demonstrates that specific program components may have an appreciable impact on *any* and *exclusive* breastfeeding discontinuation and may even attenuate the impact of maternal and infant characteristics that typically increase risk for discontinuation. The current study demonstrates the importance of in-

person contacts between participants and trained peer counselors compared to phone contacts and further demonstrates that the combination of in-person and phone contacts may have an appreciable impact on breastfeeding outcomes.

CHAPTER FIVE:

SELF-REPORTED REASONS FOR BREASTFEEDING CESSATION AMONG LOW-INCOME WOMEN ENROLLED IN A PEER COUNSELING BREASTFEEDING SUPPORT PROGRAM

Rozga, M.R., Kerver, J.M., Olson, B.H. (2014). Accepted to the Journal of Human Lactation.

Abstract

Background: Peer counseling programs have demonstrated efficacy in improving breastfeeding rates in the low-income population, but there is little research concerning *why* women enrolled in these programs ultimately discontinue breastfeeding.

Objective: To describe the self-reported reasons for discontinuing breastfeeding among women who are receiving peer counseling support by participant characteristics and timing of discontinuation.

Methods: This study is a secondary analysis of data collected from 7,942 participants who discontinued breastfeeding while enrolled in a peer counseling breastfeeding support program from 2005 to 2011. Reasons for discontinuing breastfeeding were assessed in relation to participant characteristics and weaning age using chi-square analyses and Kruskal-Wallis ANOVA.

Results: The most common reasons reported for discontinuing breastfeeding were “Mother’s Preference” (39%) and “Low Milk Supply” (21%); although reasons differed by age of infant weaning ($p < 0.001$). Among participants who discontinuing the earliest, the most commonly cited reasons were “Breastfeeding Challenges” [Median duration (IQR): 4.7 (2.0, 13.4) weeks], followed by “Low Milk Supply” [8.9 (4.6, 19.1) weeks] and “Mother’s Preference” [12.9 (5.0, 25.7) weeks]. Women who were younger, less educated, Non-Hispanic Black, unmarried, and

had no prior breastfeeding experience were the most likely to discontinue breastfeeding due to “Mother’s Preference”.

Conclusion: Peer counselors are in a unique position to offer breastfeeding education and encouragement and may be able to use evidence presented here to anticipate specified concerns either prenatally or postpartum, to prevent early breastfeeding discontinuation.

Background

Mothers and infants who breastfeed are at lower risk for many adverse health conditions compared to their formula-feeding counterparts. Therefore, the AAP recommends that infants are breastfed for one year or beyond (Johnston, et al., 2012). Unfortunately, only 17.9% of low-income mothers in the US breastfeed for one year (CDC Pediatric Nutrition Surveillance, 2012), despite the higher risk of adverse health conditions in this population that may be improved by breastfeeding (Braveman, et al., 2010; Smedley, et al., 2003). To address these low rates, PC breastfeeding support programs have been implemented throughout the US. In these programs, each mother is matched with a peer who has been recruited from the community, has breastfeeding experience, and has been trained to provide breastfeeding education and support (Chapman, et al., 2010; Rossman, 2007). PC programs have demonstrated efficacy in improving breastfeeding rates in the low-income population (Jolly, et al., 2012). The US Department of Agriculture has recognized the efficacy of PC and allocated 60 million dollars for WIC breastfeeding PC for 2014 (Catalog of Federal Domestic Assistance, 2014).

The goal of PC programs is to help women reach their breastfeeding goals, yet there is little detail on the reasons women in these programs discontinue breastfeeding, and few studies

have associated reasons for cessation with infant age at weaning or maternal characteristics. This information may be utilized to tailor program delivery. To our knowledge, there has been no prior examination of these factors in PC programs.

Prior literature has demonstrated that, compared to higher income women, WIC participants were more likely to agree that breastfeeding could be embarrassing or difficult in public and was painful and uncomfortable. WIC participants were also more likely to not initiate or stop breastfeeding if their partner did not support breastfeeding (Wojcicki et al., 2010). In the IFPS II, WIC-eligible mothers were more likely to discontinue because “Breast milk alone did not satisfy my baby” compared to higher-income mothers, though timing of discontinuation within this demographic group was not explored (Li, et al., 2008).

The IFPS was also conducted with prenatally enrolled WIC participants (McCann, et al., 2007). Although the results of this study are helpful in examining the proportion of low-income women who experience breastfeeding problems during the postpartum period, they generally only reveal that women who continue to breastfeed until five months experience fewer issues as time progresses. The authors did not report other common reasons for breastfeeding discontinuation including return to work/school and lack of social support.

Authors analyzing the IFPS II and the PRAMS national surveys concluded that reasons for stopping breastfeeding were associated with infant age (Li, et al., 2008; Ahluwalia, et al., 2005). However, the IFPS II sample consisted primarily of married, white, middle-class Americans and it is not clear how reasons for discontinuation differed between low-income participants and those in the general population in the PRAMS study; results may not be

generalized to low-income mothers, since barriers vary greatly between these populations, especially in regards to work environment and social support (Hedberg, 2013).

Although there is an abundance of literature describing breastfeeding barriers and reasons for discontinuation, there is a significant gap in the literature regarding reasons for breastfeeding discontinuation for women enrolled in PC programs. Elucidation of these reasons is important, as it may inform design of educational curriculum for breastfeeding mothers that anticipates and addresses reasons for discontinuation. This method may be of particular benefit in the PC model because peer counselors' interact with mothers throughout their breastfeeding experiences. The objective of this study was to determine the reasons women discontinue breastfeeding in a PC breastfeeding support program and to examine if these reasons vary by timing of discontinuation or participant characteristics, in order to provide evidence-based suggestions for practice in PC programs. We hypothesized that 1) the reason for discontinuation would be associated with infant age at weaning, and 2) these reasons would vary according to participant characteristics.

Methods

The Breastfeeding Initiative Program

The Breastfeeding Initiative (BFI) Program is operated by Michigan State University Extension and the Michigan Department of Community Health's WIC program. Peer counselors are recruited from the community and are required to have a high school diploma or its equivalent, transportation, and a positive breastfeeding experience. The peer counselor is initially provided basic breastfeeding and home visiting training followed by ongoing lactation and breastfeeding support education.

Participants are eligible for the BFI Program if they are WIC eligible (<185% of the poverty level). They are primarily recruited through their local WIC agencies and may enroll prenatally or postnatally. Peer counselors primarily contact participants through home visits and phone calls. Other in-person contacts include visits in WIC clinics or other public settings and electronic communication such as text messaging. Participants are enrolled in the program until they discontinue breastfeeding, choose to withdraw from the program while breastfeeding, or until the infant is one year of age.

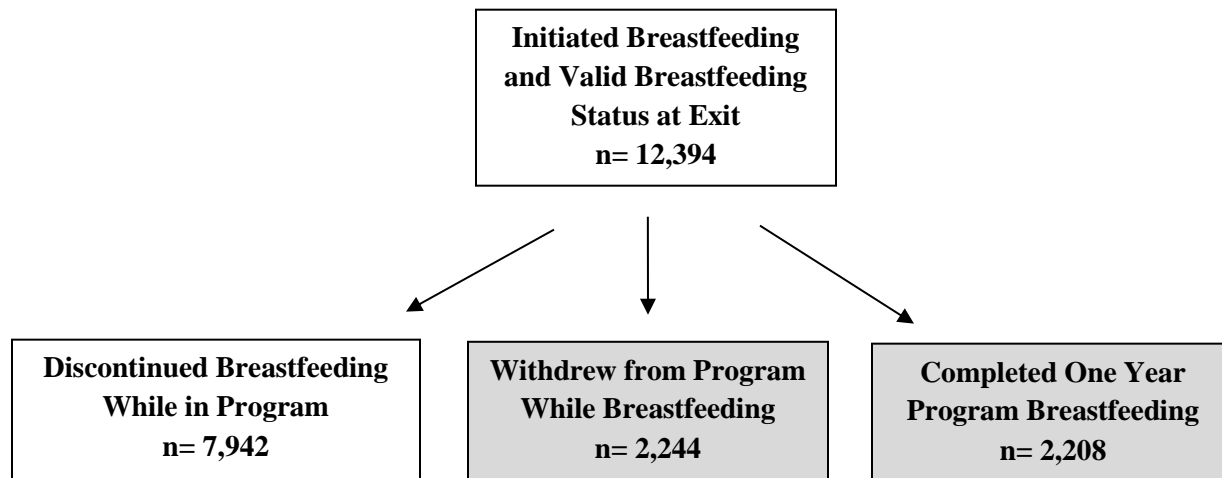
Data Collection

The BFI program is designed to support participants through their first year of breastfeeding. This secondary analysis includes women who were enrolled in the program from October 2005 until September 2011 and discontinued breastfeeding while enrolled in the BFI program (n= 7,942). Reason for discontinuation was not captured for participants who withdrew from the program while breastfeeding or breastfed until the maximum enrollment length of one year, and these participants were excluded from analysis (**Figure 4**).

Mothers' demographic characteristics were collected by the peer counselors upon enrollment. Infants' birth information was collected during the first contact after birth for prenatal enrollees and upon enrollment for postnatal enrollees. Completed breastfeeding information, including breastfeeding duration and reason for cessation, was collected upon participant exit from the program. Breastfeeding duration was determined by subtracting infant's date of birth from the date the mother reported discontinuing breastfeeding at the first contact

with the peer counselor after discontinuation. All information was entered into a database by BFI staff.

Figure 4. Flow Chart for Sample Size and Breastfeeding Status at Program Exit



Reasons for Discontinuing Breastfeeding

Upon exiting the program, mothers who discontinued breastfeeding were asked to identify their primary reason for cessation from a list of nine reasons with definitions (**Table 9**). The list of reasons for discontinuing was created by a team of peer counselors and lactation consultants from the BFI program based on prior observation and common reasons given for cessation by participants. The reason given for discontinuation is typically the product of a conversation between the peer counselor and participant, often over the phone, at participant exit. Participants may only choose one reason. If a reason cannot be categorized by one of the options listed, the peer counselor may choose “other” and identify the specific reason. Though the

mother and peer counselor determine the final reason together, the peer counselor ultimately documents the reason given for discontinuation (Personal communication with Pat Benton, Program Manager, 2/13/2014). For the purposes of this analysis, “Mother returning to work” and “Mother returning to school” were combined into one category.

Table 9. Survey Response Options for Participants to Report Primary Reason for Discontinuing Breastfeeding

Reason	Examples
Breastfeeding Challenges	Infant won't latch Nipples inverted/flat or sore Physical discomfort Biting/Teething
Doctor Recommended	
Infant's Medical Condition	Premature Hospitalization Acid reflux Thrush
Lack of Social Support	In hospital, by partner, family, or employer
Low Milk Supply	Mother doesn't think infant is getting enough milk Concerns about infant's weight Infant always hungry
Mother's Medical Condition/Medications	Hospitalization/illness Mastitis Breast surgery Taking medications/birth control
Mother's Preference	Met goals Too demanding Prefers formula Planning pregnancy Embarrassment
Mother Returning to Work	Barriers at work
Mother Returning to School	Barriers at school
Other	Specify

Statistical Analysis

A Kruskal-Wallis ANOVA test was used to determine if the distribution in timing of discontinuation varied according to the reasons mothers gave for cessation. Median breastfeeding durations were described for each reason of discontinuation. Seven of the reasons listed encapsulated a vast majority of the reasons given by participants (97.6%). Chi-square analysis was used to test associations between common reasons, maternal and infant characteristics, and quantity of contacts with the peer counselor. An alpha level of 0.05 was set to denote statistical significance.

The Institutional Review Boards at Michigan State University and The Michigan Department of Community Health approved analysis of the Breastfeeding Initiative's program data.

Results

Valid breastfeeding duration was available for 7,852 (98.9%) of eligible participants. The median (IQR) breastfeeding duration for these participants was 11.1 (4.3, 25.6) weeks and ranged from 1- 364 days. Characteristics for the BFI enrollees and their infants who initiated and discontinued breastfeeding are described in **Table 10**. A majority of participants were 20-29 years of age, had a high school diploma or equivalent, were Non-Hispanic White, single, and had no prior breastfeeding experience.

Reason for breastfeeding discontinuation was available for 7,837 (99.8%) of participants with valid breastfeeding duration data. The reason for discontinuing breastfeeding according to the time of discontinuation is described in **Table 11**. In total and for each duration category,

“Mother’s Preference” was the most commonly cited reason for breastfeeding cessation. “Low Milk Supply” also predominated as a reason given, especially after one week postpartum.

“Breastfeeding Challenges” was a common reason given in the early breastfeeding periods, and

“Mother returning to Work or School” was frequently given as a reason in the later periods. The

Kruskall-Wallis ANOVA test revealed there was a significant difference in the distribution of reasons cited for discontinuing breastfeeding according to age of weaning ($p < 0.001$).

Table 10. Characteristics of Participants who Discontinued Breastfeeding while Enrolled in Program

	n (%) (n= 7,852)^a
Maternal Age, years	
<20	1,837 (23.4)
20-29	4,402 (56.0)
≥30	1,626 (20.7)
Education	
< High School Diploma	1,905 (24.6)
High School Diploma or Equivalent	5,831 (75.4)
Race/ Ethnicity	
White, non-Hispanic	4,532 (60.3)
Black, non-Hispanic	1,975 (26.3)
Hispanic	1,004 (13.4)
Marital Status	
Single	2,713 (38.7)
Unmarried Couple	1,958 (27.9)
Married	2,342 (33.4)
# Other Children in Household	
0	2,212 (28.2)
≥ 1	5,640 (71.8)
Previous Breastfeeding Experience	
No	5,517 (70.3)
Yes	2,335 (29.7)
Gestational Age	
Premature (<37 weeks)	837 (10.7)
Full Term	7,015 (89.3)
Birth Weight	
<2500 g	721 (9.2)
≥ 2500 g	7,131 (90.8)

^an for individual variables may vary due to missing or incomplete data

Table 11. Primary Reason Reported for Discontinuing Breastfeeding by Infant Age at Weaning (%)^a

	Total (n= 7,837)	< 1 week (n= 298)	1 week- <4 weeks (n= 1,148)	4 weeks- <3 months (n= 3,001)	3 months- <6 months (n= 1,798)	6 months- <12 months (n= 1,592)
Breastfeeding Challenges	8.2	23.2	15.7	7.6	5.5	4.0
Doctor Recommended	1.5	1.0	3.2	1.7	0.9	0.8
Infant's Medical	3.7	4.4	5.8	5.1	2.3	0.9
Lack of Support	0.8	2.0	1.3	1.0	0.6	0.3
Low Milk Supply	20.9	8.7	21.8	25.6	19.8	15.1
Mother's Medical Condition/Medications	7.8	12.8	10.1	8.5	6.6	5.2
Mother's Preference	39.3	41.6	34.7	36.2	41.2	46.0
Mother Returning to Work or School	10.1	0	2.4	9.5	16.0	11.7
Other	7.6	6.4	5.0	4.7	7.1	16.0

^a Kruskal-Wallis ANOVA test: reason is associated with time of breastfeeding discontinuation ($p < 0.001$)

Median breastfeeding durations for each reason cited for discontinuation are shown in **Table 12** and depict that women are likely to discontinue breastfeeding the earliest because of “Breastfeeding Challenges” followed by medical reasons, “Low Milk Supply”, and “Mother’s Preference”. Women tended to discontinue breastfeeding later if they discontinued because of returning to work or school or for an “Other” reason.

Table 12. Median Weeks of Breastfeeding Duration by Reason for Breastfeeding Cessation

Reason For Breastfeeding Cessation	N	Breastfeeding Duration (weeks)	
		Median	25% Quartile, 75% Quartile
Breastfeeding Challenges	641	4.7	2.0, 13.4
Doctor Recommended	120	6.0	3.0, 12.7
Infant’s Medical	290	6.3	3.4, 12.0
Lack of Support	66	7.6	3.0, 12.9
Mother’s Medical Condition/Medications	611	8.6	3.9, 17.1
Low Milk Supply	1,641	8.9	4.6, 19.1
Mother’s Preference	3,081	12.9	5.0, 25.7
Mother Returning to Work or School	788	17.1	8.6, 25.7

The associations between the most common reasons given for discontinuation and participant characteristics are described in **Table 13**. Maternal age, education, race/ethnicity, marital status, and previous breastfeeding experience, as well as infant birth outcome and weight, were all associated with the reasons mothers gave for discontinuing breastfeeding ($p < 0.001$ for each variable). Mothers < 20 years of age were more likely than older mothers to give “Mother’s Preference” and “Breastfeeding Challenges” as the reasons for breastfeeding discontinuation, while mothers ≥ 30 years of age were more likely to cite a medical condition (mother or infant) as

their primary reason for discontinuation ($p < 0.001$). Mothers without a high school degree were more likely than mothers with more education to cite “Mother’s Preference” as their reason for discontinuation ($p < 0.001$). Among the racial/ethnic groups analyzed, Non-Hispanic White mothers were the most likely to discontinue for medical conditions (mother or infant). Non-Hispanic Black mothers were the most likely to discontinue because of “Mother’s Preference”, but the least likely to discontinue because of “Low Milk Supply”. Hispanic mothers, conversely, were the most likely to discontinue because of “Low Milk Supply” ($p < 0.001$). Compared to married mothers who were more likely to discontinue breastfeeding because of the mother’s medical condition, single mothers were more likely to discontinue breastfeeding due to “Mother’s Preference” ($p < 0.001$). Finally, there were similar associations between the reason given for discontinuation and the infants’ birth outcomes and weights; mothers of infants who were premature and/or low birth weight were more likely to discontinue breastfeeding because of the infants’ medical conditions compared to full term and/or normal birth weight infants ($p < 0.001$ for each variable). Participants had a mean (\pm SD) of 7.6 (\pm 4.8) contacts with their peer counselors. Those who had fewer than five contacts were more likely to discontinue breastfeeding because of “Breastfeeding Challenges” and “Low Milk Supply”, while those with over nine contacts were less likely to discontinue for these reasons ($p < 0.001$).

Table 13. Associations Between Participant Characteristics and Common Reasons Cited for Discontinuing Breastfeeding (%)^a

	Mother's Preference (n= 3,103)	Low Milk Supply (n= 1,654)	Return to Work/School (n= 794)	Breastfeeding Challenges (n= 648)	Mother's Medical Condition/Medications (n= 613)	Other (n= 605)	Infant's Medical (n=297)
Maternal Characteristics							
Maternal Age, years***							
<20	44.0	17.3	10.4	9.8	6.3	6.9	2.7
20-29	37.5	22.5	10.2	8.4	7.7	7.5	3.9
≥30	38.5	20.9	9.0	6.2	9.7	9.0	4.5
Education***							
< High School Diploma	42.9	19.7	8.8	8.6	7.1	8.3	2.4
High School Diploma or Equivalent	37.9	21.3	10.6	8.1	8.0	7.5	4.2
Race/ Ethnicity***							
White, non-Hispanic	34.7	21.9	9.9	8.7	9.0	8.1	4.9
Black, non-Hispanic	50.1	16.8	9.2	8.0	5.5	6.7	2.0
Hispanic	38.3	24.1	12.9	6.8	6.7	7.2	2.8
Marital Status***							
Single	44.7	19.5	9.8	8.3	6.7	5.7	3.0
Unmarried Couple	38.1	21.5	10.4	9.6	7.2	5.6	4.4
Married	36.3	21.6	9.6	7.3	9.6	8.7	4.9
# Other Children in Household**							
0	41.7	19.5	10.0	9.4	7.7	5.9	3.3
≥ 1	38.3	21.5	10.1	7.7	7.8	8.3	4.0
Previous Breastfeeding Experience***							
No	41.0	20.9	10.0	8.9	6.9	6.6	3.5
Yes	35.3	21.1	10.3	6.5	9.9	10.1	4.4
Infant Characteristics							
Gestational Age***							
Premature (<37 weeks)	38.0	20.9	6.4	7.7	8.4	7.0	9.5
Full Term	39.4	20.9	10.5	8.3	7.7	7.7	3.1
Birth Weight							
<2500 g	37.8	20.8	7.2	6.7	7.5	7.2	10.9
≥ 2500 g	39.4	21.0	10.3	8.4	7.8	10.3	3.0
Program Components							
Total Contacts with Peer Counselor***							
1-4	39.6	21.7	7.8	10.6	8.3	7.4	3.9
5-9	39.8	21.2	10.3	7.8	7.7	5.7	3.6
>9	38.0	19.5	11.8	6.6	7.3	10.3	4.0

Table 13 (cont'd)

^aAssociations between participant characteristics and reason for discontinuation were tested using chi-square analysis

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Discussion

This study is the first to describe reasons women in a PC breastfeeding support program discontinued breastfeeding according to infant age at weaning and participant characteristics. The most common reason given for discontinuation in all time periods was “Mother’s Preference”. The examples given for this reason correspond most closely to the Psychosocial Distress category in the IFPS II survey. However, unlike the current study, Psychosocial Distress represented only a small proportion of the reasons listed in the IFPS II survey (Li, et al., 2008; Odom, Ruowei, Scanlon, Perine, & Grummer Strawn, 2013). The frequency of citing this reason in the current study may be multi-factorial. First, it is the most broad of the reasons given, and may represent a “catch-all” category or an accumulation of barriers the mother has experienced. In addition, mothers may choose this reason if they believe giving a more specific reason would prompt their peers to troubleshoot the problem to keep them breastfeeding. Higher likelihood of discontinuing for “Mother’s Preference” may also reflect the low-income nature of the population studied. In a study by Wojcicki, et al. (2010), the authors found that, compared to higher income women, WIC participants were more likely to believe that breastfeeding could be embarrassing or difficult in public and was painful and uncomfortable.

Though “Mother’s Preference” was the most prevalent reason cited, it may also be the most difficult to address since a primary goal of PC programs is to empower mothers and respect their individual decisions. If a mother reaches a time when she definitively feels she cannot or does not want to continue breastfeeding, the mother is supported and congratulated for making the positive decision to have breastfed her baby for the duration until discontinuation. Breastfeeding rates have risen in recent years (CDC National Immunization Survey, 2014) as the benefits have become apparent and encouraging mothers to breastfeed has become an important

public health goal. As breastfeeding becomes normalized and breastfeeding role models become more visible, mothers' preferences may adapt. Peer counselors can encourage this adaptation by directing mothers to support groups where they can attain support from other breastfeeding mothers and alerting mothers not only to the benefits of breastfeeding but also the risks of formula feeding (McNiel, Labbok, & Abrahams, 2010).

In agreement with the IFPS II and WIC IFPS studies, issues related to low milk supply remained prominent throughout the postpartum period for mothers in the BFI program (Li, et al., 2008; McCann, et al, 2007). Low milk supply is a common concern noted throughout the literature. While it seems that low milk supply is a chronic condition for some women, it may be possible to address and correct this condition in others. "Low Milk Supply" may also be subject to interpretation and encapsulate other reasons. Discontinuation due to low milk supply in the early postpartum period may be due to lack of education concerning how much milk an infant requires or lack of confidence in the adequacy of breast milk following a health care provider's concern about infant weight gain. Low milk supply during later periods may be a result of infant growth spurts, mother's medications or diminished supply due to formula supplementation or inadequate pumping at school or work. While it is not always possible to correct low milk supply, counselling may be effective if an external factor is contributing to the low milk supply or if the mother is responsive to efforts to increase milk supply. Education addressing low milk supply may include preventative information on how to recognize low milk supply, methods to increase milk supply, and information on pumping. The IFPS II study demonstrated that compared to higher income women, WIC-eligible women were more likely to discontinue breastfeeding because "Breast milk alone did not satisfy my baby" (Li, et al., 2008), and the

findings in this study support the notion that concerns about low milk supply may be widespread in this population.

The goal of examining reasons for breastfeeding cessation in this population is to design preventative interventions to address concerns and potentially prolong breastfeeding to the year recommended by the AAP. It would be beneficial to target specific causes of discontinuation before *most* women discontinue for these reasons. In agreement with prior literature, the reason for discontinuing earliest was “Breastfeeding Challenges, but this reason became less prevalent for those who discontinued later (Li, et al., 2008; Ahluwalia, et al., 2005). This is logical, since technical issues may be more likely to occur soon after delivery and dissipate as the mother and infant become more comfortable with breastfeeding. It may be beneficial to target breastfeeding education concerning common technical challenges in the prenatal period followed by specific advice regarding a mother’s particular challenges in the very early postnatal period, ideally while the mother is in the hospital following delivery.

Cessation for “Doctor Recommended”, “Infant’s Medical”, and “Mother’s Medical Conditions/Medications” also tended to occur early postpartum, but these reasons may need to be addressed on an individual basis. It may be advantageous to preventatively address common medical issues that warrant discontinuation in order to empower mothers to make informed decisions during this vulnerable period. Mothers’ discontinuing because of their medical conditions/medications in the later postpartum period may benefit from resources concerning safety of breastfeeding while on specific medications including birth control and antibiotics.

Though “Low Milk Supply” and “Mother’s Preference” were the most common reasons given for cessation, women discontinuing for these reasons typically did so after the first month

postpartum. These issues may be focused on after breastfeeding has been established to avoid overwhelming the mother with too much information. The finding that “Mother’s Preference” is a reason often given in the later breastfeeding period gives credence to the hypothesis that this category may represent an accumulation of barriers for the mother. However, this category is broad, and there is a need for further research to understand the motivations and specific experiences that prompt women to discontinue for this reason.

Similarly to other breastfeeding outcomes, reasons for discontinuation were associated with maternal characteristics. Prior examination of risk factors for specific reasons of discontinuation demonstrated fewer differences according to demographic factors, (Ahluwalia, et al., 2005) but these were examined in the general population in contrast to the low-income PC enrollees in the current study.

Participants choosing “Mother’s Preference” as the reason for discontinuing were more likely to be members of groups at risk for premature breastfeeding discontinuation, including mothers who were younger, less educated, Non-Hispanic Black, single, and had no previous breastfeeding experience (CDC National Immunization Survey, 2014; Bolton, et al., 2009; Yun, et al., 2009). The increased likelihood of Non-Hispanic Black mothers discontinuing breastfeeding due to “Mother’s Preference” is supported by prior literature describing an increased comfort with formula feeding , as well as an increased likelihood of agreeing with perceived breastfeeding barriers among low-income African American women (McCann, et al., 2007; Nommsen-Rivers, Chantry, Cohen, & Dewey, 2010). A higher likelihood of choosing “Mother’s Preference” may also be due to latent factors that contribute to shorter breastfeeding durations in these populations including lack of role models and lack of confidence making health decisions.

The most striking group differences for those discontinuing breastfeeding because of “Low Milk Supply” was among racial/ethnic groups, with Hispanic mothers being the most likely to discontinue for this reason. This finding is in agreement with results from prior literature (McCann, et al., 2007; Ahluwalia, et al., 2005; Hurley, et al., 2008). The higher likelihood of discontinuing breastfeeding due “Low Milk Supply” among Hispanic participants may stem from a cultural belief that, though breast milk is healthy, formula is not harmful and may be needed to grow a “chubby” baby (Bartick & Reyes, 2012). Low milk supply may result from formula supplementation, since supplementation may disrupt the supply and demand balance necessary for adequate milk production. Hispanic women in this population were also the most likely to discontinue because of returning to school/work. There may be cross-over in these categories within this population, since returning to school or work may precede formula supplementation and difficulties pumping, which, in turn, may cause low milk supply.

Discontinuation due to “Mother’s Medical Conditions/Medications” was also variable according to maternal characteristics. Women who were older, more educated, Non-Hispanic White and married were more likely to discontinue due to their own medical conditions. Though we may speculate that older mothers may be more likely to have medical issues, the higher likelihood of discontinuing for this reason in this and other demographic groups may also be symptomatic of higher access to health care in which medical issues may be diagnosed and flagged as incompatible with breastfeeding.

Women who received the most contacts from their peer counselors were less likely to discontinue breastfeeding because of “Low Milk Supply” or “Breastfeeding Challenges”, while women who had fewer contacts with their peers were more likely to discontinue for these reasons. This is telling, as these are factors that may be highly modifiable with more education

and support. These results reveal the areas in which peers may effectively promote breastfeeding. We do note, however, that there was no difference in likelihood of discontinuing for “Mother’s Preference” or “Mother’s Medical/Conditions” according to the quantity of support the mother received from the peer counselor.

Strengths & Limitations

To our knowledge, this is the first study to quantitatively describe the reasons why low-income women enrolled in PC breastfeeding support programs discontinue breastfeeding and to associate these reasons with timing of discontinuation and participant characteristics. Both breastfeeding duration and reason for discontinuation were collected from mothers at the first contact after discontinuing breastfeeding, thus reducing risk of recall bias. Unlike national surveys that have aimed to examine the reasons for breastfeeding cessation, this study focuses on a high-risk population enrolled in a PC breastfeeding support program.

Because of the nature of the program and data collection, the reason for discontinuation was collected from every woman who chose to discontinue breastfeeding while still in the program, though this variable is unknown for those who withdrew from the program while breastfeeding. The primary limitation of this study is the potential variability in peer counselor and participant interpretation of the reasons for discontinuation. Participants may have felt compelled to give reasons they felt were most acceptable to the PC, resulting in social desirability bias. In addition, participants in the program were only able to choose one of nine pre-defined reasons, and a mother’s reason for discontinuation may not have been represented in these choices. Some reasons may encapsulate others. This issue may be the cause of the large

proportion of women choosing “Mother’s Preference” as their reason for premature discontinuation.

Conclusion

Peer counselors are in a unique position to offer education and encouragement to specific groups of women throughout their breastfeeding experience, and consequently, are able to address specific concerns at the appropriate times prenatally or postpartum. This study contributes to the knowledge of why women in PC programs discontinue breastfeeding and provides evidence-based information concerning when and which women in enrolled in these programs discontinue breastfeeding for specific reasons.

CHAPTER SIX: CONCLUSIONS AND IMPLICATIONS FOR PRACTICE

This analysis of six years of data from a PC breastfeeding support program goes beyond the status quo of reporting overall program effect and instead demonstrates how specific aspects of PC programs may impact breastfeeding outcomes. These findings may be utilized for design and adaptation of PC breastfeeding support programs that is evidence-based and tailored to individual participant needs. Modifying PC programs to include these factors will ensure that interventions delivered not only improve breastfeeding outcomes, but also optimize peer counselors' efforts and effectively reach as many low-income women as possible.

Breastfeeding Status at Program Enrollment and Exit

Summary & Discussion

There were differences in populations of participants according to their breastfeeding status when they enrolled in and exited the PC program. Women who enrolled prenatally were more likely to have demographic characteristics associated with poor breastfeeding outcomes in the literature (Yun, et al., 2010; Bolton, et al., 2009). These high risk characteristics did indeed translate into shorter any and exclusive breastfeeding durations in this group compared with postnatal enrollees, though these results persisted even after adjustment for demographic characteristics. Shorter breastfeeding durations observed in the prenatal group, then, may be an effect of residual confounding of unmeasured factors, including breastfeeding intent. Women with the highest intentions to breastfeed may not feel they need the PC program, and may enroll only upon encountering breastfeeding difficulties during the postpartum period. Therefore,

prenatal enrollment may be capturing women who have less intention to breastfeed, which would expectedly translate into shorter mean breastfeeding durations. Without breastfeeding intention information prior to program intervention, it is difficult to determine how timing of enrollment in the program may have impacted breastfeeding outcomes. For instance, women who enrolled prenatally may have had shorter breastfeeding goals compared to women who enrolled postnatally, but may have been more likely to meet or exceed their breastfeeding goals compared to those who did not receive prenatal support, education, and encouragement from their peer counselor.

Breastfeeding participants may be enrolled in the program until their infant reaches one year of age. Because of the long-term nature of PC breastfeeding support programs, there are often many losses to follow-up, and breastfeeding outcomes of women who withdraw from PC programs while breastfeeding have not been examined in the literature. Initial analysis revealed that demographic characteristics were similar between women who withdrew from the program while breastfeeding and women who discontinued breastfeeding. Compared to women who breastfed for an entire year while in the program, women who discontinued breastfeeding or withdrew from the program while breastfeeding were more likely to have demographic characteristics associated with poor breastfeeding outcomes in the literature. However, upon further investigation, it became clear that women who withdrew from the program while breastfeeding did so at a much longer mean duration than those who discontinued breastfeeding. The mean breastfeeding duration at time of withdraw from the program was greater than six months, and typically, rates of discontinuation are low after this point (Sparks, 2011). The authors concluded that women who withdrew from the program while breastfeeding likely did so

because they were no longer in need of breastfeeding support. It may be helpful to follow-up with these mothers at one year postpartum to validate this hypothesis.

Implications for Practice

Though much money has been earmarked for breastfeeding PC in the WIC setting (Catalog of Federal Domestic Assistance, 2014), these funds may still be inadequate to reach the needs of low-income pregnant and postpartum mothers. Therefore, PC programs must prioritize peer counselors' time and resources. One suggestion for resource management is to focus on groups of women who are at higher risk for breastfeeding discontinuation. Findings in this manuscript demonstrate that prenatal enrollees may be at higher risk for undesirable breastfeeding outcomes, while postnatal, and especially later postnatal, enrollees are more likely to have longer total and exclusive breastfeeding durations. Because prenatal participants are at greater risk of premature breastfeeding cessation, PC programs should continue to encourage prenatal enrollment in order to acclimate mothers to the barriers they may face during the potentially trying early postpartum period. Conversely, many later postnatal enrollees have established breastfeeding upon enrollment in the program and may not need, or even desire, intensive support from a peer counselor. In order to conserve peer counselors' efforts, it may be advantageous to address the specific issues of the later postpartum mother, and encourage the mother to initiate subsequent contact if needed.

The authors concluded that there may be self-selection occurring for breastfeeding status at exit, with those who may have needed less support in the later postpartum period withdrawing from the program while breastfeeding. Rather than focusing on retaining these mothers in the

program, it may be advantageous to focus peer counselor efforts on women at high risk of breastfeeding discontinuation, especially in the early postpartum period.

Peer Counseling Program Protocols

Summary & Discussion

Delivery of PC program protocols was associated with participant breastfeeding outcomes. Contrary to the authors' hypothesis, receiving an in-person contact from a peer counselor while in the hospital following delivery did not significantly impact breastfeeding outcomes. This finding may be attributed to the potential for breastfeeding support outside of peer counselors that may have been available in the hospital setting, including from a Lactation Consultant.

Home, phone, and other contacts from a peer counselor, however, were effective in prolonging any breastfeeding and exclusive breastfeeding durations. Initial analysis revealed that each contact between the participant and peer counselor significantly reduced the hazard of discontinuing any and exclusive breastfeeding by six and three months postpartum respectively. Though there were slight variations in impact, the effect was relatively consistent between the types of contacts when examining contact quantities as continuous variables, and the authors concluded that this consistency was a result of delivery of the appropriate types of contacts at the appropriate periods in the participants' breastfeeding experiences.

However, results varied when breastfeeding outcomes were examined using a categorical approach in which the independent variables were quantities of each type of contact in reference

to “optimal” program delivery described in standard program protocols. When the quantity of phone contacts was examined according to whether the participant received an “optimal” quantity in reference to program protocols, the quantity of phone contacts appeared to be inversely proportional to any and exclusive breastfeeding durations. These seemingly contradictory findings may be a function of the interaction between phone contacts and time of enrollment and the residual factors that accompanied time of enrollment. Earlier in this discussion we speculated that prenatal participants included a broader category of women compared to postnatal participants who may be self-selected to have lower risk of premature breastfeeding cessation. Therefore, later postnatal enrollees may only enroll in the program for a specific issue and may only want support and education on that issue. For these women, increasing the number of phone contacts may be a hindrance, rather than an asset, to improved breastfeeding outcomes. It would be helpful, then, to understand if phone contacts had the same impact for prenatal compared to later postnatal enrollees. If phone contacts proved to have a lesser or even detrimental impact according to timing of enrollment, different protocols may be needed for different groups of women. For instance, peer counselors serving later postnatal enrollees may chose to address the participant’s specific concerns and advise the participant to contact them upon encountering other breastfeeding concerns. This method would not only cater to individual participant needs, it would also reduce peer counselors’ time input for lower-maintenance participants.

When in-person contacts were examined as categorical variables in reference to standard program protocols, however, they appeared to have a greater impact on breastfeeding outcomes than noted in the Cox regression. In categorical analysis, women who received more in-person contacts than was considered “optimal” were more likely to have longer breastfeeding and

exclusive breastfeeding durations. Thus, we can conclude that in-person visits, a vast majority of which took place in the participants' homes, are crucial to improving breastfeeding outcomes. This conclusion is logical for three essential reasons. The first is that accessing participants in their homes removes barriers common to the low-income population. In the best of situations it can be difficult to leave the house during the early postpartum period due to pain, exhaustion, and all of the difficulties that accompany traveling with a small infant. However, low-income women may have additional barriers, including of lack of access to reliable transportation and child care for older children. These barriers may prevent low-income women from pursuing lactation support in the early postpartum period, and establishing breastfeeding during this period is crucial for long-term breastfeeding success. Second, in-person contacts, especially in the home, allow peer counselors to observe and address potential barriers individual mothers may face in their own home settings, including non-supportive family members and lack of space in which to comfortably breastfeed. Breastfeeding direction in the setting in which most breastfeeding will take place (ex: the chair the mother most often uses) allows for the most individualized counseling and instruction possible. In addition, breastfeeding is a physical process, which is best facilitated when breastfeeding educators can observe the breastfeeding directly. Issues such as infant hold, latch, and "tongue-tie" may not be evident to the mother, and the peer counselor may need to be present to even identify, let alone address, the breastfeeding problem.

The final reason in-person visiting is crucial to participant success correlates with the reason that peer counseling programs are successful in general: they allow for personal connection. While technical assistance is imperative for successfully establishing breastfeeding, it is the connection and support with a peer who has experienced similar barriers that is necessary

for long-term breastfeeding success. Anecdotally, our peer counselors have described that when they connect with a mother in her home, the mother is much more likely to remain in the program, in part because they have connected with a peer who they know is invested in their breastfeeding success. Some level of breastfeeding difficulty is inevitable, and it is more likely that a mother will persist when she feels less isolated in this process.

Implications for Practice

Despite the positive findings in this study concerning the impact of in-person contacts on breastfeeding outcomes and the corroboration of these findings with prior literature (Renfrew, et al., 2012), this aspect of peer counseling programs can be complicated. In many WIC peer counseling programs, in-person contacts take place in the WIC clinic. Though these meetings allow for connection and direct observation of breastfeeding, they do not address transportation or child care challenges and do not allow for peer counselors to observe mothers in the home setting. Home visiting, however, is expensive due to the time and cost of peer counselor travel. In addition, facilitating organizations may be liable for problems encountered during travel or in the participants' homes. Because of these complications, some programs have initiated a phone-based support program, but these do not appear to be as effective in improving breastfeeding outcomes. Thus, in-person contacts, ideally in the home, must remain a central aspect of PC breastfeeding support programs, though these contacts may need to be limited due to cost and liability.

Reasons for Breastfeeding Discontinuation

Summary & Discussion

In this PC breastfeeding support program, participants' reasons for discontinuing breastfeeding varied from the reasons reported in the literature for the general population (Kirkland & Fein, 2013; Li, et al., 2008; Odom, et al., 2013). The most common reasons for discontinuation in this population were "Mother's Preference" and "Low Milk Supply". "Mother's Preference" may represent a culmination of reasons that result in the perception that a mother "just cannot keep doing this". Though low milk supply is a seemingly technical issue, this condition may be perceived rather than actual (Amir, 2006), and perception may be a result of low self-efficacy or disempowerment by family or health professionals. Thus, these most common reasons given for breastfeeding discontinuation in this population may be the most difficult to address.

The reasons given for discontinuation were significantly related to the timing of breastfeeding discontinuation. "Breastfeeding Challenges" and "Return to Work or School" were common reasons in the early and later postpartum periods respectively, and these associations are logical. Reasons for breastfeeding discontinuation were also significantly associated with maternal characteristics. For instance, mothers who were younger, had less education, were unmarried, non-Hispanic Black, and had no prior breastfeeding experience were the most likely to discontinue breastfeeding due to "Mother's Preference". Mothers who identified as Hispanic were more likely to discontinue breastfeeding because of perceived "Low Milk Supply". Support for these findings are found throughout the literature (Ahluwalia, et al.,

2005; Nommsen-Rivers, et al., 2010; Hurley, et al., 2008), but this study is the first account of evidence in the low-income PC population.

When addressing a topic as complex as breastfeeding in a society in which breastfeeding barriers are ubiquitous for low-income women, reasons for discontinuing breastfeeding may not be discrete, and thus may not be adequately encapsulated in one reason. The list of reasons that participants chose from for breastfeeding discontinuation may represent either a culmination of reasons or a terminal, rather than isolated, reason for discontinuation. Prior examination of reasons for discontinuation in the general population relied on factor analysis to identify and group major reasons for discontinuation (Kirkland & Fein, 2003), and it may be beneficial to conduct this analysis in the low-income PC population to ensure that all pertinent reasons are represented and to minimize risk of overlapping reasons between categories.

Implications for Practice

Examination of when and which participants discontinued for specific reasons allows for design of curriculum that anticipates and addresses common reasons for discontinuation before they occur. A standard set of curricula may be developed based on the timeline elucidated in the findings discussed in Chapter 5, and these may be adapted according to individual participant needs. For instance, peer counselors may preventatively discuss how to recognize low milk supply, but may only focus on methods by which to increase supply for participants who suspect the problem. Peer counselors are in a unique position to effectively deliver these curricula, not only because they have experienced common breastfeeding barriers, but also because they have contact with mothers regularly throughout the breastfeeding experience.

Recommendations for Future Studies

Breastfeeding is a complex practice with many factors contributing to a woman's desire to breastfeed and to success in reaching her breastfeeding goals. Analysis of public program data allows for investigation into the efficacy of interventions as they actually occurred in real-world situations. However, demographic factors and program protocols may not be sufficient to explain outcomes. In order to accurately examine breastfeeding outcomes, it is advantageous to also collect information on breastfeeding intent. This information would not only allow for more accurate interpretation of outcomes, but would also allow breastfeeding outcomes to be measured in reference to a mother's personal breastfeeding goals, rather than any or EBF duration. Collection of this information would also allow for investigation into the factors that contribute to attainment of one's own breastfeeding goals. A tool for breastfeeding intent has been validated in the general population, but this tool must be validated for low-income mothers enrolled in a PC program.

Lactation Consultants are considered professionals rather than peers and their expertise may be at least as effective as peer counselors when addressing technical issues such as establishing latch in the very early postpartum period. It would be beneficial to document support participants received in the hospital to verify if hospital support is indeed beneficial and from which sources it is most beneficial. Findings from this study should not validate that contacts in the hospital are ineffective in improving breastfeeding outcomes, as only 13.5% of participants received a visit while in the hospital, and other lactation support was not documented.

In this study, “other” contacts demonstrated nearly equal efficacy in improving breastfeeding outcomes compared to home and phone contacts in the Cox regression analysis. Unfortunately, the “other” category encompassed a wide variety of types of contacts, including postal service mailings to meetings with participants outside of the hospital and home. Considering the lack of efficacy demonstrated in phone-only programs and the complications with home visiting, this “other” category requires further investigation. Detail on how specific types of “other contacts”, including those via social media and in the WIC clinic, are necessary for creating program protocols that are effective and efficient.

Elucidation of when and which women discontinued breastfeeding for specific reasons has important implications for delivery of educational materials that prevent premature breastfeeding discontinuation. To build on these findings, qualitative analysis is necessary in order to understand specific knowledge deficits as well as the most effective methods of delivering education for women in this population. Researchers examining this topic may seek to compile an educational curriculum based on these findings, and this curriculum must be tested to examine efficacy.

Overall Conclusion

Though PC programs have demonstrated efficacy in improving breastfeeding outcomes, there has been little examination of how specific aspects of these programs may impact outcomes. When delivering program protocols, it is important to recognize the varying needs of individual participants. Identifying participants who are at higher risk of undesirable breastfeeding outcomes, reaching participants using the most effective methods, and delivering

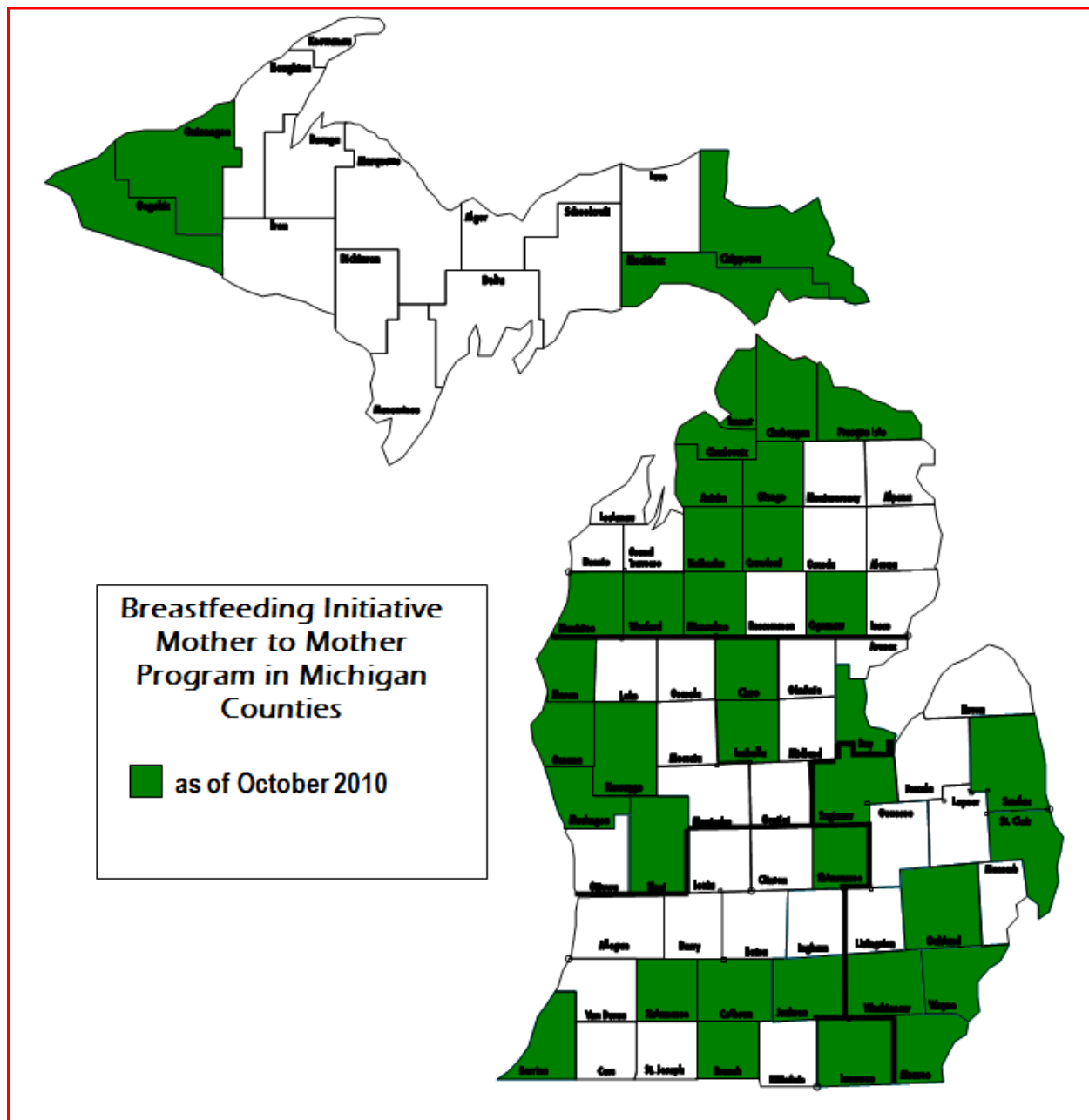
curriculum that addresses common reasons for discontinuation may serve to improve breastfeeding outcomes in women enrolled in PC programs.

APPENDICES

Appendix A:

Michigan Counties with Breastfeeding Initiative Program


Figure 5. Michigan Counties with Breastfeeding Initiative Program



Appendix B:

Enrollment Form

Figure 6. Enrollment Form

	<p>MSUE/WIC BFI</p> <h2 style="margin: 0;">#1 Enrollment</h2> <p style="font-size: small; margin: 0;">Keep the Original in the Office, Put a copy in your Peer Notebook. Form to be completed by the Peer</p>	<p>Peer _____</p> <p>BFI County _____</p> <p style="text-align: right;">Date Entered: ____/____/____</p>												
<p><i>Check here if a Return Participant</i> <i>Enrollment Form Completed</i> ____/____/____</p>														
<p>1. Participant's Name: _____ <small>(First) (M.) (Last)</small></p> <p>2. Address: _____ <small>City County Zip</small></p> <p>3. Phone: (____) _____ Alternate Phone: (____) _____</p>		<p>4. Participant's Date of Birth: ____/____/____ <small>Month Day Year</small></p> <p>5. Marital Status: <i>(check one)</i> <input type="checkbox"/> Married <input type="checkbox"/> Single <input type="checkbox"/> Divorced <input type="checkbox"/> Unmarried Couple</p>												
<p>6. Highest Grade Completed: <i>(check one)</i> <input type="checkbox"/> 8th grade or less <input type="checkbox"/> Some High School <input type="checkbox"/> GED <input type="checkbox"/> High School graduate <input type="checkbox"/> Some college <input type="checkbox"/> College degree <input type="checkbox"/> Advanced degree</p>														
<p>7. Race: <i>(check as many as apply)</i></p> <p><input type="checkbox"/> White/Caucasian <input type="checkbox"/> Black/African American <input type="checkbox"/> American Indian/Alaskan Native <input type="checkbox"/> Asian <input type="checkbox"/> Native Hawaiian or other Pacific Islander <input type="checkbox"/> Other _____ <input type="checkbox"/> Do not wish to provide</p>		<p>8. Ethnicity: <i>(check one)</i> <input type="checkbox"/> Hispanic/Latino <input type="checkbox"/> Non-Hispanic/Latino <input type="checkbox"/> Do not wish to provide</p>												
<p>9. Did Participant breastfeed any previous children? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>														
<p>10. Family WIC ID: _____ <i>(number on the shopping list or verification of certification (VOC) paper)</i> OR WIC eligible <i>(check if participant is income eligible)</i></p>														
<p>11. This is a Prenatal Enrollment (woman is pregnant) <i>Complete # 12 and # 13.</i></p> <p>12. Due Date: ____/____/____ <small>Month Day Year</small></p> <p>13. Is participant currently breastfeeding a previous child? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>		<p style="font-size: x-small;">Fill out prenatal OR postnatal NOT BOTH</p>												
<p>11. This is a Postnatal Enrollment (infant is already born) <i>Complete # 12 and # 13. Complete #3 Birth Record now!</i></p> <p>12. Due date: ____/____/____ <small>Month Day Year</small></p> <p>13. Is participant currently breastfeeding a previous child? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>														
<p>14. Place of Residence: <i>(check one)</i> <input type="checkbox"/> Farm <input type="checkbox"/> Towns and cities 10,000-50,000 <input type="checkbox"/> Central cities over 50,000 <input type="checkbox"/> Towns under 10,000 and rural <input type="checkbox"/> Suburbs of cities over 50,000</p>														
<p>15. Total Household Income last month: <i>(check one)</i> <input type="checkbox"/> \$800 or less <input type="checkbox"/> \$801-\$1000 <input type="checkbox"/> \$1001-\$1200 <input type="checkbox"/> More than \$1200</p>														
<p>16. Age of ALL Children in Household <i>(including infant if postnatal enrollment)</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">1) _____</td><td style="width: 50%;">4) _____</td></tr> <tr><td>2) _____</td><td>5) _____</td></tr> <tr><td>3) _____</td><td>6) _____</td></tr> </table>		1) _____	4) _____	2) _____	5) _____	3) _____	6) _____	<p>17. Age of Adults in Household <i>(not including participant)</i></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">1) _____</td><td style="width: 50%;">4) _____</td></tr> <tr><td>2) _____</td><td>5) _____</td></tr> <tr><td>3) _____</td><td>6) _____</td></tr> </table>	1) _____	4) _____	2) _____	5) _____	3) _____	6) _____
1) _____	4) _____													
2) _____	5) _____													
3) _____	6) _____													
1) _____	4) _____													
2) _____	5) _____													
3) _____	6) _____													
<p>18. Assistance programs that family participates in at ENTRY: <i>(check all that apply)</i> <input type="checkbox"/> WIC <input type="checkbox"/> FDIPIR <input type="checkbox"/> TANF (DHS) <input type="checkbox"/> Medicaid <input type="checkbox"/> TEFAP <input type="checkbox"/> MIHP (MSS/ISS) <input type="checkbox"/> SNAP/Bridge Card <input type="checkbox"/> Commodities <input type="checkbox"/> Child Nutrition <input type="checkbox"/> MSUE Programs <input type="checkbox"/> Other <i>(Please Specify)</i> _____</p>														
<p>19. Do you qualify or have you or your Family applied for, or received SNAP/Bridge Card in the last 12 months? <input type="checkbox"/> Yes <input type="checkbox"/> No</p>														
<p>20. Who referred this woman to you? <input type="checkbox"/> WIC <input type="checkbox"/> MIHP <input type="checkbox"/> SNAP <input type="checkbox"/> Hospital <input type="checkbox"/> Physician <input type="checkbox"/> Other _____</p>														
<p>21. Enrollment Date: ____/____/____ <i>(date you signed mother into the BFI)</i> <small>Month Day Year</small></p>														
<p>22. I agree to allow MSU Extension and Michigan WIC to share information about me and my infant's health and nutrition. This information is strictly confidential and will only be available to WIC and MSUE staff. Client signature: _____ Date: ____/____/____ <small>Month Day Year</small></p>														

September 2, 2010

Appendix C:

Prenatal Contacts Form

Figure 7. Prenatal Contacts Form

MSUE/WIC BFI #2 Prenatal Contacts <i>Keep in Participant Tracking Notebook. Does not have to be sent for data entry.</i>	<input type="checkbox"/> Enrollment form #1 completed
--	---

Mother's First Name _____ Last Name _____

Other information I may need: (directions to home, other contact persons or phone numbers etc)

Phone (____) _____

Expected Delivery Date ____/____/____

Hospital _____

Check if: ☐ Planned C/S ☐ Planned Inducement

List Attempted phone contacts:
After leaving three messages, send card

Date sent: ____/____/____

First Visit: *Use open ended questions! ("How", "What", "Tell Me")* Comments

<i>Tell me about your previous experiences with breastfeeding.</i>	
<i>Which of your family and friends will be supportive?.</i>	
<i>What are your plans for returning to work or school?</i>	
<i>What worries you about breastfeeding?</i>	

Type of contact: T=phone call C=clinic visit HV=home visit BFC=Class H=Hospital O=other (explain)	1st Prenatal Contact Date: _____ Type: _____	2nd Prenatal Contact Date: _____ Type: _____	3rd Prenatal Contact Date: _____ Type: _____
Anticipatory Guidance	✓ <i>if talked about</i>	✓ <i>if talked about</i>	✓ <i>if talked about</i>
Identify/address mother's barriers			
Hospital policies			
breastfeed in the first 2 hrs, if you can latch on and positioning			
quiet alert/deep sleep			
feeding cues			
Breast care			
Birth control after delivery			
How to notify PC of baby's birth			
PC/s phone # given			
Make appointment for the next contact			
Write it in your planner/Leave mom a card.			
Tell mom to call with questions she has.			
Materials given:			
Referrals made, if any:			


Initial if this is a home visit: Mom _____ PC _____ Mom _____ PC _____ Mom _____ PC _____
 Use the back for additional information or additional contacts

DEC2009G:\PhD\GA\BFI Project\BFI forms\#2 Prenatal Contacts.doc

Appendix D:

Birth Record Form

Figure 8. Birth Record Form

	<p>MSUE/WIC BFI</p> <h1 style="margin: 0;">#3 Birth Record</h1> <p style="margin: 0; font-size: small;">Keep Original in the Office. Put a copy in your Participant Tracking Notebook.</p>	<p>Peer _____</p> <p>BFI County _____</p> <p style="text-align: right;">Date Entered: ____/____/____</p>
<p>To be completed by the Peer</p>		<p>Birth Record Completed ____/____/____</p>
<p>1. Participant's (Mother's) Name: _____</p> <div style="display: flex; justify-content: space-around; width: 100%; font-size: small;"> (First) (M.) (Last) </div> <p>2. Is this a multiple birth? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p style="margin-left: 40px; font-size: x-small;">(for multiple births, use one form for each infant)</p> <p>3. Infant's name: _____</p> <div style="display: flex; justify-content: space-around; width: 100%; font-size: small;"> (First) (M.) (Last) </div> <p>4. Infant's Date of Birth: ____/____/____</p> <div style="display: flex; justify-content: space-around; width: 100%; font-size: x-small;"> Month Day Year </div> <p>5. Infant's Birth Weight: _____ lbs. _____ oz.</p> <p>6. Infant's gender: <input type="checkbox"/> Male <input type="checkbox"/> Female</p> <p>7. Has this infant received any of mother's milk? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain why: _____</p> <p>8. Date of First Contact After Baby was Born: ____/____/____</p> <div style="display: flex; justify-content: space-around; width: 100%; font-size: x-small;"> Month Day Year </div> <p>9. Comments: _____</p> <p>_____</p>		

Appendix E:

First Two Weeks After Discharge Form


Figure 9. First Two Weeks After Discharge Form

MSUE/WIC BFI #4 First Two Weeks After Discharge Three Contacts Are Required (Make more if necessary) <small>Keep in Participant Tracking Notebook. Does not have to be sent for data entry; use the back for additional information.</small>				
Mother's First Name _____ Last Name _____		Attempted phone contacts: After leaving three messages, send card		
Baby _____ M F First Name Circle baby's sex				
<i>Remember: Use open ended questions.</i>		<i>Help mother to feel like a great mom to her baby. YoU Give the information she needs to Empower her to solve her own problems.</i>		<i>Listen Observe Validate Empower</i>
	<i>*At least one of these needs to be a face to face visit in the home. If in a clinic, please indicate.</i> Circle Location T -phone HV -home visit H-hospital O -other (Describe)	First Contact Date:	Second Contact Date:	Third Contact Date:
	T HV H O:	T HV H O:	T HV H O:	T HV H O:
Baby	Baby's Age			
	Signs that baby is growing			
Evaluate Feeding	Number of Stools in 24 hours (describe) Number of wet diapers in 24 hours	S = wd =	S = wd =	S = wd =
	Describe Latch and Positioning: L =looks good N =Not feeding at breast B =better at end of visit S =Still working on it D =did not observe			
	Describe successes or challenges such as: Hearing swallowing Baby's satisfaction, ending the feeding breast softening after feed Pain during feed			
	Number of feedings in 24 hours			
	Describe what baby gets other than mom's milk. How much? How Often?			
MOM	Ask about Engorgement			
	Describe any nipple or breast soreness			
	Topics and Concerns discussed 1. she's a good mom 2. feelings about delivery 3. engorgement 4. Feeding cues and patterns 5. Stooling patterns and appearance 6. Making enough milk 7. Breast/nipple care 8. Growth spurts 10-14 days 9. Milk expression, pumping	<i>List numbers for topics discussed. Make any additional notes.</i>	<i>List numbers for topics discussed. Make any additional notes.</i>	<i>List numbers for topics discussed. Make any additional notes.</i>
	Materials provided			
	List referrals made, if any			
<i>Tell mom to call with questions she has. Make appointment for the next contact. Write it in your planner</i>				
Initials of person making contact _____ Initials of Mother if a face to face visit _____		_____	_____	_____

Appendix F:

Follow-Up Contacts Form

Figure 10. Follow-Up Contacts Form

		MSUE/WIC BFI #5 Follow Up Contacts		Page 1
<i>(This is a three page form)</i>		<i>Keep Participant Tracking Notebook. Does not have to be sent for data entry. If you need extra room, use the back of the page.</i>		
Mother's First Name, Last Name		Baby's Name		
Note: <i>If baby weans before one year, fill in weaning info at the end of this form and fill out #6 Exit Form</i>	Type of contact T = phone HV = Home O = Other <i>(please list)</i>	Is baby growing? Baby's Weight or other signs	Anything but Breastmilk? What? How Much?	Briefly list: topics discussed mother's plans materials given <i>Make appointment for the next contact/ Give mom a card.</i>
3 Weeks / / Mo. Day Year				Initial if face to face visit Peer Initials _____ Mom's _____
4 Weeks (One Month) / / Mo. Day Year				Peer Initials _____ Mom's _____
6 Weeks / / Mo. Day Year				Peer Initials _____ Mom's _____
Two Months / / Mo. Day Year				Peer Initials _____ Mom's _____
Three Months / / Mo. Day Year				Peer Initials _____ Mom's _____

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Figure 10 (cont'd).

MSUE/WIC BFI #5 Follow Up Contacts				Page 2
	Type of contact T =phone HV =Home O =Other (please list)	Is baby growing? Baby's Weight or other signs	Anything but Breastmilk? What? How Much?	Briefly list: topics discussed mother's plans materials given
Four Months <div style="text-align: right;">/ /</div> <div style="text-align: right;">Mo. Day Year</div>				<div style="text-align: right;">Peer Initials _____</div> <div style="text-align: right;">Mom's _____</div>
Five Months <div style="text-align: right;">/ /</div> <div style="text-align: right;">Mo. Day Year</div>				<div style="text-align: right;">Peer Initials _____</div> <div style="text-align: right;">Mom's _____</div>
Six Months <div style="text-align: right;">/ /</div> <div style="text-align: right;">Mo. Day Year</div>				<div style="text-align: right;">Peer Initials _____</div> <div style="text-align: right;">Mom's _____</div>
Seven Months <div style="text-align: right;">/ /</div> <div style="text-align: right;">Mo. Day Year</div>				<div style="text-align: right;">Peer Initials _____</div> <div style="text-align: right;">Mom's _____</div>
Eight Months <div style="text-align: right;">/ /</div> <div style="text-align: right;">Mo. Day Year</div>				<div style="text-align: right;">Peer Initials _____</div> <div style="text-align: right;">Mom's _____</div>

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Figure 10 (cont'd).


MSUE/WIC BFI #5 Follow Up Contacts				Page 3
	Type of contact T =phone HV =Home O =Other (please list)	Is baby growing? Baby's Weight or other signs	Anything but Breastmilk? What? How Much?	Briefly list: topics discussed mother's plans materials given
Nine Months / / Mo. Day Year				Peer Initials _____ Mom's _____
Ten Months / / Mo. Day Year				Peer Initials _____ Mom's _____
Eleven Months / / Mo. Day Year				Peer Initials _____ Mom's _____
One Year / / Mo. Day Year			Congratulations to Mom! She has completed the Mother to Mother Program. Fill out #6 Exit Form. :	

Weaning Information:

Appendix G:

Exit Form

Figure 11. Exit Form

	<p>MSUE/WIC BFI</p> <h2 style="margin: 0;">#6 Exit Form</h2> <p style="font-size: small;">After all required forms are completed, store the participant's complete file in the office.</p>	<p>Peer _____</p> <p>County _____</p> <p style="text-align: right;">Date Entered: ____/____/____</p>												
<p><i>To be completed by the Peer</i> Exit Form Completed ____/____/____</p>														
<p>1. Participant's (Mother's) Name: _____</p> <p style="text-align: center; font-size: small;">(First) (M.) (Last)</p>														
<p>2. Date of last contact you had with mother: ____/____/____ (Infant's Name: _____)</p> <p style="text-align: center; font-size: small;">Month Day Year</p>														
<p>3. Date participant exited: ____/____/____</p> <p style="text-align: center; font-size: small;">Month Day Year</p>														
<p>4. Did infant receive any of mother's milk? <input type="checkbox"/> Yes <input type="checkbox"/> No (If no, explain and skip to #8.) _____</p>														
<p>5. Has infant stopped breastfeeding?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No Infant was still breastfeeding at last contact (see #2)</p> <p>Age of infant _____ OR date ____/____/____ breastfeeding was discontinued.</p> <p style="text-align: center; font-size: small;">Month Day Year</p>														
<p>6. Reason participant gives for discontinuing breastfeeding (select one). <i>If still breastfeeding at last contact, skip #6.</i></p> <table style="width: 100%; font-size: small;"> <tr> <td><input type="checkbox"/> Mother's Preference (Met goals, too demanding, prefers formula, planning pregnancy, embarrassment)</td> <td><input type="checkbox"/> Mother's Medical Condition/Medications (Hospitalization, illness, mastitis, breast surgery, taking medications/birth control)</td> <td><input type="checkbox"/> Low Milk Supply (Mother doesn't think infant is getting enough milk, infant weight concerns, infant always hungry)</td> </tr> <tr> <td><input type="checkbox"/> Mother returning to work (Barriers at work)</td> <td><input type="checkbox"/> Infant's Medical Condition (Premature, hospitalization, acid reflux, thrush)</td> <td><input type="checkbox"/> Doctor Recommended</td> </tr> <tr> <td><input type="checkbox"/> Mother returning to school (Barriers at school)</td> <td><input type="checkbox"/> Breastfeeding Challenges (Infant won't latch, nipples inverted/flat or sore, physical discomfort, biting/teething)</td> <td><input type="checkbox"/> Lack of Social Support (Partner/family support, employer, hospital)</td> </tr> <tr> <td><input type="checkbox"/> Unable to speak directly to mother.</td> <td></td> <td><input type="checkbox"/> Other (Specify) _____</td> </tr> </table>			<input type="checkbox"/> Mother's Preference (Met goals, too demanding, prefers formula, planning pregnancy, embarrassment)	<input type="checkbox"/> Mother's Medical Condition/Medications (Hospitalization, illness, mastitis, breast surgery, taking medications/birth control)	<input type="checkbox"/> Low Milk Supply (Mother doesn't think infant is getting enough milk, infant weight concerns, infant always hungry)	<input type="checkbox"/> Mother returning to work (Barriers at work)	<input type="checkbox"/> Infant's Medical Condition (Premature, hospitalization, acid reflux, thrush)	<input type="checkbox"/> Doctor Recommended	<input type="checkbox"/> Mother returning to school (Barriers at school)	<input type="checkbox"/> Breastfeeding Challenges (Infant won't latch, nipples inverted/flat or sore, physical discomfort, biting/teething)	<input type="checkbox"/> Lack of Social Support (Partner/family support, employer, hospital)	<input type="checkbox"/> Unable to speak directly to mother.		<input type="checkbox"/> Other (Specify) _____
<input type="checkbox"/> Mother's Preference (Met goals, too demanding, prefers formula, planning pregnancy, embarrassment)	<input type="checkbox"/> Mother's Medical Condition/Medications (Hospitalization, illness, mastitis, breast surgery, taking medications/birth control)	<input type="checkbox"/> Low Milk Supply (Mother doesn't think infant is getting enough milk, infant weight concerns, infant always hungry)												
<input type="checkbox"/> Mother returning to work (Barriers at work)	<input type="checkbox"/> Infant's Medical Condition (Premature, hospitalization, acid reflux, thrush)	<input type="checkbox"/> Doctor Recommended												
<input type="checkbox"/> Mother returning to school (Barriers at school)	<input type="checkbox"/> Breastfeeding Challenges (Infant won't latch, nipples inverted/flat or sore, physical discomfort, biting/teething)	<input type="checkbox"/> Lack of Social Support (Partner/family support, employer, hospital)												
<input type="checkbox"/> Unable to speak directly to mother.		<input type="checkbox"/> Other (Specify) _____												
<p>7. Has infant received anything in addition to breastmilk on a regular basis?</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No Date: ____/____/____</p> <p style="text-align: center; font-size: small;">Month Day Year</p> <p>Received (check all that applies): <input type="checkbox"/> Formula <input type="checkbox"/> Other foods</p>														
<p>8. Primary reason for exiting the BFI program: (choose only A, B, C, D or E)</p> <table style="width: 100%; font-size: small;"> <tr> <td style="vertical-align: top;"> <p><input type="checkbox"/> A. Participant completed program --Participant has received program services with a <u>minimum</u> of one home visit AND</p> <p><input type="checkbox"/> Infant has weaned OR <input type="checkbox"/> Infant is one year old and still breastfeeding</p> </td> <td style="vertical-align: top;"> <p><input type="checkbox"/> C. Infant did not breastfeed or receive any breastmilk</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p><input type="checkbox"/> B. Infant was still breastfeeding at last contact, but (check only one)</p> <p><input type="checkbox"/> Lost contact with mother</p> <p><input type="checkbox"/> Mother moved</p> <p><input type="checkbox"/> Mother lost interest in program</p> <p><input type="checkbox"/> Mother had other obligations</p> <p><input type="checkbox"/> Peer vacancy (no further services could be provided)</p> <p><input type="checkbox"/> Returned to school</p> <p><input type="checkbox"/> Returned to work</p> <p><input type="checkbox"/> Family concerns, doesn't want to continue</p> <p><input type="checkbox"/> Infant removed from home</p> </td> <td style="vertical-align: top;"> <p><input type="checkbox"/> D. I made a prenatal home visit, but was unable to contact mother after delivery.</p> <p><input type="checkbox"/> E. Not a live birth (stillborn, miscarriage). (Counsel mother as needed.)</p> </td> </tr> </table>			<p><input type="checkbox"/> A. Participant completed program --Participant has received program services with a <u>minimum</u> of one home visit AND</p> <p><input type="checkbox"/> Infant has weaned OR <input type="checkbox"/> Infant is one year old and still breastfeeding</p>	<p><input type="checkbox"/> C. Infant did not breastfeed or receive any breastmilk</p>	<p><input type="checkbox"/> B. Infant was still breastfeeding at last contact, but (check only one)</p> <p><input type="checkbox"/> Lost contact with mother</p> <p><input type="checkbox"/> Mother moved</p> <p><input type="checkbox"/> Mother lost interest in program</p> <p><input type="checkbox"/> Mother had other obligations</p> <p><input type="checkbox"/> Peer vacancy (no further services could be provided)</p> <p><input type="checkbox"/> Returned to school</p> <p><input type="checkbox"/> Returned to work</p> <p><input type="checkbox"/> Family concerns, doesn't want to continue</p> <p><input type="checkbox"/> Infant removed from home</p>	<p><input type="checkbox"/> D. I made a prenatal home visit, but was unable to contact mother after delivery.</p> <p><input type="checkbox"/> E. Not a live birth (stillborn, miscarriage). (Counsel mother as needed.)</p>								
<p><input type="checkbox"/> A. Participant completed program --Participant has received program services with a <u>minimum</u> of one home visit AND</p> <p><input type="checkbox"/> Infant has weaned OR <input type="checkbox"/> Infant is one year old and still breastfeeding</p>	<p><input type="checkbox"/> C. Infant did not breastfeed or receive any breastmilk</p>													
<p><input type="checkbox"/> B. Infant was still breastfeeding at last contact, but (check only one)</p> <p><input type="checkbox"/> Lost contact with mother</p> <p><input type="checkbox"/> Mother moved</p> <p><input type="checkbox"/> Mother lost interest in program</p> <p><input type="checkbox"/> Mother had other obligations</p> <p><input type="checkbox"/> Peer vacancy (no further services could be provided)</p> <p><input type="checkbox"/> Returned to school</p> <p><input type="checkbox"/> Returned to work</p> <p><input type="checkbox"/> Family concerns, doesn't want to continue</p> <p><input type="checkbox"/> Infant removed from home</p>	<p><input type="checkbox"/> D. I made a prenatal home visit, but was unable to contact mother after delivery.</p> <p><input type="checkbox"/> E. Not a live birth (stillborn, miscarriage). (Counsel mother as needed.)</p>													
<p>9. Number of BFI contacts at exit:</p> <p>Number of Home Visits: _____</p> <p>Number of Phone Calls: _____</p> <p>Number of Hospital Visits: _____</p> <p>Number of Other Educational Contacts: _____ (Specify, i.e.: mail, WIC Clinic)</p>														
<p>10. Did participant receive any of the following as a result of a referral or suggestion from the peer?</p> <p><input type="checkbox"/> WIC <input type="checkbox"/> FDPIR <input type="checkbox"/> TANF (DHS) <input type="checkbox"/> Medicaid <input type="checkbox"/> TEFAP <input type="checkbox"/> MIHP (MSS/ISS) <input type="checkbox"/> SNAP/Bridge Card</p> <p><input type="checkbox"/> Head Start <input type="checkbox"/> CSFP <input type="checkbox"/> Child Nutrition <input type="checkbox"/> MSUE Programs <input type="checkbox"/> Other (Please Specify) _____</p>														
<p>11. Comments _____</p>														

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