Protecting Your Ability to Breastfeed Your Baby: A Pilot Feasibility Study of an Educational Program for Breastfeeding Mothers and Babies

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Abstract

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Despite the fact that the first 6 months of exclusive breastfeeding is recommended by WHO/UNICEF and the American Academy of Pediatrics, only 16% of mothers in the United States exclusively breastfeed their infants for the first 6 months postpartum. Perceived insufficient milk (PIM) is the number one reason for early breastfeeding discontinuation cross culturally. Discontinuation from PIM begins in the first 1 to 2 weeks postpartum and continues to be a primary concern over the course of breastfeeding regardless of the infant's age. There are two mutable causes of PIM: (1) maternal perception about infant behavior and (2) maternal lack of confidence in her ability to breastfeed her infant. Breastfeeding behaviors aimed at modifiable factors can help mothers establish and sustain their breastfeeding practice.

The goals of this study were to add to a mother's knowledge and skills in breastfeeding; to increase her sensitivity to infant behavioral cues; to increase the likelihood that she will respond to infant behavior by unrestricted breastfeeding directly on the breast; and to enhance her confidence (self-efficacy) in breastfeeding. By achieving these goals, the hypothesis was that the mother would be less likely to perceive her infant's behavior to be a result of PIM, and she would be more likely to establish and sustain breastfeeding directly on the breast in the first month postpartum.

The specific purpose of this study was to evaluate the feasibility and short-term impact of the program, **Protecting Your Ability to Breastfeed Your Baby**, using mixed methods within a single group, three-occasion pretest-posttest design. The educational program was implemented during three home intervention sessions delivered to 15 dyads of breastfeeding mothers and their healthy, full term singleton infants within 1 month postpartum.

The study was feasible. However, recruitment was particularly challenging. The intervention significantly increased participating mother's sensitivity to infant behavioral cues, improved maternal breastfeeding self-efficacy, and enhanced the relationship between infant crying behavior and perceived adequate milk supply. In addition, there was a significant improvement in the quality of the mother and infant relationship. A larger study using a more rigorous research design is warranted.

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Chapter 1

Introduction

Significance of the Problem

Despite the fact that the first 6 months of exclusive breastfeeding either directly on the breast or through use of expressed breast milk in a bottle is recommended, only 16 % of the mothers in the United States exclusively breastfeed their infants in the first 6 months postpartum. Reasons for breastfeeding discontinuation include mutable and non-mutable causes. Breastfeeding behaviors aimed at modifiable factors can help mothers establish and sustain their breastfeeding practice.

Perceived insufficient milk, which is the number one reason for early breastfeeding discontinuation across the world, begins in the first 1 to 2 weeks postpartum and continues to be a primary concern during the course of breastfeeding regardless of the infant's age. The mutable causes of perceived insufficient milk include: (1) maternal perception about infant behavior and (2) lack of confidence in her ability to breastfeed her infant.

This study addresses breastfeeding research for nursing practice. The objectives of this study were:

1. To systematically review research measures for breastfeeding initiation, duration, and exclusivity (Chapter 2).
2. To systematically review interventions that enhance breastfeeding initiation, duration, and exclusivity (Chapter 3).
3. To evaluate the feasibility and the short term impact of the program, **Protecting Your Ability to Breastfeed Your Baby**, using mixed methods within a single group, three-occasion pretest-posttest design delivered to 15 dyads of breastfeeding mothers and their healthy full term singleton infants in Washington State (Chapter 4 and 5).

Chapter 2

Research Measures for Breastfeeding Initiation, Duration, and Exclusivity: A Systematic Review

Abstract

There were two main dependent variables in published breastfeeding randomized control trials: (1) efficacy/effectiveness of the interventions on different types of breastfeeding behavior and (2) rate of breastfeeding initiation, duration, or exclusivity by specific points in time. The goal of this paper is to analyze breastfeeding measures that have been used to collect breastfeeding initiation, duration, or exclusivity as a primary, secondary, or tertiary outcome. A total of 263 articles were reviewed and analyzed, of which 21 articles are included in this review. Results showed that the different types of measures were used in response to research questions. The strengths included: (1) interviews were being used to avoid the misclassification of breastfeeding categories, to allow probing, and the identification of breastfeeding problems and concerns, (2) self-report questionnaires were used to obtain information from a large sample size, (3) observations provided the most accurate information about breastfeeding initiation and exclusivity, and (4) diaries could keep track of daily infant feeding. The limitations included: (1) a 24 hour recall bias in self-reports, (2) misclassification of breastfeeding categories, (3) lack of consistency in breastfeeding definitions, (4) scarce report of the reason for breastfeeding discontinuation, and (5) breastfeeding itself was considered as an independent variable. Future studies need to address the mutable causes of breastfeeding discontinuation, followed by other variables, including breastfeeding initiation, duration, or exclusivity.

Introduction

The World Health Organization (WHO)/ The United Nations Children's Fund (UNICEF) and the American Academy of Pediatrician (AAP) recommend exclusive breastfeeding either directly on the breast or through use of expressed milk in a bottle for the first 6 months, and partial breastfeeding with combination of complimentary foods for at least 1 year, and preferably for up to 2 years or beyond (AAP, 2012; Gartner et al., 2005; WHO/UNICEF, 1991). Extensive evidence on the science of breastfeeding has demonstrated the long lasting health benefits to both mothers and infants (Ip, Chung, Raman, Trikalinos, & Lau, 2009; Kramer & Kakuma, 2009). Evidence also points to early initiation, longer duration, and exclusivity of breastfeeding as key to realizing health benefits and protective effects (Heinig, 2001; Ip et al., 2009; Kramer & Kakuma, 2009; Oddy et at., 2003; Raisler, Alexander, O'Campo, 1999). The protective effects of breastfeeding occurred as a result of dose-response; therefore, minimal breastfeeding may not be protective (Raisler et al., 1999). As such, breastfeeding initiation, duration, and exclusivity are major outcomes for breastfeeding studies.

Randomized controlled trials (RCTs) represent the gold standard for evaluating the efficacy and/or effectiveness of interventions when they are appropriately designed, tested, and analyzed. RCTs provide approximately to assess causal relationships between independent variables and dependent variables. RCTs minimize potential threats to internal validity, strengthening the validity of the inference and evidence (Polit &Beck 2012). After major outcomes are identified, i.e., initiation, duration, and exclusivity of breastfeeding, data collection methods for those variables needed to be addressed. Based on the definition of the types of breastfeeding behavior, researchers determine the best method to capture intended dependent variables. Lack of precise and consistent breastfeeding definitions will lead to problems with the collection of valid and reliable information on breastfeeding outcomes, misinterpretation of data, and lack of comparability across studies.

The purpose of this paper is to analyze research measures that were used to examine dependent variables, including either breastfeeding initiation, duration, or exclusivity in RCTs. The strengths as well as limitations of the measure of the dependent variables are analyzed. Finally, recommendations are generated for improvement of the measures of breastfeeding initiation, duration, and exclusivity.

Methods

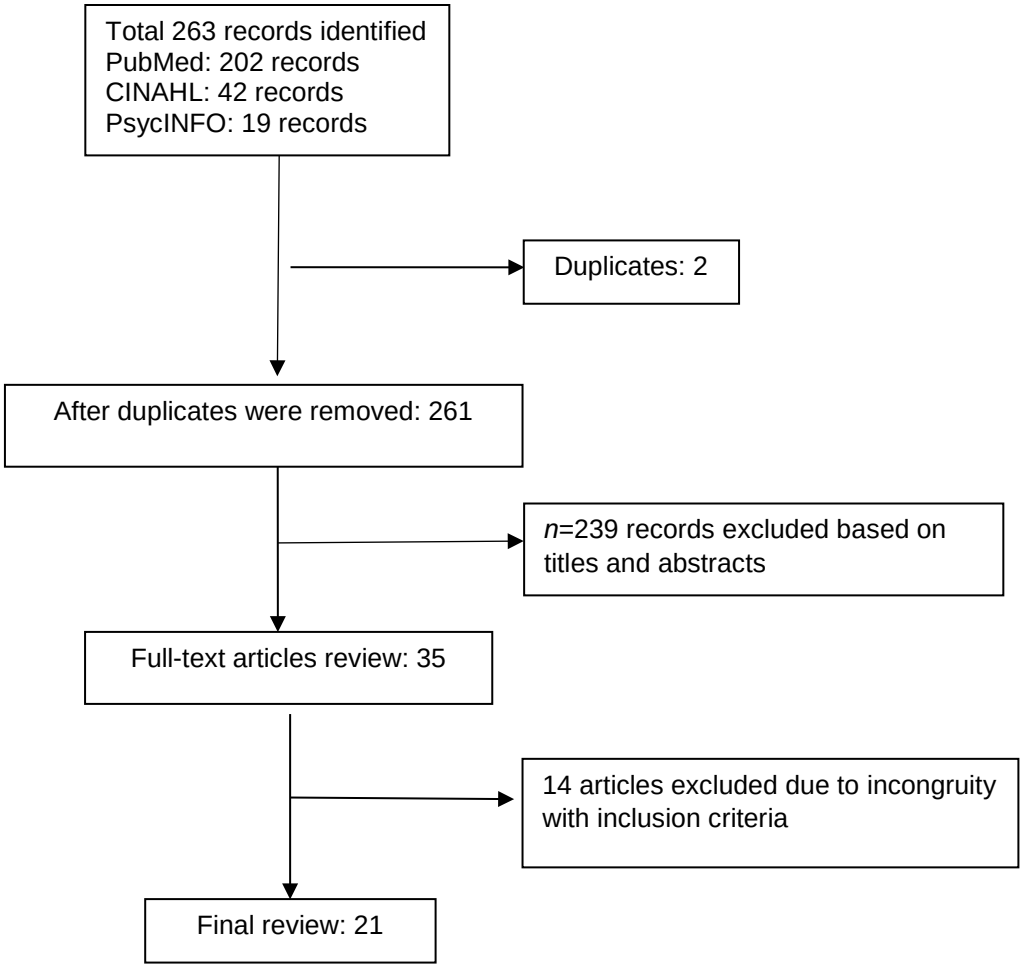
A literature search was conducted in January 2015 by formulating search engines with the consultation of a nursing liaison librarian at the University of Washington using PubMed/MEDLINE (National Library of Medicine), CINAHL Plus (EBSCO), and PsycINFO (EBSCO). In PubMed/MEDLINE, appropriate medical subject headings (MeSH) were used along with entry terms. Combinations of the following search terms were used to identify relevant articles: breastfeeding, feeding behavior, prenatal/patient education, health promotion, social support, perinatal/ prenatal/intrapartum/postnatal care, and postpartum period. Retrieval was limited to randomized clinical trials/randomized controlled trials, humans, English language, female, and January 2004 to December 2014. The publication date was limited for the past 10 years. The search strategies yielded 202 abstracts. Similar procedures were conducted in CINAHL Plus and PsycINFO by using subheadings which yielded 42 and 19, respectively. Results from each database were exported to EndNote. After duplicates were removed, 263 abstracts were reviewed. An investigator reviewed each abstract for elements of clinical trial design that comprised abstract selection criteria, including breastfeeding intervention tested, control group used, randomization to study group, and breastfeeding status as study outcomes. Then 35 full length English articles that met study criteria were reviewed. Those criteria included study outcomes of either breastfeeding initiation, and/or duration, and/or exclusivity as a primary, and/or secondary, and/or tertiary outcomes, healthy term singleton infants and healthy mothers, no smoking, alcohol or drug abuse during pregnancy throughout the postpartum period. Exclusion criteria included studies reported targeting adolescents, mothers with HIV positive status, and study outcomes focused on breastfeeding friendly hospital practices. Based on this review process, 21 articles were identified that met the inclusion and exclusion criteria of the study. Of these 21 articles, eight articles were focused during pregnancy, three articles during the hospital stay, three articles in the postpartum period, one article during the hospital stay through the postpartum period, five articles during pregnancy through the postpartum period, and one article comparing during pregnancy and the postpartum period (see Figure 2.1). The appendix provides a summary of breastfeeding measures, including participants, objectives, primary/secondary/tertiary outcomes, and measures.

Results

Study Design

Seventeen studies include parallel-group randomized trials and four cluster-randomized trials.

Figure 2.1. Flow Diagram for Literature Review



Participants

The participants were either healthy pregnant women and/or mothers with group size ranging from 20 to 2511. The included studies were from 11countries, including the US, Canada, England, Italy, Netherlands, Denmark, France, Brazil, Jordan, Australia, and Singapore.

Types of Outcome Measures

There were two main dependent variables: (1) efficacy or effectiveness of the interventions on different types of breastfeeding behavior and (2) rates of breastfeeding initiation, and/or duration, and/or exclusivity by specific points in time. The majority of studies had primary outcomes and secondary outcomes. There was variability among the studies regarding the time points when data were collected.

Primary outcomes. Primary outcomes were recorded for initiating breastfeeding by means of breastfeeding success in terms of infant breastfeeding behavior as well as breastfeeding rate at birth

(*n*=6). Table 2.1 shows primary outcomes. For exclusive breastfeeding, the rate of exclusive breastfeeding was collected at a single point from birth to 2 months (*n*=1), from birth to 6 months (*n*=4), at 4 weeks (*n*=1), at 10 to 14 days (*n*=1), at 6 weeks and at 6 months (*n*=1), and within 3 weeks and at 6 months (*n*=1). Predominant breastfeeding rate along with exclusive breastfeeding rate was collected at 2 weeks, 6 weeks, 3 months, and 6 months (*n*=1). Full breastfeeding rates were collected up to 6 months postpartum (*n*=1).

Table 2.1. Primary Outcomes

Dependent Variables	Time	First Author and Year
BF initiation rate	at birth	Carfoot, 2005; Chapman, 2004
	within 1 week	Ryser, 2004; MacArthur, 2009; Forster, 2004
EBF rate	from birth to 2 months	Anderson, 2007
	from birth to 6 months	Coutinho, 2005
EBF & any BF rate	at 4 weeks	Laverere, 2003
	at hospital discharge, 2 weeks,6 weeks, 3 months, & 6 months	Su, 2007
	10-14 days, 6weeks, & 6 months	Jolly, 2012
EBF rate & predominant BF rate	within 3 weeks & at 6 months	Kronborg, 2007
	at 2 weeks, 6 weeks, 3 months, & 6 months	Mattar, 2007
Full BF rate	up to 6 months	Khresheh, 2011
BF rate	at 4 weeks & 8 weeks	Noel-Weiss, 2006; Kools 2005
Duration of EBF	in the first 6 months	Kronborg, 2007
Duration of EBF/partial BF	at 4 months	Carfoot, 2005
Duration of EBF or any BF	at 17 weeks	Wallace, 2006
Duration of any BF	at 3 months	Kools, 2005
	at 6 weeks	Graffy, 2004
	in the first 6 months	Forster, 2004
Duration of full & any BF	from 6 weeks up to 1 year	Kronborg, 2012
BF duration of EBF & % of BM	at 13 weeks & 52 weeks	Bonuck, 2005

Note. BF=breastfeeding, EBF=exclusive breastfeeding, BM=breast milk.

The duration of exclusive breastfeeding was measured by the number of days, weeks, and months in the first 6 months (*n*=1), and at 4 weeks and 8 weeks (*n*=1), the duration of exclusive breastfeeding and partial breastfeeding at 4 months (*n*=1), the duration of exclusive breastfeeding or any breastfeeding at 17 weeks (*n*=1), the number of mothers of any breastfeeding at 4 weeks and 8 weeks (*n*=1), at 6 weeks (*n*=1), and in the first 6 months (*n*=1). Full or any breastfeeding duration was calculated from 6 weeks up to 1 year (*n*=1), and the duration of exclusive breastfeeding (*n*=1), and percent of breast milk at 13 weeks and 52 weeks (*n*=1).

Secondary outcomes. Table 2.2 shows secondary outcomes. Secondary outcomes were recorded for the rate of exclusive breastfeeding at 2 months (*n*=1), at 4 months (*n*=1), at the hospital discharge and 6 months (*n*=1), and at other time points: 2 weeks, 4 weeks, 1 month, 6 weeks, 3 months, 4 months, 6 months, and 1 year (*n*=7). In addition to breastfeeding status, other study outcomes, including breastfeeding problems at 1 month postpartum (Moore & Anderson, 2007; Labarere et al., 2005), type of care delivered (Wallace et al., 2006), the level of mother's breastfeeding knowledge (Khresheh, Suhaimat, Jalamdeh, & Barclay, 2011; Kronborg, Maimburg, & Vaeth, 2012), infant hospital admission rates (Khresheh et al., 2011), breastfeeding self-efficacy (Kronborg et al., 2012; Noel-Weiss, Rupp, Cragg, Bassett, & Woodend, 2006), mother's satisfaction during the course of breastfeeding (Kronborg, Vaeth, Olsen, Iversen, & Harder, 2007; Labarere et al., 2005), the proportion that fulfilled mothers prenatal breastfeeding expectation, and the duration of breastfeeding intention (Lavender et al., 2005) were collected.

Breastfeeding Definitions

Two types of breastfeeding definitions were identified: operational definitions of breastfeeding and standardized definition of breastfeeding. Each definition is described in detail as follows.

Operational definitions of breastfeeding. The types of breastfeeding were defined using different terminology across different studies. Thirteen out of 21 studies (62%) adapted the definitions of exclusive breastfeeding from WHO (1991) (Anderson, Damio, Young, Chapman, & Perez-Escamilla, 2005; Bonuck, Trombley, Freeman, & McKee, 2005; Continho, de Lira, de Carvalho, & Ashworth, 2005; Di Nappoli et al., 2004; Graffy, Taylor, Williams, & Eldridge, 2004; Forster et al., 2004; Jolly et al., 2012; Kools, Thijs, Kester, van den Brandt, & de Vries, 200; Kronborg et al., 2007; Labarere, 2003; Mattar et al.,

Table 2.2. Secondary Outcomes

Dependent Variables	Time	First Author and Year
EBF rate	at 2 months	Anderson, 2007
	at 4 months	Carfoot, 2005
EBF/any BF rates	at 1 month	Moore, 2007
Any BF rate	at 1 month	Laverere, 2003
	at 2 weeks, 6 weeks, 3 months, & 6 months	Graffy, 2004
	at 4 months	Su, 2007
BF duration rate	at hospital discharge & 6 months	Forster, 2004
	at 1,3, & 6 months	Chapman, 2004
Full/any BF duration rate	at 1 year	Kronborg, 2012
BF rates	at 2 weeks, 6 weeks, 3 months, & 6 months	Mattar, 2007
	at hospital discharge & 4 months	Lavender, 2005

Note. BF=breastfeeding, EBF=exclusive breastfeeding.

2007; Su et al., 2007; Wallace et al.,2006) and in four studies (20%) definitions were adapted from the Interagency Group for Action (1988) (Khresheh et al., 2011; Kronborg et al., 2012; Moore & Anderson, 2007; Noel-Weiss et al., 2006). Noel-Weiss et al. (2006) adapted six categories by the Interagency Group for Action (1988) and delineated exclusive breastfeeding into directly breastfeeding or expressed milk in a bottle. Moore & Anderson (2007) did not consider expressed milk by pumping to be breastfeeding because the primary outcome variable was success of first breastfeeding with emphasis on the sucking component of the infant, not the amount of breast milk consumed by the infant. Wallace et al. (2006) divided exclusive breastfeeding to include with or without additional water. In addition to exclusive breastfeeding, eight studies (38%) used the term “any breastfeeding” as a categorical variable for convenience (Graffy et al., 2004; Forster et al., 2004; Jolly et al., 2012; Kronborg et al., 2012; Labarere et al., 2003; Moore & Anderson, 2007; Su et al., 2007; Wallace et al., 2006). Any breastfeeding refers to any types of breastfeeding except exclusive breastfeeding. One study (4%) adopted “predominant breastfeeding” which includes vitamins, minerals, water, juice, or ritualistic feeds given infrequently in

addition to breastfeeding (Mattar et al., 2007). Three studies (14%) defined breastfeeding initiation differently from the WHO (1991) (MacArthur et al., 2009; Mattar et al., 2007; Moore & Anderson, 2007). For example, MacArthur et al. (2009) described breastfeeding initiation by the time of hospital discharge; Matter et al. (2007) within the first 2 weeks of delivery; and Moore and Anderson (2007) in the first 2 hours of birth. The duration of breastfeeding was equal to the infant's age when the mother completely stopped breastfeeding.

Standardized definitions of breastfeeding. The Interagency Group for Action on Breastfeeding (1988) (Labbok & Krasovec, 1990) first developed standardized terminology to assess breastfeeding and test interventions (see Table 2.3). The definitions include full breastfeeding, partial breastfeeding, and token breastfeeding, categorized this way because of a dose-response relationship between the different levels of breast milk consumed and health outcomes, including morbidity and mortality in the infant and fertility consequences in the mother.

Table 2.3. Categorization of Breastfeeding Types by the Interagency Group for Action on Breastfeeding

Types	Subtypes	Definitions
Full	a. Exclusive	BM only either breastfeeding on the breast or expressed BM in a bottle, no liquid or solid
	b. Almost Exclusive	Breastfeeding in addition to occasional vitamins, minerals, water, juice, or ritualistic feeds
Partial		% of feeds from BM out of BM & formula milk
	a. High	80% BM
	b. Medium	20-80% BM
	c. Low	<20%
Token		non-nutritive sucking

Note. Definitions above are simplified from the Interagency Group for Action (1988). BM=breast milk.

Full breastfeeding is divided into exclusive and almost exclusive breastfeeding. Exclusive breastfeeding is defined as breast milk only either in the form of breastfeeding on the breast or expressed milk in a bottle, no other liquid or solid fed to infants. Water is excluded because there is an increased risk of diarrhea (Labbok & Krasovec, 1989). Almost exclusive breastfeeding refers to vitamins, minerals, water, juice, or ritualistic feeds given infrequently in addition to breastfeeding.

Partial breastfeeding is further delineated into high, medium, and low. A mixed feeding is a combination of both breast milk and formula milk depending on percent of feeds from breast milk. It is

high if more than 80% of the feeds from breast milk, medium if 20 to 80% comes from breast milk, and low if less than 20% come from breast milk.

Token breastfeeding is a category described as minimal, occasional, and irregular breastfeeding. It is mainly used for infant comfort and consoling measures: non-nutritive purposes (Labbok & Krasovec, 1990).

In 1991, WHO and UNICEF (1991), for simplicity, proposed modifications to the definitions as outlined by The Interagency Group for Action on Breastfeeding (see Table 2.4). The definition then focused solely on what enters the infant's mouth. There are three types of breastfeeding: exclusive breastfeeding, predominant breastfeeding, and complementary breastfeeding. Two methods of infant feeding include breastfeeding and bottle feeding.

Table 2.4. Categorization of Breastfeeding Types by WHO/UNICEF

Types	Definition
Exclusive Breastfeeding (EBF)	Breast milk only either breastfeeding on the breast or expressed breast milk (BM) in a bottle, no liquid or solid except drops/syrups without vitamins, minerals, or medicines as needed
Predominant Breastfeeding	Breast milk only either breastfeeding on the breast or expressed BM in a bottle with limited amounts of liquids and ritual fluids
Full Breastfeeding	EBF and Predominant breastfeeding
Complementary Feeding	BM and solid/semi-solid food, including non-human milk
Breastfeeding	Receiving BM
Bottle Feeding	Receiving liquid/semi-solid food from a bottle with an artificial nipple

Note. Definitions above are simplified from WHO/UNICEF (1991).
EBF=exclusive breastfeeding, BM=breast milk.

Exclusive breastfeeding is defined as giving infants exclusively breast milk, either directly on the breast or by expressed breast milk in a bottle. No other liquids or solids are given with the exception of drops or syrups which contain vitamins, minerals, or medicines as needed.

Predominant breastfeeding is defined as the infant receiving breast milk directly on the breast or expressed breast milk in a bottle as the predominant source of nourishment. However, the infant is allowed to receive liquids (water, sweetened and flavored water, teas, fruit juice, and oral rehydration solution), ritual fluids, and drops or syrups which contain vitamins, minerals, or medicines. The liquids and ritual fluids are accepted only in limited amounts. The categories of exclusive and predominant breastfeeding together constitute full breastfeeding.

Complementary feeding requires that the infant receives both breast milk and solid or semi-solid food. The infant is allowed to receive any food or liquid, including non-human milk.

Breastfeeding and bottle feeding are infant feeding methods. Breastfeeding requires the infant receives breast milk. Bottle feeding requires that the infant receives liquid or semi-solid food from a bottle with an artificial nipple or teat. Expressed milk in a bottle falls in both categories.

There are similarities and differences in breastfeeding definitions between the Interagency Group for Action on Breastfeeding (Labbok & Krasovec, 1990) and WHO/UNICEF (1991). Both agencies do not differentiate between the physical and psychological effects of direct breastfeeding behavior on the breast and those of indirect breastfeeding behavior such as bottle feeding expressed milk. The breastfeeding category of "token" which includes infant comfort and consoling measures was omitted in the WHO/UNICEF. The terminology of WHO/UNICEF has changed from "almost exclusive breastfeeding" to "predominant breastfeeding". There is an acceptance of drops or syrups in the category of exclusive breastfeeding, and liquids, and ritual fluids in limited amounts in the category of predominant breastfeeding in WHO/UNICEF.

Some research studies have adapted the age-based feeding recommendation by WHO (1991) which states that "All infants should be fed exclusively on breast milk from birth to 4 to 6 months of age." by including a transitional period during the fifth and sixth months of life for the introduction of complementary foods in addition to breast milk. However, Kramer and Kakuma (2009) reported in the latest systematic review that exclusively breastfed mother-infant dyads for 6 months received several more health benefits than mother-infant dyads who were exclusively breastfed for 3 to 4 months followed by a mixed feeding which is defined as in a combination of breast milk and formula milk. Those include lower risk of gastrointestinal infection for the infant, more rapid maternal weight return to pre-pregnancy size after childbirth, and delayed onset of menstrual periods (Kramer and Kakuma, 2009).

Early initiation of breastfeeding refers to mothers who put her infant to the breast within one hour after birth (WHO, 1991). Breastfeeding duration was equivalent with the infant age when the mother completely stopped breastfeeding.

Data Collection Methods

Data collection methods varied among studies (see Table 2.5). Breastfeeding initiation was assessed using observations, chart reviews, questionnaires, and interviews by trained research assistants. Two studies examined the efficacy of skin-to-skin care for mothers and their healthy newborn infants on breastfeeding initiation (Carfoot et al., 2004; Moore & Anderson, 2007). Both studies assessed whether mothers initiated breastfeeding through observations.

Table 2.5. Data Collection Methods

Major Dependent Variables	Measures	First Author/Year
Breastfeeding initiation	Face-to-face interviews	Chapman, 2004: Forster, 2004
	Telephone interviews	Forster, 2004; Ryser, 2004
	Chart review	MacArthur, 2009
EBF rate	Face-to-face interviews	Coutinho, 2005; Jolly, 2012; Kronborg, 2007
	Telephone interviews	Anderson, 2005; Jolly, 2012
	Chart reviews	Anderson, 2005
	Telephone questionnaires/in person questionnaires	Mattar, 2007
	Mailed questionnaires	Lavarere, 2005
Breastfeeding duration	Telephone interviews	Jolly, 2012; Noel-Weiss, 2006
	Mailed questionnaires	Kools, 2005
	Mailed/emailed questionnaires	Kronborg, 2012
	Open/closed-ended questionnaires	Graffy, 2004
	Diaries	Kools, 2005; Lavender, 2005; Wallace, 2006

Note. EBF=exclusive breastfeeding.

Breastfeeding initiation was measured by means of success of an infant's breastfeeding behavior, using either the Infant Breast Feeding Assessment Tool (IBFAT) (Matthews, 1988, 1991; Moore & Anderson, 2007) or the modified IBFAT (BAT) (Carfoot et al., 2004). Both evaluate infant breastfeeding behaviors, including infant state, readiness to feed, rooting, latching, and sucking. Each item is scored from 0 (the worst score) to 3 (the best possible score). Successful breastfeeding was defined as a total score of 10 or above, giving a total score range of 0 to 12 (infant state is not scored) on the first three consecutive feeding scores (Matthews, 1988, 1991). The inter-rater reliability of the mother and the

researcher was 91% (Matthews, 1988). However, Riordan and Koehn (1997) reported reliability of this tool ranged only from .27 to .69. Test/retest reliability at 6 months was .88 (Riordan & Koehn, 1997). Riordan and Koehn (1996) then concluded that the IBFAT does not sufficiently address reliability or validity for clinical use. Therefore, the assessment needs to be updated. Carfoot et al. (2004) used the BAT. However, they did not report the validity and reliability of the BAT instrument.

In terms of measurement, either mothers or trained research assistants scored the IBFAT or BAT instruments. In the study of Moore and Anderson (2007), mothers were taught by the first author to score the IBFAT for the first 3 consecutive breastfeeding attempts after birth and kept the feeding log for summated IBFAT scores in the first 7 days postpartum at home. Carfoot et al. (2004) had the trained research assistants observe the first breastfeeding attempt in the delivery room and scored the BAT. However, the research assistants observed only until the end of the first breastfeeding, not the first 3 consecutive breastfeeding.

Other studies reported the rate of breastfeeding initiation at a single point in time from birth to 2 weeks after birth in order to test interventions such as prenatal peer support (Chapman, Damio, Young, & Perez-Escamilla, 2004; MacArthur et al., 2009) and prenatal professional support (Forster et al., 2004; Mattar et al., 2007; Ryser, 2004). Breastfeeding initiation rate was assessed through personal interviews during hospital stay (Chapman et al., 2004; Forster et al., 2004), telephone interviews if the mothers were already discharged from the hospital (Forster et al., 2004), and telephone interviews 1 week after delivery (Ryser, 2004), or a chart review (MacArthur et al., 2009). Measurement for these studies was dichotomous variables (yes/no) and converted into a proportion of mothers who initiated or did not initiate breastfeeding.

After the interventions which include peer counseling (Anderson et al., 2005), the baby friendly initiative practice vs. the same system combined with home visits (Coutinho et al., 2005), prenatal lactation consultant support (Mattar et al., 2007), postpartum professional support such as MDs (Laberere et al, 2003), RNs (Kronborg et al., 2007), peer support during pregnancy and postpartum period (Jolly et al., 2012), the rate of exclusive breastfeeding was collected through telephone interviews (Anderson et al., 2005; Jolly et al., 2012), face-to-face interviews during home visits (Coutinho et al., 2005; Jolly et al., 2012; Kronborg et al., 2007), postpartum questionnaires over the telephone or in person during a clinic

visit (Mattar et al., 2007), mailed questionnaire survey (Lavarere et al., 2003), and chart reviews (Anderson et al., 2005). In the study of Anderson et al. (2005), a personal interview was conducted in either English or Spanish, depending on the preference of the participants. The timing of data collection was different across studies, ranging from birth to 6 months.

The definition of exclusive breastfeeding varied across studies. Therefore, caution has to be exercised when interpreting the trends. However, it is likely that exclusive breastfeeding was explained either as the infant receiving only breast milk or by inversely asking whether the infant has received anything besides breast milk. Mothers were able to answer both types of questions. Exclusive breastfeeding data were collected in the previous 24 hours before the interview. For example, Kronborg et al. (2007) assessed exclusive breastfeeding through interviews during home visits combined with a structured questionnaire which include information about breastfeeding and/or the use of water, tea, artificial milk, other liquids, pacifiers, and bottles in the previous 24 hours. In the study by Coutinho et al. (2005), the researchers asked mothers about the timing of the first introduction of water, tea, artificial milk, other liquids, pacifiers, and bottles to differentiate from exclusive breastfeeding. Mattar et al. (2007) used questionnaires which were developed by the research team and administered over the telephone or in person during clinical visits. In their questionnaires, breastfeeding definitions were clearly addressed, including exclusive breastfeeding, predominant breastfeeding, and partial breastfeeding. Then the mothers circled the current type of breastfeeding, including exclusive breastfeeding. Labarere et al. (2003) used a mailed questionnaire survey and assessed exclusive breastfeeding rate, any breastfeeding rate and its duration, the proportion of mothers with breastfeeding problems, and the rate of maternal satisfaction with her breastfeeding experiences. Each item on the survey questionnaire that was developed by the authors in the previous studies (Labarere et al., 2003; Vittoz, Labarere, Castell, Durand, & Pons, 2004) was rated on a 4-point ordinal scale. Jolly et al. (2012) administered questionnaires at 6 weeks and 6 months either by mail or by phone depending on the mother's preference. Khresheh et al. (2011) conducted telephone interviews by researchers and assessed full breastfeeding rate up to 6 months postpartum as well as the mother's breastfeeding knowledge level at 6 months postpartum, including hand washing, positioning, optimal breastfeeding duration, timing of introducing baby food, and how to assess breast milk supply.

The duration of breastfeeding up to 6 months postpartum was measured as the number of weeks or days of different types of breastfeeding. Kools et al. (2005) examined the efficacy of professional support during pregnancy vs. standard care in terms of breastfeeding duration. The mailed questionnaires asked mothers about the types of feeding methods, including exclusive breastfeeding, complementary breastfeeding, or formula feeding and then compared breastfeeding rate between the treatment group, who received professional counseling during pregnancy, and the control group who received standard care at 3 months and 6 months postpartum. Kronborg et al. (2012) examined the effect of an antenatal training program on breastfeeding knowledge, breastfeeding self-efficacy, and breastfeeding problems, and breastfeeding duration at 6 weeks and again at 1 year. A questionnaire survey was either mailed or emailed in order to assess full or any breastfeeding duration.

Both types of questionnaires (mailed or administered during home visits) for breastfeeding duration were administered as a repeated measure to track the course of breastfeeding over the time of the research study and then the proportion of mothers who continued breastfeeding was calculated. Other methods of collecting breastfeeding duration were telephone interviews at 4 and 8 weeks postpartum by research assistants (Noel-Weiss et al., 2006), at 6 weeks and 6 months by trained peers (Jolly, 2012), and postpartum questionnaires with open-closed questions at 6 weeks and 4 months postpartum (Graffy et al., 2004). Wallace et al. (2006) used feeding diaries to keep track of daily infant feeding for breastfeeding duration up to 17 weeks and to identify breastfeeding problems. Lavender et al. (2005) and Kools et al. (2005) also used diaries.

Discussion

Strengths

This analysis of breastfeeding measures reveal several strengths. First, face-to-face interview surveys yielded a high response rate. This is important because the study purposes were to evaluate efficacy or effectiveness of the interventions in order to make generalizations to a larger population (Polit & Beck, 2012). Interviews offered a purposeful conversation in which the interviewer asked prepared questions and mothers answered them. It was particularly useful when the definitions of breastfeeding needed clarification. Interviews allow a deeper probe into the initial responses of the mother to gain accurate information about breastfeeding. This avoids misclassifying breastfeeding categories.

Open-ended interview questions were used when asked about breastfeeding problems and concerns experienced by mothers. This method gives freedom for the mother to answer the questions while they have a feeling of control in the interview situation (Polit & Beck, 2012). In-depth responses can be expected along with a description or explanation of their decisions. These advantages of face-to-face interviews can be applied to telephone interviews but they are more suitable for short and less complex interviews.

Self-report questionnaires were distributed by mail, email, or in person during a postpartum check-up. It is the simplest way of obtaining information concerning initiation of breastfeeding, current types of breastfeeding, when other liquid/solid food were introduced, and when exclusive breastfeeding was terminated. Questionnaires offer an effective way of obtaining specific information about breastfeeding from a large sample size, are cost effective and limit interviewer bias.

Structured observations were used to collect data about successful breastfeeding and breastfeeding initiation during skin-to-skin care. Detailed observations of the patterns of infant feeding behavior in terms of breastfeeding success provided the most accurate information about breastfeeding initiation and exclusivity.

Despite the fact that various operational definitions of breastfeeding were used, the researchers provided clarity on what was studied and how data were collected and analyzed. For example, Noel-Weiss et al. (2006) delineated exclusive breastfeeding into direct breastfeeding or expressed milk in a bottle in their breastfeeding self-efficacy intervention. Even though they recognize pumping and bottle feeding with expressed breast milk requires extreme dedication, it can easily be quantified which is not the case for breastfeeding on the breast. Therefore, mothers with bottle feeding with expressed breast milk and with breastfeeding on the breast were assigned as separate groups to test breastfeeding self-efficacy and breastfeeding duration. Likewise, Moore and Anderson (2007) did not consider expressed milk by pumping as breastfeeding because of the important component of infant sucking to initiate and establish breastfeeding.

Feeding diaries kept track of daily infant feeding, including the type, methods, and numbers of breastfeeding which provides sufficient information about breastfeeding on demand (Kools et al., 2005; Lavender et al. 2005; Wallace et al., 2006). Data combined with diaries and interviews were useful to

increase validity (Wallace et al., 2006). Chart review by the research team is not error free but it limits misclassification (Labarere et al., 2003). Subject loss to follow-up is minimized.

Limitations

A 24 hour recall either by questionnaires and/or interviews is primarily used by breastfeeding researchers to assess the types of feeding in the past 24 hours prior to data collection. This is a tool that is used by the WHO (1991). WHO states the selection of a 24 hour recall is based on its popularity and appropriateness found in surveys of dietary intake. The 24 hour recall may give the types of feeding at a point in time. However, this method is not a reliable representation of breastfeeding over longer recall periods (Hector, 2004; Noel-Weiss et al., 2012). It is possible to resume exclusive breastfeeding either on the breast or expressed milk in a bottle after supplementing formula feedings in the early postpartum. Recall bias in self-reports might have resulted in misclassification and/or over-reporting of breastfeeding. Misclassification would bias the results.

Lack of consistency in breastfeeding definitions remain a problem. Breastfeeding definitions from WHO focus on the types of breastfeeding and not on the method of breastfeeding (Noel-weiss et al., 2012). For example, exclusive breastfeeding requires that the infant receives only breast milk. The method does not matter, either direct breastfeeding on the breast or expressed milk in a bottle after pumping or manual expression. However, separating breast milk from the mother ignores significant mediators or moderators such as attachment on the mother's breasts, distinctive suckling patterns and comfort sucking which contribute to health outcomes and protective effects of both mothers and infants (Noel-Weiss et al., 2012). Lack of precise and consistent breastfeeding definitions lead to problems with the collection of valid and reliable information on breastfeeding outcomes, misinterpretation of data, and comparability across studies.

Surveys with large, population based samples tend to assess only exclusive breastfeeding and/or any breastfeeding. However, without an assessment of breastfeeding, including the type and method of breastfeeding, it is difficult to test efficacy and/or effectiveness of interventions. Limited outcome assessment can bias results (Bonuck et al., 2005).

The actual reason for discontinuing breastfeeding was seldom reported. The rates of breastfeeding initiation, duration, and exclusivity alone do not tell what caused breastfeeding

discontinuation. This is a sensitive topic but having that information is essential to determine the causes of breastfeeding discontinuation. This should be asked during interviews.

Each data collection method has limitations. Interviews are expensive and time consuming. Interviewers need to be trained to elicit more useful information from respondents in open-ended questions. Interviewers can introduce bias into a study in recording or interpreting information. Misclassifications in the self-report questionnaires will occur when inappropriate terminology is used in the questionnaires. Mailed questionnaires may be less sensitive in detecting breastfeeding problems and concerns than interviews. Over-reporting of breastfeeding, particularly in the treatment group, might occur if mothers provided socially desirable answers, especially when they develop a good relationship with providers. Interviews and telephone surveys provide additional interaction between researchers and mothers and may influence the findings. Under or over reporting of breastfeeding might occur if mothers do not keep an accurate track of their infant feedings.

Recommendations

With the analysis of evidence, including the strengths as well as limitations of the measures of breastfeeding initiation, duration, and exclusivity, recommendations need to be made to improve measurement methods. Through the review, three studies used breastfeeding logs (Kools et al., 2004; Lavender et al., 2005; Wallace et al., 2006) and one study used breastfeeding logs along with interviews (Wallace et al., 2006). The researcher collected data from breastfeeding logs as the main source of information and used interviews as augmentation. By using both methods, the researcher reported increased validity in measurement (Wallace et al., 2006).

When breastfeeding logs have the information about when to start breastfeeding, types of feeding, methods of feeding, frequency of feeding, other liquids and/or solids, it makes classification easier. If mothers keep breastfeeding logs, the pattern of breastfeeding can be recognized. In this way, breastfeeding behavior can be differentiated from breast milk feeding. More accurate data will be collected both in the short and long term, preventing recall bias which occurs in a 24 hour recall. It will not create an unnecessary burden to the mother if she keeps breastfeeding logs periodically on a daily basis. If she makes it a habit, she can catch up if she occasionally forgets logging in a feeding for the day.

Furthermore, feeding logs can detect breastfeeding difficulties that a mother and an infant may experience such as difficulty latching, sleepy infant, crying, fussiness, jaundice, poor weight gain, engorgement, nipple pain, inadequate feeding, and perceived insufficient milk. The number of dirty and wet diapers will indicate if the infant is getting enough milk. The sleep-wake pattern is reflected by the frequent feeding demands required during the first few months. Feeding logs can help assess the underlying cause of breastfeeding discontinuation. Feeding logs make it easier for health care professionals to monitor breastfeeding behavior, give feedback on how the mother is doing with breastfeeding, and provide continuous support. If mothers are asked to keep feeding logs every 4 to 6 hours, it will reduce subject burden as well as increase accuracy. Feeding logs are subjective data but they increase validity and reliability when used with objective data such as observations of breastfeeding during clinical visits.

Studies have shown that mothers who completed breastfeeding logs in the first 3 weeks were more likely to exclusively breastfeed at 6 months postpartum (Pollard, 2011). The study also indicated that feeding logs might work well for mothers who were older, educated, and motivated (Pollard, 2010).

In the majority of studies, the independent variable was breastfeeding itself. Breastfeeding initiation, duration, and exclusivity data were collected as outcomes at some points in time. However, breastfeeding itself should not be considered as an independent variable. Instead, breastfeeding should be viewed in the context of the intervention. The model of the interventions that targets the mutable causes of breastfeeding discontinuation should involve the independent variable. As such, outcomes that determine the mutable causes of breastfeeding discontinuation come first, followed by other variables including breastfeeding initiation, duration, and exclusivity.

Limitations for This Review

There are three limitations of this review. First, only English articles were used. Second, the methodological differences across studies limited its findings and interpretation. Third, the date limitation as there may be studies prior to 2004 that would have been useful.

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Appendix. Measures

Author/ year	Participants	Objective	Primary Outcome	Secondary/ Tertiary Outcome	Measures	Results
Prenatal						
Mattar 2007	Singapore 401 Mean age: 30 Majority married multiparous>primiparous 63-76% prior BF experience Race & ethnicity: Chinese, Indian, Malaysian Low income Less educated A: education & counseling B: education C: usual care	To address the efficacy of simple antenatal educational interventions on breastfeeding practice	EBF and predominant BF rates at 2 weeks, 6 weeks, 3 months & 6 months	Overall BF rates at each study period	Self-report questionnaire during well child visits at 2 weeks and 6 weeks pp and telephone interviews at 3 months and 6 months pp	Mothers in group A were more likely to exclusively or predominantly BF at 3 mo (OR 2.6, 95% CI [1.0-5.7]) and 6 months pp (OR 2.4, 95% CI [1.0, 6.3]) compared with mothers in the control group. Mothers in group A were more likely to exclusively or predominantly BF at 6 months pp (OR 2.5, 95% CI [1.0, 6.3]) compared with mothers in B.
Ryser 2004	US 54 Urban low income	To determine the effect of the Best Start BF educational program on BF attitudes, intention and initiation	BF initiation rates	None	BF attrition prediction tool (BAPT) used as pretest and posttest Prenatal infant feeding Postpartum infant feeding telephone survey within 1 week after birth	The women in the experimental group had significantly increased positive feelings about BF and decreased negative feelings about BF ($p < .01$). The women also increased their control over breastfeeding decisions ($p < .01$). As a result, the women in the experimental group had significantly higher BF intention and BF initiation compared to the control group.
Kronborg 2012	Denmark 1193	To assess the effect of an	Full/any BF duration at 6	Full/any BF duration at 1	Emailed/mailed self -report	The women in the experimental group

	Primiparous White Well educated Majority infants had formula during hospital stay Majority NVD Married	antenatal training program on knowledge, self-efficacy and problems related to BF and on BF duration	weeks	year	questionnaires at 6 weeks and 1 year Knowledge was measured on a 5 -point ordinal scale by asking whether the women had sufficient BF knowledge but details unknown BF self-efficacy at 6 weeks	significantly increased their BF confidence at 36 weeks gestation ($p < .05$) but did not sustain it thereafter. In the experimental group, women with sufficient BF knowledge continued to BF longer than women without enough knowledge (HR 0.74, 95% CI [.58, .97]).
Noel-Weiss 2006	Canada 110 Primiparous 64% NVD High family income Well educated	To determine the effects of a prenatal breastfeeding workshop on maternal BF self-efficacy and BF duration	BF rates and amount and BF self-efficacy at 4 and 8 weeks	None	BF self-efficacy within 24 hours aft birth and between 4 and 8 weeks by telephone BF status by telephone interviews	The women in the experimental group increased their BF self -efficacy score and were more likely to EBF at 8 weeks pp compared to the control group (OR 3.2, 95% CI [1.26, 7.94]). However, BF duration was not different between the two groups. 85% of mothers initiated BF Within those mothers, 30% discontinued BF by 8 weeks pp. The most common reasons was “lack of milk” alone or a combination of other variables which were not specified.
Kools 2005	Netherlands 781 Majority 25-30 years Multiparous and primiparous Well educated	To examine the effectiveness of a BF promotion program to increase BF duration	BF rates and BF duration of any BF at 3 months	None	Pregnancy questionnaire: previous BF experience, intention, & attitudes to BF Postpartum questionnaire during hospital stay: BF	The 3 months BF rate was 32% in the experimental group and 38% in the control group (OR .79, 95% CI [.58, 1.08]). Not effective because the intervention based on the health counseling model was focused on BF

					initiation and types of feeding	difficulties during postpartum which made mothers attention shift to formula feeding.
Lavender 2005	UK 1249 29±5 years old Multiparous and primiparous 90% White Low income	To evaluate the effect of an antenatal educational BF intervention on women's BF duration	Proportion that fulfilled mothers prenatal BF expectation and duration of BF intention	BF rates at hospital discharge and 4 months	Questionnaires Diaries for BF experiences	No difference between the groups in the proportion of mothers who attained their expected BF duration (OR 1.2, 95% CI [.89, 1.6], χ^2 = .07, *df* =1, *p* = .02). No difference between the groups in BF initiation on discharge (OR 1.2, 95% CI [.8, 1.7], χ^2 = 1.1, d*f* =1, *p* = .03) or exclusivity at 4 mo (OR 1.1, 95% CI [.6, 1.8], χ^2 = .07, d*f* =1, *p* = .8).
Mac Arthur 2009	UK 2511 18-36 years Majority multiparous Majority minorities Low income	To assess the effectiveness of an antenatal service using community based BF peer support workers on BF initiation	BF initiation	None	Chart review from computerized maternal records	No difference between the groups in BF initiation (69% in the experimental group, 68% in the control group); cluster adjusted OR 1.11, 95% CI [.87, 1.43). Ethnicity, parity, and mode of delivery predicted BF duration.
Forster 2004	Australia 984 Majority 20-30 years Primiparous Multi racial Married Low income 30-40% history of smoking before pregnancy Majority high school graduates	To determine the influence of mid-pregnancy BF education of BF rates	BF initiation rate	BF duration at hospital discharge	Chart review Interviews in person/by phone if already discharged using structured questionnaires between 2 and 4 days pp	No effects on BF initiation and duration compared to usual care.

Intrapartum						
Carfoot 2005	UK 201 40% primiparous 80% multiparous with BF experience Majority NVD	To examine the effect of early skin to skin care (SSC) between mothers and their healthy full term infants on BF initiation and duration.	BF initiation and duration at 4 months after received SSC	None	Observation for first BF success using the BAT (rooting, latch -on, sucking) which was modified by the Infant BF Assessment Tool (IBFAT) Telephone interview at 4 months	91 % of mothers in the SSC initiated BF compared with 83 % of the moms in the control group but this was not statistically significant. There was no difference in EBF rate at 4 months between the two groups (p = .64).
Moore 2007	US 20 Primiparous Most white NVD Majority married Majority employed & College educated	To examine the effects of SSC during the first 2 hours after birth	Sucking competence during the first BF, time to effective BF	EBF/any BF rates and BF problems at 1 month	Observation for first BF success using the (IBFAT: arousal, readiness to feed, rooting, reflex, latch -on, sucking) after birth BF experience scale (measures the presence of 18 common early BF problems) Self-report the index of BF status at 1 month (measure of EBF) Feeding logs	Infants in the experimental group had a higher score on sucking than the control group (p < .02) and initiated BF earlier (p < .45). There was no difference in BF problems or EBF at 1 month between the two groups.
Wallace 2006	UK 70 Primiparous Majority NVD Predominantly Well educated	To determine whether hands off care by midwives on positioning and attachment of the infant improves BF duration	EBF or any BF duration up to 17 weeks	Type of care delivered	Diaries to record feeding patterns daily up to 6 weeks pp (occurrence and type of feeding in 3 times blocks/day) and a single record per week of the type of feeding thereafter to 17 weeks. Semi-structured	Mother in the experimental group were more likely to hold their infants but less likely to get the infant attached and breastfed when compared to the control group (p = .1). There was no difference in the incidence of BF problems and EBF rate at 6 or 17 weeks between the

					interviews at home at 6 weeks Telephone interviews at 17 weeks	two groups.

From Intrapartum throughout Postpartum						
Khresheh 2011	Jordan Primiparous NVD Low income Majority less educated	To test efficacy of the intervention about BF support.	Full breastfeeding rates up to 6 months	BF knowledge Tertiary outcome: infants' hospital admission rates	Interviews 2 hours after delivery during hospital stay Structured questionnaires about BF status, feeding types & methods, time of BF cessation, infant weight, BF problems, hospital admissions, & BF knowledge	There was significantly improved BF knowledge in the experimental group ($p < .001$). However, there was no difference in full breastfeeding rate between the experimental group and the control group at 6 months pp.

Postpartum						
Coutinho 2005	Brazil Majority multiparous Majority NVD Low income Less educated	To compare the effects of BF rates of two systems for BF promotion such as a hospital-based system and the same system combined with home visits	EBF rates from birth to 6 mo on 1,10 days and every months in the first 6 months	None	Observation Interviews during hospital stay at 1 day pp Structured questionnaire (type of BF, time of first introduction of other liquid)	Approximately 70% of mothers in the experimental group were EBF during their hospital stay but only 30% continued to EBF at home at 10 days pp and 15% at 1 month pp. EBF rate from 10 to 180 days pp in the experimental group was still significantly different from the control group ($p < .0001$).
Kronborg 2007	Denmark 1597 Both primiparous &multiparous with little BF experience	To address the efficacy of a supportive intervention on BF duration	EBF rates during 6 months follow up	Mother's satisfaction with the BF period	Mother's satisfaction on a 5-point ordinal scale Questionnaires within 3 weeks after birth and at 6 months	Mothers in the experimental group were more likely to EBF for a longer duration and less likely to use pacifiers and discontinue breastfeeding compared to

						the control group (HR .86, 95% CI [.75, .99]). Mothers in the experimental group were more confident in their ability to BF without quantifying the amount of breastmilk.
Labarere 2005	French 231 Majority primiparous Majority used epidural Majority married Majority higher than high school educated Majority participated prenatal classes	To determine whether attending an early, routine, preventive, outpatient visit delivered in a primary care physician's office would improve BF outcomes	EBF rates at 4 weeks	Any BF rates at 4 weeks including BF duration, difficulties, and satisfaction	Chart review for BF Initiation Questionnaires within 2 weeks after birth and between 2 and 4 weeks pp	Mothers in the experimental group were more likely to EBF at 4 weeks (HR1.17, 95% CI [1.01,1.34]) with longer duration (HR 1.40, 95% CI [1.03-1.92]) and less likely to have BF difficulties (HR 0.76, 95% CI [.98,1.22]) compared to the control group.

From Pregnancy throughout Postpartum						
Anderson 2005	US 182 Majority 20-30 Primiparous and multiparous Mexican Intention to BF 6-12 mo Majority married Low income (90% WIC) Less educated	To assess the efficacy of peer counseling to promote EBF	EBF rates	Determinants of EBF at 2 months pp	Chart review for BF initiation and formula feeding Interviews	The mothers in the experimental group were more likely to initiate BF and EBF at 3 months pp compared with the control group.
Chapman 2004	219 US Older than 20 years 40% primiparous	To evaluate the effectiveness of an existing BF peer counseling program in the US	BF initiation rate at birth	BF duration rate at 1,3,6 months	Chart review Monthly telephone interviews until mothers stop BF or for 6 months at max	The mothers in the experimental group were more likely to initiate BF and to BF their infants longer at 1 and 3 months pp

	Majority Mexican Majority NVD 20% married Low income & WIC participants 12 years living in the US on average					compared with the control group. However, there was no difference in EBF at 1 and 3 months pp.
Bonuck 2005	US 382 Older than 19 years Primiparous & multiparous Hispanics & Black Majority multiparous with experienced BF Majority intention to BF Majority married Majority NVD Low income High school educated	To determine whether an individualized, prenatal and postnatal lactation consultant intervention resulted in BF duration	BF duration at 13 and 52 weeks	None	Telephone interviews at 1,2,3,4,5,6,8,10 & 12 months The index of BF status (% of BF)	The experimental group was more likely to complementary BF at 20 weeks pp. BF exclusivity was low. There was no difference between the two groups.
Graffy 2004	UK 720 Majority primiparous Multiparous with previous BF discontinuation before 6 weeks Majority white Married Middle income Well educated	To investigate whether offering volunteer support from counselors in BF would result in more women BF	BF rates at 6 weeks	Any BF rates at 4 months	Questionnaires (BF satisfaction, BF problems, advice received was helpful, BF duration, time to introduction to formula feeding)	No effect on BF rates.

Jolly 2012	UK 848 Primiparous & multiparous Miltiethnicity Majority has intention to BF 45% experienced BF Majority older than 20 years old	To assess efficacy of BF continuation through a peer support worker service	Rates of EBF or any BF at at 10 to 14 days, 6 weeks, & 6 months pp	None	Interviews about feeding status at home at 10 to 14 days pp Questionnaires about type & method, length of BF either by mail or phone at 6 weeks & 6 months pp	There was no difference in any or EBF rate between the experimental group and the control group at 10 to 14 day, 6 weeks or 6 months pp.

Comparison between Prenatal and Postpartum Intervention						
Su 2007	Singapore 450 Low income Less educated Group 1: usual care Group 2: prenatal education Group 3: postpartum lactation support	To investigate whether prenatal BF education alone or pp lactation support improves EBF rates compared to usual care	EBF rates at hospital discharge, 2weeks, 6weeks, 3 months, & 6months	Any BF rates	Questionnaires	Mothers in Group 3 were more likely to EBF at 2 weeks (RR 1.82, 95% CI [1.14, 2.90]), 6 weeks (RR 1.85, 95% CI [1.11, 3.09]), 3 months (RR 1.87, 95% CI [1.03, 3.41]), 6 months (RR 2.12, 95% CI [1.03, 4.37]) pp compared to mothers in Group 1. Mothers in Group 2 were more likely to EBF at 6 weeks (RR 1.73, 95% CI [1.04, 2.90]), 3 months (RR 1.92, 95% CI [1.07, 3.48]), 6 months (RR 2.16, 95% CI [1.05, 4.43]) pp compared to mothers in Group 1. Mothers in Group 3 were more likely to exclusively or predominantly BF 2 weeks after delivery compared with mothers in Group 2 (OR 1.53, 95% CI [1.01, 2.31]). The rate of any BF 6 weeks

						after delivery was also higher in Group 3 compared to Group 2 (OR 1.16, 95% CI [1.02, 1.31]).

Note. EBF=exclusive breastfeeding, BF=breastfeeding, NVD=normal vaginal delivery, pp=postpartum

Chapter 3

Interventions That Enhance Breastfeeding Initiation, Duration, and Exclusivity: A Systematic Review

Abstract

Despite multiple hundreds of articles promoting exclusive, long-term breastfeeding, interventions have failed to achieve the goal of exclusive breastfeeding for the first 6 months postpartum. The goal of this paper is to evaluate the interventions that have been trialed to date and to recommend future needed directions in breastfeeding research. A literature review was conducted using PubMed, CINAHL Plus, and PsycINFO to identify articles that evaluated the efficacy or effectiveness of breastfeeding interventions on either breastfeeding initiation, duration, or exclusivity as a primary, secondary, or tertiary outcome. A total of 263 articles were reviewed and evaluated, of which 8 articles were included in this review. Results showed that the intervention studies relied on three factors to affect breastfeeding practices: acquisition of knowledge and skills, emotional support by health care providers or peers, and self-efficacy over maternal confidence in her ability to breastfeed her infant. Although these factors were addressed in the published studies, breastfeeding mothers had difficulty transferring what they gained from the interventions into their real life breastfeeding practices. There were conceptual limitations: (1) lack of understanding of maternal perceptions of infant behavior and (2) perceived insufficient milk as a remaining number one reason for breastfeeding discontinuation. There were methodological limitations: (1) lack of theory based interventions and (2) lack of intervention fidelity. Future studies involving breastfeeding need to focus on the mutable causes of the problems driven by theory based interventions integrated with intervention fidelity.

Introduction

Efforts to increase breastfeeding initiation, duration, and exclusivity have been initiated in the prenatal period, immediately after childbirth, during the hospital stay, and throughout the postpartum period in hospitals, community settings, and in the home. The Baby Friendly Hospital Initiative (WHO, 1998) lists ten steps to successful breastfeeding, geared primarily toward providing support for breastfeeding mothers. In spite of this, after leaving the hospital, many mothers find breastfeeding challenging, with the highest drop-off rate of exclusive breastfeeding noted in the first 1 month postpartum (Centers for Disease Control and Prevention, 2014). Perceived insufficient milk is the main reason for early breastfeeding discontinuation which begins in the first 1 to 2 weeks postpartum and continues to be a primary concern during the course of breastfeeding regardless of the infant's age (Colin & Scott, 2002; Cooke, Sheehan, & Schmied, 2003; Segra-Millan, Dewey, & Perez-Escamilla, 1994). Establishing as well as sustaining exclusive breastfeeding is the preferred outcome, especially since both WHO/UNICEF and the American Academy of Pediatrics recommend exclusive breastfeeding in the first 6 months (AAP, 2012; Gartner et al., 2005; WHO/UNICEF, 1991). Despite multiple hundreds of articles promoting exclusive, long-term breastfeeding, interventions have failed to achieve the goal of exclusive breastfeeding in the first 6 months postpartum. The goal of this paper is to evaluate the interventions that have been trialed to date and to recommend future needed directions in breastfeeding research.

The purposes are to: (1) analyze the studies to identify which factors, if any, uniquely enhance initiation, uniquely enhance duration, or uniquely enhance exclusivity and those that enhance all of these components, (2) analyze the limits of what is known to enhance breastfeeding practices, and (3) recommend what is still needed to be studied to better understand the factors that enhance initiation, duration, and exclusivity.

Methods

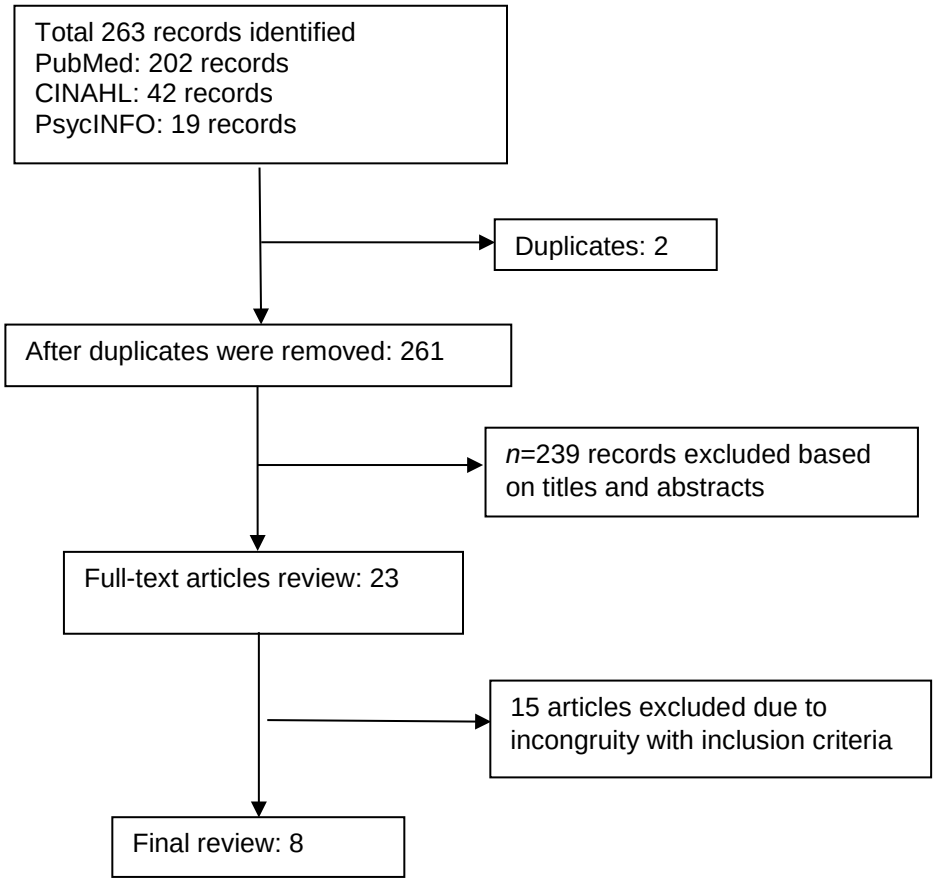
A literature search was conducted in January 2015 by formulating search engines with the consultation of a nursing liaison librarian at the University of Washington by using PubMed/MEDLINE (National Library of Medicine), CINAHL Plus (EBSCO), and PsycINFO (EBSCO). In PubMed/MEDLINE, appropriate medical subject headings (MeSH) were used along with entry terms. Combinations of the following search terms were used to identify relevant articles: breastfeeding, feeding behavior,

prenatal/patient education, health promotion, social support, perinatal/ prenatal/intrapartum/postnatal care, and postpartum period. Retrieval was limited to randomized clinical trials/ randomized controlled trials, humans, English language, female, and January 2004 to December 2014, focused on the past 10 years. The search strategies yielded 202 abstracts. The PubMed search strategies are shown in Figure 3.1. Similar procedures were conducted in CINAHL Plus and PsycINFO by using subheadings which yielded 42 and 19, respectively. Results from each database were exported to EndNote. After duplicates were removed, 263 abstracts were reviewed. An investigator reviewed each abstract for elements of clinical trial design that comprised abstract selection criteria, including breastfeeding intervention tested, control group used, randomization to study group and breastfeeding status as study outcome, and not targeting adolescents or mothers with HIV positive status. Then 23 full length English articles were reviewed after the study criteria were met. Those criteria included study outcomes of either breastfeeding initiation, and/or duration, and/or exclusivity as a primary, and/or secondary, and/or tertiary outcome, healthy term singleton infants and healthy mothers with no smoking, alcohol, or drug abuse during pregnancy throughout the postpartum period. Exclusion criteria included study outcomes focused on breastfeeding friendly hospital practices and skin-to-skin contact during the intrapartum period at the hospital. Based on this review process, eight articles were identified that met the inclusion and exclusion criteria of the study for further analysis.

Results

There were four studies conducted during the prenatal period, three studies during the postpartum period, one study from the prenatal period throughout the postpartum period, and one study compared prenatal and postpartum interventions. The appendices provide a summary of the intervention components and content during the prenatal period; specifically the intensity of intervention such as dose (the number of sessions, duration, follow-ups, and booster session), timing, setting, providers, delivery mode within core components, and the fidelity of the intervention. Each of these studies is discussed in more detail below during the prenatal period, the postpartum period, and from the prenatal period throughout the postpartum period. See Appendix A through C. See the study results of the measures in Chapter 2.

Figure 3.1. Flow Diagram for Literature Review



Prenatal Period

Appendix A provides the results of the four studies that were conducted during the prenatal period. Mattar et al. (2007) recruited 401 pregnant women with various ethnic backgrounds in Singapore. The intervention occurred at 36 weeks gestation and had three arms: Group A received breastfeeding education and individual counseling by lactation counselors. Breastfeeding education consisted of watching a 16-minute video and a reading a pamphlet. Both materials contained breastfeeding benefits, feeding techniques (positioning and latch-on), management of common breastfeeding problems (nipple pain,) and expressing breast milk. Counseling delivered by lactation counselors consisted of one 15-minute session for the assessment of nipple traction and answering questions related to breastfeeding. Group B received only breastfeeding education. Group C was the control group who received none of the above but the usual prenatal care. Mothers in Group A (education and counseling) were more likely to exclusively or predominantly breastfeed at 3 months (OR 2.6, 95% CI [1.0, 5.7]) and 6 months

postpartum (OR 2.4, 95% CI [1.0, 6.3]) compared with mothers in the control group. Mothers in Group A (education and counseling) were more likely to exclusively or predominantly breastfeed at 6 months postpartum (OR 2.5, 95% CI [1.0, 6.3]) compared with mothers in Group B (education alone).

Ryser (2004) evaluated the effect of a prenatal breastfeeding program on breastfeeding attitudes, intention, and breastfeeding initiation among 54 pregnant women with low income in the US. The program centered on eliciting and recognizing the women's feelings and concerns about breastfeeding and teaching breastfeeding benefits. The author, who is also an RN, provided counseling, and had the women watch a video, and read materials about common breastfeeding barriers. The intervention was given four times during prenatal visits. The experimental group received the program whereas the control group received the usual care. Pretest and posttests using the Breastfeeding Attrition Prediction Tool (Janke, 1994) were given to assess breastfeeding attitudes. The women in the experimental group significantly increased positive feelings about breastfeeding and decreased negative feelings ($p < .01$). The women also increased their control over breastfeeding decisions ($p < .01$). As a result, the women in the experimental group had significantly higher breastfeeding intention ($\chi^2 = 11.10$, $df = 1$, $p < .01$) and breastfeeding initiation ($\chi^2 = 9.52$, $df = 1$, $p < .01$) compared to the control group.

Krongborg, Maimburg, & Vaeth (2012) compared knowledge, self-efficacy, and concerns related to breastfeeding among highly educated 1193 primiparous pregnant women who received or did not receive the breastfeeding educational program in Denmark. The program was provided for couples between 30 and 35 weeks gestation. The program was taught by trained midwives giving lectures, leading discussions, watching a breastfeeding video, and using a doll for practice. The intervention lasted for two hours. Knowledge was measured on a 5-point ordinal scale by asking whether the women had sufficient breastfeeding knowledge. At 6 weeks, self-efficacy aimed at breastfeeding continuation for up to 4 months postpartum was measured on the validated scale (Dennis, 2003). The women in the experimental group significantly increased their breastfeeding confidence at 36 weeks gestation ($p < .05$) but did not sustain it thereafter. In the experimental group, women with sufficient breastfeeding knowledge at 6 weeks postpartum continued to breastfeed longer than women without enough knowledge (HR 0.74; 95% CI [.58, .97]). There was no difference in breastfeeding concerns between the two groups.

Noel-Weiss, Rupp, Cragg, Bassett, and Woodend (2006) evaluated the effects of a 2.5-hour prenatal breastfeeding workshop on maternal breastfeeding self-efficacy and breastfeeding duration in 110 primiparous pregnant women in Canada. The intervention was done after 34 weeks gestation and given once for 2.5 hours as a portion of the series of three prenatal workshops. The program was theoretically based using Bandura's social cognitive theory and adult learning principles. Nurses and lactation consultants taught breastfeeding self-efficacy in breast milk supply without quantifying it and differentiated infant feeding categories as follows: exclusive breastfeeding by breast, exclusive breastfeeding by breast with some exclusive breast milk, and exclusive breast milk. The content was delivered by using dolls, videos, and discussions. Breastfeeding self-efficacy was measured at 24 hours after childbirth and 4 weeks on a validated instrument (Dennis, 2003). When the actual workshop attendance was analyzed, the women in the experimental group increased their breastfeeding self-efficacy score at 4 weeks postpartum and were more likely to exclusively breastfeed at 8 weeks postpartum when compared to the control group (OR 3.2, 95% CI [1.26, 7.94]). Breastfeeding duration significantly increased in the experimental group compared with the control group when actual workshop attendance was analyzed (p = .02). The most common reasons for breastfeeding discontinuation was "lack of milk" alone or a combination of other variables which were not specified.

Overall, the operational elements of breastfeeding interventions during the prenatal period consist of three areas: 1) acquisition of knowledge and skills, 2) emotional support from professionals, and 3) self-efficacy over maternal confidence in her ability to breastfeed her infant. Knowledge was delivered in all four studies. Knowledge is an essential prerequisite for breastfeeding behavior. Knowledge encompasses understanding the benefits of breastfeeding, types and methods of feeding, and infant behavior. One study showed breastfeeding knowledge increased breastfeeding duration. However, knowing about breastfeeding problems did not decrease breastfeeding concerns in the postpartum period (Kronborg et al., 2012). One study showed clarification of breastfeeding doubts and/or myths reassured pregnant women and helped them to continue pursuing exclusively/predominantly breastfeeding (Mattar et al., 2007). Three studies delivered skills such as positioning, and latch-on by showing in the video (Mattar et al., 2007), or infant care, and breastfeeding by using a doll (Kronborg et al., 20012; Noel-Weiss et al, 2006). Emotional support was provided in all four studies but in different forms. In counseling,

emotional support was provided by listening to issues and concerns about breastfeeding from low socioeconomic pregnant women and giving reflective responses. This helped them to develop a relationship with providers and ultimately established a therapeutic alliance (Mattar et al., 2007; Ryser, 2004). Emotional support for the pregnant women with high socioeconomic status was embedded in discussions in the prenatal breastfeeding workshop; feelings and concerns about breastfeeding were shared and discussed with other pregnant women (Kronborg et al., 2012; Noel-Weiss et al., 2006). Two studies examined self-efficacy of educational interventions on breastfeeding practice but the results were mixed (Kronborg et al., 2012; Noel-Weiss et al., 2006). In the study by Kronborg et al. (2012), self-efficacy focused on outcome expectation, i.e., breastfeeding continuation in the first 4 months postpartum. Maternal confidence in her ability to breastfeed her infant without quantifying the amount of breast milk was the focus for the study by Noel-Weiss et al. (2006). Watching the video and the use of a doll were the components of self-efficacy intervention for both studies (Kronborg et al., 2012; Noel-Weiss et al., 2006); vicarious experience through discussions and performance attainment respectively.

Most of the prenatal breastfeeding interventions began in the third trimester and were aimed at increasing the rate of breastfeeding initiation (Ryser, 2004), duration (Kronborg et al., 2012; Noel-Weiss et al., 2006), and exclusivity (Kronborg et al., 2012; Mattar, 2007; Noel-Weiss et al., 2006) as primary or secondary outcomes. Beside breastfeeding outcomes, Noel-Weiss et al. (2006) measured breastfeeding self-efficacy as primary outcome. Prenatal breastfeeding intervention typically occurred within a formally structured setting such as a prenatal breastfeeding workshop at the hospital, or on an individual level delivered at the hospital, or provided during prenatal check-ups. Providers who delivered the interventions included midwives, lactation consultants, and/or maternity nurses.

The educational sessions took place between one and four times. The duration of individual counseling was 15 minutes or longer. Only one study reported the fidelity of the intervention such as the use of a teaching manual for the training and course evaluation by participants at the end of the intervention session, resulted in high compliance rate in the experimental group (Kronborg et al., 2012).

Postpartum Period

Appendix B provides the results of the three studies that were conducted during the postpartum period. Two studies examined the effects of postpartum home visits on exclusive breastfeeding rate in

the first 6 months postpartum (Coutinho, de Lira, de Carvalho Lima, and Ashworth, 2005; Kronborg, Vaeth, Olsen, Iversen, and Harder, 2007) and one study used a clinical visit, aimed at increased exclusive breastfeeding with longer duration (Laberere et al., 2005). Coutinho et al. (2005) evaluated the effect of postpartum home visits after mothers were discharged from the Baby Friendly Hospital on exclusive breastfeeding from birth to 6 months postpartum in 350 mothers with low socioeconomic and educational status in Brazil. The experimental group received 10 home visits; four visits in the first month at 3,7,15 and 30 days, biweekly during 2 months postpartum and monthly visits between 3 and 6 months postpartum. Each visit lasted 30 minutes with the first visit a little longer and was conducted by trained maternity staff at the Baby Friendly Hospital Initiative. The control group received no home visits. The home visits contained emotional support and guidance for breastfeeding mothers. Breastfeeding assessment was conducted to determine positioning, latch-on, flow of milk, and infant satiety. An illustrated booklet was provided to record the infant's developmental milestones and to answer questions about breastfeeding. Mothers were referred if breastfeeding difficulties were not resolved. Breastfeeding attitudes of the family members were assessed if they were present. Approximately 70% of mothers in both groups were exclusively breastfeeding during their hospital stay. However, only 30% continued to exclusively breastfeed at home at 10 days postpartum and 15% at 1 month postpartum in the control group. Exclusive breastfeeding rate from 10 to 180 days postpartum in the experimental group was significantly increased from the control group ($p < .0001$) with a 45% of breastfeeding prevalence in the experimental group compared with 13% of breastfeeding prevalence in the control group. Although the intervention of Coutinho et al. (2005) brought an increase in breastfeeding initiation rate and a significant effect on exclusive breastfeeding, a high drop-off rate was noted within 1 month. Even though emotional support, guidance, and breastfeeding assessment were given, sustainability was low. It is unknown which factors were responsible for the outcome but it is possible the training for the maternity staff may have been insufficient. Also, there may be an existing cultural belief that it is a good thing to introduce formula feeding within the first week postpartum.

Kronborg et al. (2007) evaluated the effect of one to three home visits delivered by trained RNs within the first 5 weeks postpartum on breastfeeding exclusivity and duration in 1597 mothers in Denmark. Mothers in the experimental group received support, breastfeeding assessment, modeling, and

breastfeeding knowledge. Coping skills were reinforced through feedback. Mother's concerns about breastfeeding were acknowledged. A booklet about breastfeeding techniques and infant hunger cues was provided. Mothers in the control group received usual home visits. Mothers in the experimental group were more likely to exclusively breastfeed for a longer duration and less likely to use pacifiers and discontinue breastfeeding compared to the control group (HR0.86; 95% CI [.75, .99]). Mothers in the experimental group were more confident in their ability to breastfeed without quantifying the amount of breast milk.

Laberere et al. (2005) reported that French mothers who received postpartum breastfeeding support in addition to their usual care for mother and infant dyads within the first 2 weeks postpartum by trained primary care physicians in the office were more likely to exclusively breastfeed at 4 weeks (HR1.17; 95% CI [1.01, 1.34]) with longer duration (HR 1.40, 95% CI [1.03, 1.92]) and less likely to have breastfeeding difficulties (HR 0.76, 95% CI [.98, 1.22]) compared to the control group. Training was aimed at improving breastfeeding knowledge and technique, including the management of problems such as infant weight gain, jaundice, diarrhea, and mother's medication during breastfeeding. It is not reported what counseling skills were used but counseling had a positive effect on the outcomes.

In the postpartum period, breastfeeding interventions aimed at breastfeeding duration and exclusivity began and lasted at various points in time. Home visits with a range from 1 to 10 times was delivered to both primiparous mothers and multiparous mothers beginning within 3 days after hospital discharge for 3 to 6 months lasting for 30 minutes or longer, usually on a weekly basis in the first month and monthly thereafter (Coutinho et al., 2005; Kronborg et al., 2007). RNs, trained maternity staff, and physicians taught postpartum breastfeeding. The components of postpartum breastfeeding intervention were similar to those in the prenatal period. Emphasis was placed on breastfeeding assessment in the two studies (Coutinho et al., 2005; Kronborg et al., 2007). Signs and symptoms of existing and/or impeding breastfeeding difficulties such as engorgement, nipple pain, and infant health were assessed. The signs of hunger and satiety were affirmed. Through breastfeeding observations, latching-on and positioning were confirmed during home visits (Coutinho et al., 2005; Kronborg et al., 2007). One study concerning maternal confidence in her ability to breastfeed her infant without quantifying the breast milk supply was embedded in the breastfeeding self-efficacy component. Breastfeeding self-efficacy was

enhanced by hands-on/off assistance, observing other mothers breastfeed and a positive psychological state (Krongborg et al., 2007). Emotional support was continuously provided in response to the mother's issues and concerns related to breastfeeding in the three studies (Coutinho et al., 2005; Kronborg et al., 2007: Labarere et al., 2005). All three studies reported the fidelity of the intervention, including training sessions for providers using training manuals (Coutinho et al., 2005; Kronborg et al., 2007: Labarere et al., 2005).

From Prenatal Period throughout Postpartum Period

Appendix C provides data from a study conducted from the prenatal period through the postpartum period. Chapman, Damio, Young, and Perez-Escamilla (2004) evaluated the effectiveness of peer counseling in 219 mothers in the US. The majority of mothers were low-income Mexican descent who lived in the US on average for 12 years. The experimental group received peer counseling, including one prenatal home visit, daily intrapartum visits, three postpartum home visits, and telephone counseling for 6 months as needed. The mothers in the experimental group were more likely to initiate breastfeeding (RR 0.39, 95% CI [.18, 0.86]) and to breastfeed their infant longer at 1 month postpartum (RR .72, 95%CI [.50, 1.05]) and 3 months postpartum (RR .78, 95% CI [.61, 1.00]) compared with the control group. However, the prevalence of exclusive breastfeeding at 1 month postpartum was extremely low in the experimental group (RR 1.07, 95% CI [.90, 1.27]).

This study shows that peer support from pregnancy throughout postpartum with emotional support, including counseling in addition to the usual care by RNs were effective for breastfeeding initiation and duration for Mexican mothers with low socioeconomic status. However, the program did not change the low prevalence of exclusive breastfeeding. There were issues with monitoring the program's integrity as peers were understaffed, and sometimes accidently visited, and provided support for mothers in the control group during the hospital stay which may have affected the results of the study.

Discussion

This section contains limits of what is known to enhance breastfeeding practice, recommendations and future research and methodological limitation.

Limits of What is Known to Enhance Breastfeeding Practices

From an analysis of the results of the studies reviewed, there are limits of what is known to enhance breastfeeding practices. First, women demonstrated some of the specific breastfeeding knowledge, skills, and breastfeeding self-efficacy that were acquired through participation in prenatal breastfeeding interventions. However, when mothers encountered breastfeeding problems in the postpartum, they had difficulty transferring this knowledge, skills, breastfeeding self-efficacy into real life. Noteworthy, the studies never measured how much the mothers knew about infant behavior such as hunger cues, satiety, crying patterns, sleep cycles, and frequent feeding demand over the course of breastfeeding. It is thus not clear how mothers perceive infant behaviors, interpret, and respond to them. Additionally, the mother's perception and interpretation about infant behavior may differ. These maternal perceptions and interpretations are used for feeding decisions. Literally, there is lack of understanding of maternal perceptions of infant behavior.

Second, skills that are taught are more likely to focus on latch-on and positioning. Due to the lack of understanding of maternal perceptions of infant behavior, skills for breastfeeding difficulties might not be the correct focus.

Third, the studies that focused on building confidence in the mother's ability to breastfeed without quantifying the amount of breast milk had positive results with breastfeeding exclusivity and longer duration (Kronborg, et al., 2007; Noel-Weiss et al., 2006). This was embedded in the theoretical model of the intervention because mothers who are breastfeeding directly on the breast cannot quantify the amount of breast milk that is produced. However, maternal perception of lack of milk or actual low milk supply remain the problem as the study of Noel-Weiss et al. (2006) reported it to be the most common reason for breastfeeding discontinuation. This is a consistent finding from previous studies across the world (Ahluwalia, Morrow, & Hsia, 2005; Li,Fein, Chen, & Grummer-Strawn, 2008; Obermeyer & Castle, 1996). Lack of maternal confidence in breastfeeding is associated with perceived insufficient milk (Hill & Aldag, 1991; Otsuka, Dennis, Tatsuoka, & Jimba, 2008). Maternal perception of infant crying contributes to this and leads to the quest to quantify how much milk her infant is actually receiving (Dykes & Williams, 1999). This is the mutable cause of the problem that should be addressed.

Forth, a majority of the studies were not guided by a theoretical framework except for breastfeeding self-efficacy (Kronborg et al., 2007; Kronborg et al., 2012; Noel-Weiss et al., 2006) , adult

learning theory (Noel-Weiss et al., 2006), and the theory of planned behavior (Ryser, 2004). Theories consist of concepts that include mutable causes. Alternately, the mutable causes of the theories become the target of the program. Without theoretical guidance, study results will be limited.

Fifth, some of the professionals and non-professionals were trained before beginning the interventions and some were not. Most studies do not provide information about intervention fidelity, including training sessions for providers, the monitoring of delivery, manipulation checks, steps to maximize mothers' enactment and adherence to the intervention according to the plan in order to elicit the efficacy of the intervention. These are methodologies that must be known to increase internal validity (Bellg et al., 2004).

Recommendations and Future Research

An intervention should not directly try to change the problem, i.e., breastfeeding initiation, duration, and exclusivity. Future studies should focus directly on the mutable causes of early breastfeeding discontinuation. Mutable causes help identify the best theory(ies) to use to implement an intervention. Mutable causes become the target of the intervention as well as the variables to measure to evaluate it. The operational elements of an intervention must relate to what researchers want to change, i.e., the mutable causes. As such, the factors of an intervention need to tightly link with the theory that best fits the mutable causes.

It is known from the literature that mutable causes of perceived insufficient milk include: (1) maternal perception about infant behavior and (2) lack of confidence in her ability to breastfeed her infant. The previous studies appeared to directly target the mother's perceived milk supply by using breastfeeding self-efficacy (Kronborg et al., 2007; Noel-Weiss et al., 2006). However, maternal perception about infant behavior is the remaining unanswered question. It is not enough to assume that mothers fully understand the implication of infant behavior. As such, the intervention should focus on maternal perception about infant behavior which links to the mutable cause of the behavior. For example, maternal perception about infant behavior such as hunger cues, satiety, crying patterns, sleep cycles, and feeding frequency should be measured through breastfeeding observations and feeding logs. The theoretical model of the intervention should address mother's better understanding about infant behavior which is part of the normal developmental process and the mother learns how to breastfeed her infant in

response to this behavior. It is postulated that she then becomes more sensitive to these cues and responds to her infant through breastfeeding on demand. She becomes less likely to perceive the infant's behavior to be a result of perceived insufficient milk and continues to exclusively breastfeed directly on the breast for the first 6 months postpartum. These are outcome variables that interventions can target or attempt to change.

It is known that breastfeeding intention is a predictor variable for breastfeeding behavior and breastfeeding attitudes are determinants of breastfeeding intention (de la Mora, Russell, Dungy, Losch, & Dusdieker, 1999; Chambers, Mclnness, Hoddinott & Alder, 2007; Ryser, 2004). Previously stated, lack of maternal confidence in her ability to breastfeed her infant is associated with perceived insufficient milk resulting in early breastfeeding discontinuation (Hill & Aldag, 1991; Otsuka, Dennis, Tatsuoka, & Jimba, 2008). Mothers need to initiate breastfeeding soon after childbirth so these components should be addressed during the prenatal period.

Social cognitive theory (Bandura, 1986, 2001) explains behavioral capability, outcome expectation (1977, 1986), outcome expectancy (1977, 1986), and self-efficacy (1977, 1997). For example, outcome expectation would be that a mother wants to exclusively breastfeed her infant directly on the breast for the first 6 months. She wants to do this because she knows that breastfeeding is a natural way of feeding and health benefits and protective effects from breastfeeding on both mothers and infants are dose-related. The close skin-to-skin contact helps build emotional connections and relationships through mutual responsiveness by breastfeeding directly on the breast. These are the outcome expectancies. Therefore, interventions focused on behavioral capability, particularly the knowledge described above should be addressed before childbirth. Outcome expectation changes by vicarious learning (modeling), performance enactment, persuasion, and minimum arousal during performance enactment. Home intervention sessions during the postpartum period are a timely intervention since this is a critical time for breastfeeding to be established. The interventions that involved mother and infant dyads were more realistic for the mother to add to her knowledge, especially concerning infant behavior. This enables her to add skills for interpreting her infant's behavior around breastfeeding, responding to the infant's behavioral cues through breastfeeding, and assessing the amount of milk supply through self-reflection in the feeding logs, and feedback from interventionists.

These should be emphasized during the early postpartum period between 2 to 3 days postpartum and 10 days postpartum when mothers become more independent and take an active role in taking care of herself as well as caring for her infant. This is the prime time to learn about childrearing skills (Rubin, 1975, 1984). Additionally, copious amounts of breast milk is produced through direct infant sucking at the breast as well as breast milk removal during lactogenesis stage II which starts on day 2 to 3 until day 8 postpartum with normal vaginal delivery, while delayed onset of lactation is expected in mothers who had a C-section (Riordan & Wambach, 2010; Scott, Binns, & Oddy, 2007). In order to build breastfeeding self-efficacy, there is a need to reconsider the intensity of the treatment, including how much information will be needed, when and by whom. Should interventions, be given only for the pregnant and/or postpartum women and her partner or for the extended family? What are the amount, frequency and duration needed? It may be important to consider whether or not booster sessions are needed to sustain the knowledge and skills learned during pregnancy throughout the postpartum period. Future research is needed to test methods of how to build breastfeeding self-efficacy.

Treatment integrity is key to producing valid findings. Treatment fidelity refers to whether the treatment is delivered as intended, while treatment dosage consists of the number, frequency, and length of intervention sessions (Bellg, et al., 2004). These involve the development of a manual, training, and supervision of providers, and feedback. Manuals provide standardized training. This minimizes provider differences and reduces differences within the treatment. Having booster sessions minimizes drift in skills that occasionally happen over time. This provides an opportunity to have access to research staff for questions about the intervention and it gives time for feedback for quality improvement purposes. Performance checklists, audiotape monitoring during intervention sessions, and exit interviews with open-ended questions from participants about their perceptions of participating in the program allow research staff to evaluate whether the providers' skills and content delivered were appropriate for each intervention. This will provide information on consistent misses or non-performance of the provider's target behavior thereby, enabling the identification of potential problems in the intervention that need refinement. Both research staff and providers can discuss intervention cases and review skills in case conferences to ensure that the interventions are standardized across providers and are being conducted according to the protocol. Provider's responses to the training session needs to be assessed, which includes access to

the training session, clinical advice offered during and after the training session, acceptability, and the tools or resources that are available. The training sessions need to be tracked for utilization purposes, including the rates of attendance, follow-up, and posttest scores to determine, the continuity of the training. An evaluation for participants' compliance with intervention sessions need to be assessed to identify patterns of non-compliance for further refinement of the program (Bellg, et al., 2004; Polit & Beck, 2012). Sustaining intervention fidelity will increase statistical power, which in turn increase effect sizes and decrease sample size, and is therefore cost effective (Bellg, et al., 2004).

Future studies must appeal to the mother's learning process, not just giving advice. Coaching is an approach that can be applied (Lewis & Zahlis, 1997) to fill in the gaps between the mother's current breastfeeding behavior and the new breastfeeding behavior in response to infant behavior that is observed. Active learning will occur when mothers can engage in learning activities by interacting with interventionists. Twenty-four hour telephone access to interventionists can be used to support breastfeeding mothers in applying strategies they learned in between home intervention sessions delivered in the early postpartum. This may minimize emotional anxiety. As such, this helps mothers gain a sense of confidence and ownership of her new breastfeeding behavior.

Limitations for This Review

The methodological heterogeneity and the small number of qualified studies limited comparisons of the findings. Selection bias might be an issue based on the review of only English articles and the search strategies that were applied.

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Appendix A. Prenatal Period

Author/ year	Providers	Places	Core Components & Delivery Mode	Number of Sessions/ Duration	Timing of Treatment	Follow-ups	Fidelity
Mattar 2007	Lactation counselor	Hospital	Knowledge (BF benefits & strategies to manage common BF problems such as nipple pain) Skills (positioning, latch-on & expressing BM) Emotional support (counseling reassurance about nipple assessment & BF concerns	1 Counseling 15 min	Before 36 weeks gestation	2 weeks, 6 weeks, 3 months, 6 months pp	Not reported.
Ryser 2004	RN(PI)	Outpatient at physician's office	Knowledge (BF benefits & barriers) Emotional support (counseling reassurance about feeling and concerns about BF)	4	During pregnancy & 1week pp	1 week pp	Intervention provided by PI but fidelity not reported.
Kronborg 2012	Midwife	Workshop in hospital	Knowledge (importance of BF establishment, common BF problems) Skills (infant care & BF but not specified) BF self-efficacy focused on BF continuation in the first 4 months pp) Social relationship (a network of other women about BF concerns)	3 series of course with BF workshop offered once for 2 hours	30-35 weeks	16 weeks & 1 year pp	4 midwives with various work experience & educational backgrounds. 3 day preparation course but only 1 day for BF module. Used scripted teaching manual. Course evaluation by participants at the end of the session. High compliance in experimental grp.
Noel-Weiss 2006	RN LC	Workshop in hospital	BF self-efficacy in breast milk supply without quantifying it	1 for 2.5 hours	After 34 weeks gestation	4 weeks & 8 weeks pp	Not reported.

Appendix B. Postpartum Period

Author/ Year	Providers	Places	Core Components & Delivery Mode	Number of Sessions/ Duration	Timing of Treatment	Follow-ups	Fidelity
Coutinho 2005	Trained maternity staff at BFH	Home	BF assessment and guidance (positioning, latch-on, milk flow, infant satiety, manual expression, BF problems, advice about other liquid and the use of bottles and pacifiers, BF attitudes of the family) Emotional support including encouragement	10 to 30 minutes for each visit	Early pp	3,7,15 & 30 days, biweekly during 2 months pp and monthly visits between 3 months & 6 months pp	20 hours training based on the 18 hours UNICEF/WHO course for training BFHI and 2 hours focusing on how to provide emotional support by listening attentively, to establish a good relationship with the mother, to help mother's build confidence, and to offer support.
Kronborg 2007	RN	Home	Knowledge (self-regulated BF, hunger cues, sufficient milk, interaction with baby) BF assessment BF self-efficacy without quantifying BM supply, modeling & feedback for coping skills Emotional support including encouragement	1-3	Within 5 weeks	5 weeks pp	18 hours WHO BF training course focusing on BF technique, self -regulated BF, mother's perception of not producing enough milk, infant cues, BF problems, and how to provide emotional support. Used scripted teaching manual. RN had 1 year of supplementary. training.
Labarere 2005	MD	Physician's office	Emotional support (counseling reassurance about management of BF problems & infant health)	1	2 weeks pp	4 weeks pp	5 hours training to improve BF knowledge and counseling skills based on the guidelines.

Appendix C. From Prenatal Period throughout Postpartum Period

Author/ Year	Providers	Places	Core Components & Delivery Mode	Number of Sessions/ Duration	Timing of Treatment	Follow-ups	Fidelity
Chapman 2004	Peers	Hospital & home	Emotional support (counseling reassurance	2-4 plus daily intrapartum visits 1 prenatal HV Daily intrapartum visits 3 pp HV Telephone counseling as needed	After 26 weeks of gestation	6 months pp	Understaffed Used program protocols. Training not reported.

Note. BF=breastfeeding, BFHI=baby friendly hospital initiative, BM=breastmilk, HV=home visit, LC=lactation consultant, MW=midwife, OB RN=obstetric registered nurse, PI=principal investigator, pp=postpartum, RAs=research assistants, SSC=skin to skin contact

Chapter 4

Protecting Your Ability to Breastfeed Your Baby: A Pilot Feasibility Study of an Educational Program for Breastfeeding Mothers and Babies

Introduction

This description of a pilot feasibility study of a breastfeeding education program titled "Protecting Your Ability to Breastfeed Your Baby" contains three sections. The first section is the research problem statement of perceived insufficient milk for which this program was designed. Specific aims section provides the objectives of the study. The conceptual framework is described and the theoretical model of intervention is depicted. The second section includes the methods. The third section contains the feasibility results and the impact of the intervention. Post hoc analyses were described.

Problem Statement of Perceived Insufficient Milk

Washington State has a relatively high breastfeeding rate at 3 months, 47% and at 6 months, 20% whereas exclusive breastfeeding at 3 months in the 2011 cohort was 41% and at 6 months, 19 % (Centers for Disease Control and Prevention, 2014). Exclusive breastfeeding rate at 3 months in Washington State met the Healthy People 2020 goal which is 46.2% but not for exclusive breastfeeding at 6 months which is 26% (Office of Disease Prevention and Health Promotion, 2014). Compared to the current exclusive 6 months postpartum breastfeeding recommended by WHO/UNICEF and the American Academy of Pediatrics, this highlights the need for a new approach for the establishment and sustainment of breastfeeding.

Based on the National Immunization Survey in the 2011 cohort, breastfeeding initiation rate is 79% but exclusive breastfeeding rate at 28 days is 54% with the highest drop-off rate in the first month postpartum (CDC, 2014). Exclusive breastfeeding is defined as infants exclusively getting breast milk, either directly from the breast or by expressed breast milk in a bottle and no other liquids or solids except for vitamins, minerals, and medication (WHO/UNICEF, 1991; AAP, 2012). Studies have shown that perceived insufficient milk is the number one reason for early breastfeeding discontinuation in mothers across the world (Ahluwalia, Morrow, & Hsia, 2005; Gatti, 2008; Li,Fein, Chen, & Grummer-Strawn, 2008; Obermeyer & Castle, 1996).

The onset of perceived insufficient milk begins early, in the first 1 to 2 weeks postpartum (Colin & Scott, 2002; Cooke, Sheehan, & Schmied,2003; Segra-Millan, Dewey& Perez-Escamilla, 1994) and continues to be a primary concern during the course of breastfeeding regardless of the infant's age (Colin & Scott, 2002; Cooke, et al.,2003; Dykes & Williams, 1999; Hill & Aldag, 1991; Sacco, Caulfield, Gittelsohn, & Martinez, 2006; Segra-Millan et al., 1993; Tully & Dewey, 1985). The most common symptoms of perceived insufficient milk are infant crying and fussiness after being breastfed (Colin & Scott, 2002; Cooke, Sheehan, Schmied, 2003; Dykes & Williams, 1999; Hill & Aldag, 1991; Sacco, Caulfield, Gittelsohn, & Martinez, 2006; Segra-Millan et al, 1993; Tully & Dewey, 1985). Other symptoms include infant not gaining weight, being unsettled, and frequent feedings (Colin & Scott, 2002). Mothers tend to think infant crying and fussiness along with frequent feeding demands and wakefulness are related to hunger and specifically as a result of their not producing enough milk for the infant (Colin & Scott, 2002; Hill & Aldag, 1991; Howard et al., 2003). Mothers feel anxious over these infant crying behaviors (Dykes & Williams, 1999), feeling they result from low milk supply (Colin & Scott, 2002). Mothers assume their infants are not satisfied with breast milk alone. As a result, feeding with formula is initiated in response to this perceived insufficient milk (Hill & Aldag, 1991; Segra-Millan et al., 1993; Tully & Dewey, 1985).

Formula feeding can interfere with maternal breast milk supply because breastfeeding is a supply and demand response. In order to produce copious amount of breast milk, infant suckling directly on the breast and breast milk removal are required during lactogenesis stage II which starts on Day 2 to 3 until Day 8 postpartum with normal vaginal delivery, while delayed onset of lactation is expected in mothers who had a C-section (Riordan, 2010; Scott, Binns, & Oddy, 2007). When milk volume is added through formula feeding, then frequency of infant suckling decreases and failure of breast milk removal will occur, ultimately decreasing the breast milk supply (Howard et al., 2003). Consequently, mothers are unable to establish exclusive breastfeeding on the breast.

Lack of maternal confidence in her ability to breastfeed her infant is associated with perceived insufficient milk resulting in early breastfeeding discontinuation (Hill & Aldag, 1991; Otsuka, Dennis, Tatsuoka, & Jimba, 2008). Evidence has shown that professional support is effective in sustaining breastfeeding if professional's breastfeeding attitudes are positive with appropriate knowledge and skills.

Family attitudes toward breastfeeding influence breastfeeding duration (Britton, McCormick, Renfrew, Wade, & King, 2007). Previous randomized controlled trial studies have focused on building confidence in the mother's ability to breastfeed without quantifying the amount of breast milk (Kronborg et al, 2007; Noel-Weiss et al., 2006). However, infant crying is the main cause of maternal perception of insufficient milk, which leads to the quest to quantify how much milk her infant is actually receiving (Dykes & Williams, 1999).

Specific Aims

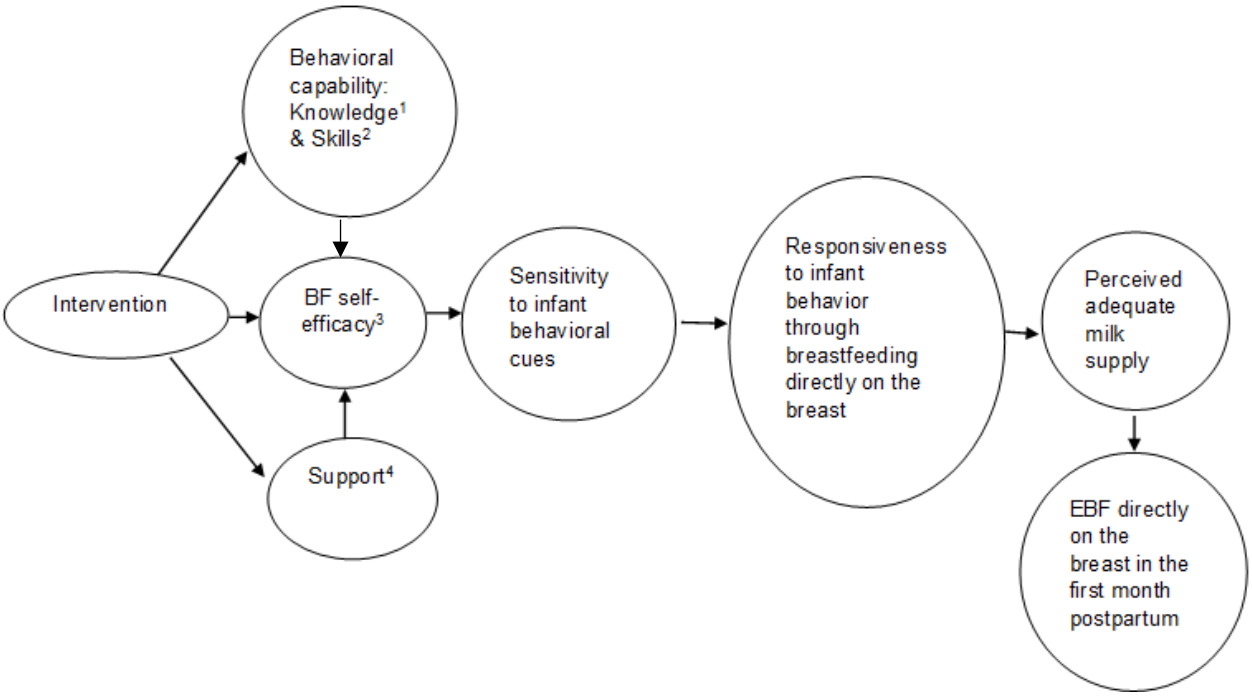
Protecting Your Ability to Breastfeed Your Baby, to be described later, is evidence-based, drawn carefully from the published evidence. The specific aims of this study are to: 1) evaluate the success and efficiency of recruitment methods (screen for target sample, evaluate the effectiveness of multiple channels for recruitment and enrollment), 2) examine fidelity and dosage of the intervention (what is delivered vs. what was planned), 3) examine study participants' adherence with the intervention, including completion of intervention sessions and feeding logs, 4) assess the acceptability of the intervention materials (per session, overall, duration of program, interval between intervention sessions), 5) assess the logistics (scheduling intervention appointments in clinic and by phone), and 6) assess the sensitivity of study questionnaires to measure changes and a short term impact between baseline and post-intervention scores and intervention change over time.

Conceptual Framework

Based on the analysis of evidence, the primary goal of this study was to add to a mother's knowledge and skills in breastfeeding and support mediated by breastfeeding self-efficacy to increase their sensitivity to infant behavior in order to respond to infant behavior by unrestricted breastfeeding directly on the breast (proximal outcome). If the mother has a better understanding about the infant behavior such as crying, feeding frequencies, and sleep patterns that are part of the normal developmental process and learns how to breastfeed her infant in response to this behavior, she becomes more sensitive to infant behavior and responds to infant behavior (proximal outcome). She is then less likely to perceive the infant's behavior to be a result of perceived insufficient milk (intermediate outcome). Breastfeeding self-efficacy involves the mother's confidence in her ability to breastfeed her infant directly on the breast with unrestricted breastfeeding in response to infant behavior (proximal

outcome) that will result in perceived adequate milk supply (intermediate outcome) and establishes and sustains breastfeeding directly on the breast in the first month postpartum (distal outcome) (see Figure 4.1).

Figure 4.1. Theoretical Model of Intervention for Protecting Your Ability to Breastfeed Your Baby



Abbreviations: BF=breastfeeding; EBF=exclusive breastfeeding

1. Knowledge
   - Health benefits and protective effects of breastfeeding
   - Infant behavioral cues such as crying, feeding frequencies, and sleep patterns
   - Establishing and sustaining breastfeeding behavior such as breastfeeding on demand, sleep arrangement, and night time feedings
2. Skills
   - Breastfeeding technique
   - Sensitivity and accuracy in interpreting infant behavioral cues
   - Responsiveness to infant behavior through breastfeeding directly on the breast
3. BF self-efficacy
   - Breastfeeding directly on the breast in the first 6 months (outcome expectation)
   - Values of breastfeeding (outcome expectancy)
   - Assessing the amount of breast milk without quantifying it
   - Increasing confidence in breast milk supply through breastfeeding directly on the breast
   - Crying not related to adequate milk supply
   - Mother's ability to breastfeed her infant directly on the breast in response to infant behavior
4. Support
   - Support from family and professionals to establish and sustain breastfeeding behavior

The conceptual framework of this study is based on Bandura's social cognitive theory (1997), Rubin's theory of maternal role attainment (1961), and Barnard model of early mother and infant interaction (1978). Social cognitive theory (Bandura, 1986, 1997, 2001) emphasizes behavioral capability and self-efficacy. Behavioral capability encompasses both knowledge and skills. Self-efficacy is confidence in one's ability to perform a certain health behavior. Self-efficacy is changed by vicarious learning (modeling), performance enactment, persuasion, and minimum emotional arousal during learning. The best sequence of health behavior will be attained by the training on behavioral capability and performance enactment. Although behavioral capability is necessary, it is not sufficient. To achieve its fullness, performance enactment, i.e., learning by doing through self-monitoring with professional feedback is the most powerful method for learning to occur (Glanz, Rimer, & Lewis, 2002). Once self-efficacy is embedded, individuals can perform health behavior even in a difficult situation. Social cognitive theory also explains outcome expectation as an individual's effort that will result in a specific outcome while outcome expectancy is an individual values and the choice of a specific behavior over another.

Maternal adjustment to motherhood will take place by tuning in to her infant and giving of herself while in the process of recovering from delivery up to the first 6 weeks postpartum (Rubin, 1975, 1984). During the "taking-in" phase which occurs after delivery up to 2 days postpartum, the mother primarily focuses on meeting her own needs, including sleeping, eating, pain relief from incisions and/or hemorrhoids. The mother spends some time reflecting on her birthing experience. During this time, the mother may be passive and dependent. During the "taking-hold" phase which occurs between 2 to 3 days postpartum and 10 days postpartum, the mother becomes more independent and takes an active role in taking care of herself as well as caring for her infant. The mother is concerned about physical recovery after childbirth as well as her ability to meet the needs of her infant. Even though the mother may be prone to changing moods and feelings, this is the prime time to learn about childrearing knowledge and skills. During the "letting-go" phase which occurs after 10 days postpartum, the mother realizes physical separation from her infant and adapts a new motherhood role. The mother becomes more sensitive to meet the needs of her infant and begins to build relationships with her infant within the family structure (Rubin, 1961).

The Barnard model (1978) emphasizes early mother and infant interaction. The mother is responsible for improving sensitivity to infant behavioral cues, alleviating infant's distress through increased responsiveness, and providing an opportunity for social and cognitive development. The infant is responsible to learn to send clear cues and responding to the mother. Feeding is the earliest form of infant sending cues and responding to the mother. By responding to each other, mother and infant can learn from one another, and modify, and adapt to each other's behavior. Consequently, mother and infant develop a positive interaction which builds a strong relationship.

Methods

Design

This pilot feasibility study used a mixed methods approach within a single group, three-occasion pretest-posttest design. Interventions were delivered to study participant's home.

Research Sample and Settings

A target sample of 15 mother and infant dyads were entered into the study from the Pediatric Care Center at the University of Washington Medical Center.

Sample Recruitment

Three recruitment channels included: clinic recruitment on site, professional referral, and self-referral. Brochures were placed in the front desk and the receptionists handed them out to breastfeeding mothers on their first well-child visit when asked by the investigator. The first recruitment channel was clinic recruitment on site. The receptionists briefly informed mothers about a breastfeeding study. Then the investigator went directly to the mother either in the waiting room or the nursing room and introduced the study. Interested mothers received further explanation about the study and were asked questions. Eligible participants were identified according to the combination of recruitment script and enrollment script developed by the investigator. This is the first scenario. The second scenario was that mothers who were interested in the study and wanted to participate received a follow-up call by the investigator at a later time. If the mother agreed to be contacted, the investigator obtained the name and phone number of the mother. The third scenario was that mothers who were interested in the study but who were not sure yet that they wanted to participate had the opportunity to call the investigator at a later date. The fourth scenario was that mothers who were interested in the study but who were not able to talk about the

study on site with the investigator were invited to call the investigator about the study by phone, using the contact phone number in the brochure.

Provider referral was the second recruitment channel. The recruitment script for health care providers was available. However, clinical provides in the recruitment site were extremely busy.

The third channel of recruitment was self-referral. The recruitment brochures were placed on the bulletin board in the clinic waiting area so mothers who were interested in the study could contact the investigator by phone.

Inclusion/Exclusion Criteria

Inclusion criteria was: (1) both primiparous and multiparous breastfeeding mothers who were concerned about their ability to breastfeed their infant in response to infant's behavior, (2) mother had either vaginal delivery or C-section, (3) mother's ability to speak, write, and read English, (4) healthy full term singleton infant with no congenital abnormalities, (5) infant with normal range of physiological jaundice, and (6) infant with normal range of physiological weight loss. Physiological jaundice and weight loss were determined by the guidelines used in the clinic. Mothers who had breast augmentation were also included. Mothers with breastfeeding medically contraindicated, breast reduction, and breast cancer were excluded. Mothers who did not have the ability to attend three home intervention sessions within the first month postpartum were also excluded.

Description of Intervention

The fully scripted intervention involved three sessions, each of which is briefly summarized, along with its rationale in Table 4.1. The components of intervention were summarized in Table 4.2. The educator manual is provided in Appendix A. Each intervention session was designed to be an hour to an hour and a half in length. Session 1 and 2 had approximately 1 week interval between them, and Session 3 occurred 2 weeks after the second session. Each intervention session was designed to help mothers gain cognitive-behavioral management strategies to enhance the sensitivity and responsiveness to their infant behaviors through breastfeeding, establishing and sustaining breastfeeding practice, and self-care. The uniqueness of the intervention was that it engaged mothers in specially designed breastfeeding practice and feeding logs, guided by the investigator who was a breastfeeding-trained RN, specializing in maternity nursing, and who was also a certified trainer on the Nursing Child Assessment Satellite Training

Feeding Scale (NCAST Feeding Scale). As such, the psycho-educational breastfeeding program turned into nurse-guided breastfeeding practice. For example, internal cues were adopted after discussing the most common concerns mothers might have had about their infant's behavior. Allowing the discussion to be didactic as well as educational, it was hypothesized that increased sensitivity to infant behavior would occur. Each session was audio tape recorded.

Table 4.1. Session-Specific Descriptions of Protecting Your Ability to Breastfeed Your Baby

Session 1. Building on Your Sensitivity and Responsiveness to Your Baby's Behavior through Breastfeeding
This session helps add to the mother's skills in breastfeeding, including enhancing her interpretation of the infant's behavior and responding to them through breastfeeding directly on the breast as well as establishing breastfeeding behavior without quantifying the amount of breast milk. An overview of breastfeeding benefits for both mother and infant is included.
Rationale: Building sensitivity and responsiveness to infant behavior is one skill; assessing the amount of breast milk without quantifying it is a different skill. Both are needed to resolve the perception of not producing enough milk and to build confidence in breastfeeding. Outcome expectation (goal) and outcome expectancy (values) enhance mother's effort to establish and sustain breastfeeding behavior. Breastfeeding observations and feedback reinforce performance enactment.
Session 2. Adding to Your Ways to Take Care of Yourself
This session builds on Session 1 and offers the mother the opportunity to reflect on the feeding logs about the pattern of her breastfeeding in response to her infant behavior. This session also involves the mother exploring what she has done to take care of herself and adding skills for her self-care needs.
Rationale: Self-monitoring with feedback from breastfeeding observations and the feeding logs enhance breastfeeding self-efficacy. The mother needs to keep a balance in life, including adequate sleep and nutrition through family support. Session 2 builds on Session 1, breastfeeding skills by adding self-care needs.
Session 3. Establishing and Sustaining Breastfeeding Behavior
This session builds on Session 1 and 2 and offers the mother the opportunity to reflect on all of the sessions and what she accomplished as a result of work in the program. The sessions also helps the mother sustain breastfeeding behavior and gain available resources.
Rationale: This self-reflective session anchors the mother's confidence in her ability to breastfeed her infant.

Table 4.2. Elements of Protecting Your Ability to Breastfeeding Your Baby

Three home-based sessions, 1 week apart between Session 1 & Session 2 and 2 weeks apart between Session 2 & Session 3
Interactive didactic text delivered by specially trained breastfeeding educator
Breastfeeding observations & feedback
Feeding logs assignment for mother to record the pattern of her breastfeeding and her infant's behavior
24 hour phone call availability

Measures

Specific measures included demographic information questionnaire, sensitivity of infant behavioral cues (NCAST Feeding Scale), responsiveness to infant behavior through breastfeeding directly on the breast (NCAST Feeding Scale), breastfeeding skills (LATCH); perceived adequate milk supply (perceived adequate milk supply questionnaire), breastfeeding self-efficacy (modified breastfeeding self-efficacy scale short-form), and exclusive breastfeeding directly on the breast (modified sleep activity record).

The demographic questionnaire consisted of questions about pregnancy, labor, and delivery. The demographic questionnaire was used in Session 1 only (see Appendix B).

Sensitivity to infant behavioral cues and responsiveness to those cues through breastfeeding directly on the breast were measured by two subscales of NCAST Feeding Scale, Sensitivity to Cues and Response to Child's Distress (Barnard, 1978). The manual reports the Cronbach's alpha of the mother's subscales ranges from .60 to .88, the mother's total subscales .85, the infant subscales .76, and the NCAST total .88. Both validity and reliability for the NCAST Feeding Scale have been established (Oxford & Findlay, 2015). There are 16 items in Sensitivity to Cues and 11 items in Response to Child's Distress. For the subscale of Response to Child's Distress, there is one item which was not age appropriate so the maximum theoretical score range was 0 to 10.

Each mother was observed feeding her infant in her home at various times of the day from 9:30 to 14:30 over three sessions. It usually took place at the beginning of a session but when the infant was not ready to nurse, the education portion of the session was given followed by breastfeeding observations. When breastfeeding occurred more than once during a session, the investigator scored the first practice before feedback was given. The subsequent observations were recorded in the clinical notes.

The investigator, who was trained to administer the NCAST Feeding Scale, obtained over 90% for inter-rater reliability. The scale was used to assess the sensitivity of the study questionnaires to measure changes between baseline and the second and third post intervention scores (see Appendix C).

Breastfeeding technique was measured by LATCH (Jensen, Wallace, & Kelsay, 1993) during breastfeeding observations throughout three sessions. There were 5 items to assess breastfeeding techniques of mother and infant. LATCH is an acronym for each category: Latch, Audible swallowing,

Type of nipple, Comfort (breast/nipple), and Hold (positioning). It was assigned a numerical point from 0 to 2 with a possible score of 0 to 10, indicating 10 with higher skills. Validity for the scale has been established (Riordan, Bibb, Miller, & Rawlins, 2001) (see Appendix D).

Breastfeeding self-efficacy was measured by a modified version of the Breastfeeding Self-Efficacy Scale Short Form (BSES-SF) (Dennis, 2003) (see Appendix E). The modified BSES-SF is a self-report measure which was administered prior to the Session 1 and 2 and after the Session 3. If the mothers were feeding their infants prior to the session, it was given after the feeding practice. There were 14 items with two subscales in the BSES-SF: technique and intrapersonal thoughts. Technique refers to the physical tasks of breastfeeding such as proper lath-on, finish feeding on one breast and switch to the other breast and intrapersonal thoughts include maternal attitude and beliefs toward breastfeeding (Dennis, 2003). Two more items were added: 1) I keep my baby close to me at night to breastfeed, and 2) I can get support from my family to breastfeed my baby. Therefore, the total number of items is 16. The content validity index were conducted with two lactation experts before the administration to the study participants. The BSES-SF uses a 5-point ordinal scale ranging from 1 to 5 with 1 indicating not at all confident and 5 indicating very confident. Internal consistency reliability (Cronhach's alpha) is .94 (Dennis, 2003). Cut-off points are not given. It has been tested with a wide range of populations and well established validity and reliability (Gregory, Penrose, Morrison, Dennis & MacArthur, 2008). The scale was used to assess sensitivity of study questionnaires to measure changes between baseline and the second and third post-intervention scores.

Perceived Adequate Milk Supply Questionnaire was developed by the investigator and Dr. Lewis contains 3 items (see Appendix F). The first item asks mothers "To what extent do you think you have adequate milk supply to breastfeed your baby?" It was measured by a 6-point ordinal scale, numbered 1 through 6 with 1 indicating not adequate milk supply and 6 indicating adequate milk supply. The second item asks mothers, "To what extent do you think your breasts are able to produce an adequate amount of milk to your infant?" It was again measured by a 6-point ordinal scale, numbered 1 through 6 with 1 indicating not adequate 6 indicating adequate. The third item asks mothers, "To what extent do you think you baby's crying is related to the adequacy of your milk supply to breastfeed your infant?" It was measured by a 6-point ordinal scale, numbered 1 through 6 with 1 indicating not related and 6 indicating

related. On item 3, a reversed score was used to obtain the maximum score of 6 for analysis. The perceived adequate milk supply questionnaire is a self-report measure administered prior to the Session 1 and 2 and after the Session 3. If the mothers were feeding their infants prior to the session, it was given after the feeding practice.

Exclusive breastfeeding directly on the breast in the first month postpartum was measured by feeding logs (see Appendix G). Modified feeding logs were adapted from the sleep/activity record from the NCAST (Barnard, 1999 & Thomas, 2014). They measure the type, method, frequency of feeding, the pattern of infant crying, sleeping, and the average number of dirty and wet diapers to assess adequacy of milk supply and breastfeeding exclusivity directly on the breast.

Additionally at the end of Session 3, 12 open-ended questions were asked about the participating mother's perception of the intervention (see Table 4.3). All interviews were digitally recorded, transcribed, and analyzed.

Table 4.3. Open-Ended Questions Asked at the End of Session 3

1)	What, if anything, did you gain from participating in the program?
2)	What were disappointments you had about the program?
3)	In your own words, please tell me what you thought about each of the three intervention sessions with the investigator.
4)	To what extent, if at all, were Sessions 1, 2 and 3 applicable to you?
5)	Please comment on the location (home), the timing (within 8 days postpartum, 2 weeks postpartum and 1 month postpartum), the duration (1 to 1.5 hours) and the interval between intervention sessions in the program?
6)	Please comment on the intervention materials used in the program.
7)	How challenging was it for you to keep feeding logs for 3 weeks of breastfeeding?
8)	How challenging was it for you to attend the three home intervention sessions?
9)	How did you feel about me observing you breastfeed?
10)	What, if anything, were the positive aspects of the three home intervention sessions?
11)	Given what you have learned, how do you feel about breastfeeding your baby? How long would you like to continue to breastfeed your baby now?
12)	Is there anything else you would want us to know about?

Data Collection Schedule and Procedures

All data collection and signed informed consent began after approval by the Human Subjects Committee was obtained. Mothers who were eligible to participate in the study had their charts reviewed for pregnancy and delivery records. When the investigator contacted mothers either in the waiting room or the nursing room in the clinic or by phone, the eligible participants were screened. When mothers and

their infants met eligibility criteria, the investigator obtained signed informed consent, scheduled appointments for home intervention sessions, administered study baseline measures, and delivered Session 1 of the intervention at home.

The first intervention session took place within 8 days postpartum, after their first well-child visit to the pediatric clinic at 3 to 5 days postpartum. There were two follow-up home intervention sessions within 2 weeks and 1 month postpartum.

The timing of first home intervention session was based on the lactogenesis stage II process, when a copious breast milk supply is produced in response to infant suckling directly on the breast concomitant with breast milk removal, as well as maternal readiness to learn based on Rubin's theory (1961). This was the prime time to recruit mothers and infants because infant physiological jaundice and weight loss were expected which would be resolved by increased frequency and length of breastfeeding. Engorgement occurs 3 to 5 days postpartum when breast milk starts to produce which is often caused by infrequent feeding (Lawrence & Lawrence, 2005). Approximately 30% to 75% of new mothers experience maternity blues which peaks at 3 to 5 days postpartum, often coincided with the onset of lactation (Hapgood, Elkind, & Wright, 1988; Kendell, McGuire, Connor, & Cox, 1981; O'Hara, Neunaber, & Zekoski, 1984). According to the CDC (2014), the highest drop-off rate for breastfeeding occurs within the first month postpartum, most likely because of mother's concerns about infant behavior as a result of perceived insufficient milk which begin in the first 1 to 2 weeks postpartum.

The second and third home intervention sessions were determined to assess the pattern of breastfeeding and infant behavior through the feeding logs. Maternal sensitivity to infant behavioral cues and responsiveness were evaluated based on breastfeeding behavioral change noted during breastfeeding observations. A booster session was given as needed for establishing and sustaining exclusive breastfeeding directly on the breast.

Data Analysis

Data were analyzed for each study aim: 1) evaluate the success and efficiency of recruitment methods of mothers who are concerned about breastfeeding their infant in response to their infant behavior during their first well-child visit, 2) examine fidelity and dosage of the intervention (what is delivered vs. what was planned), 3) examine study participants' participation with the intervention,

including completion of intervention sessions and feeding logs, 4) assess the acceptability of the intervention materials (per session, overall, duration of program, interval between intervention sessions), 5) logistics (scheduling intervention appointments in clinic and by phone), and 6) assess the sensitivity of the study questionnaires to measure changes and a short term impact between baseline and post-intervention scores. The data analyses for each study aim follows and is described in detail.

Study aim 1. A detailed spreadsheet was used to track and assess the success of different recruitment methods. Column headings on the spreadsheet included tracking the channels through which every eligible mother was recruited and enrolled, including clinic recruitment on site by the investigator with four different scenarios, by professional referral, or through self-referral.

Study aim 2. Performance checklists were developed for each of the three intervention sessions and were used to assess dosage and fidelity of the investigator's delivery of each intervention session. These checklists focused on specific, operational, observable behavior in the investigator for each of the intervention sessions. Each of the performance criteria were evaluated on a 3-point ordinal scale, thus allowing a total score for dosage as well as a fidelity score for each criterion. These checklists were used by the investigator to review and scored each completed intervention session based on the digitally-recorded sessions. They also provided information on consistent "misses" or non-performance of the investigator's target behavior, thereby enabling the identification of potential problem areas in the intervention that needed refinement. See Appendix H for the performance checklists.

Study aim 3. Study participants' adherence with the in-session and feeding logs were assessed through breastfeeding observations and completion of the feeding logs. This level of review enabled to identify patterns of non-compliance for the study sample, thereby signaling the need to modify the intervention materials.

Study aim 4. Data on the acceptability of the intervention materials (per session, overall, duration of program, interval between intervention sessions) were measured by the perception of the intervention by the study participants' during open-ended questions which were digitally recorded through interviews. Thematic analysis of the open-ended interview questions proceeded in three steps: transcription with 100% verification for accuracy, open coding for each study participant, and open coding across the study sample. Each interview question were individually analyzed after which common or core themes were

identified that were common across all or most study participants. Next, themes that were unique to study participants were summarized.

Study aim 5. Logistics issues were entered in dated word documents at the time the logistic issue surfaces, e.g., challenges in maintaining self-referral brochures in the waiting room, issues in scheduling the intervention appointments by phone, among others.

Study aim 6. The sensitivity of the adapted measures was assessed by comparing pretest scores with the two posttest scores for each mother. This comparison showed whether measures were able to detect some degree of change, as well as whether change was in the correct (increased) direction. If scores on a given measures did not change over time, or if there was evidence of ceiling or floor effects at baseline, the evidence would suggest the need to change the choice of outcome measures.

To describe changes over time on each of the quantitative variables collected at the three time points, data were plotted for each study participant individually as well as for the sample in aggregate. Additionally, simple, one-way within-subjects ANOVAs were conducted to test (a) whether there are any differences among time points and (b) to test the functional form of differences using trend analyses (specifically whether there were significant linear and quadratic components). In other words, these analyses sought to determine whether there was any change over time, and whether this change was constant (linear), and/or whether deceleration or acceleration in change over time had occurred (e.g., plateau effects).

Descriptive and inferential statistics for quantitative analyses were conducted, using *SPSS 19.0*. The type, method, frequency of feeding, night time feeding, and the pattern of infant crying and sleep, the average number of dirty and wet diapers at 1 week, 2 weeks, 3 weeks, and 4 weeks postpartum were calculated.

Results

The result section contains the feasibility results for the Study Aims from 1 to 5 and the intervention outcome results for the Study Aim 6.

Feasibility Results

Study aim 1: recruitment. The investigation attempted to recruit mother and infant dyads from five sites but for a variety of reasons, all 15 participants were ultimately recruited from only one site over a

7-month period. For their first well-child visit, a total of 122 eligible had their charts reviewed for pregnancy and delivery records when they were available in the computer system. Seventy one mothers were contacted either by the investigator or the receptionists. After the initial contact was made, the investigator approached the mothers in either the waiting room or the nursing room of the clinic. After introducing the study, interested mothers were screened to ensure they met the inclusion criteria. A total of 15 mothers and infant dyads were enrolled in the study through direct, on site approach by the investigator. The investigator obtained signed informed consent and scheduled the appointment for the first home intervention session.

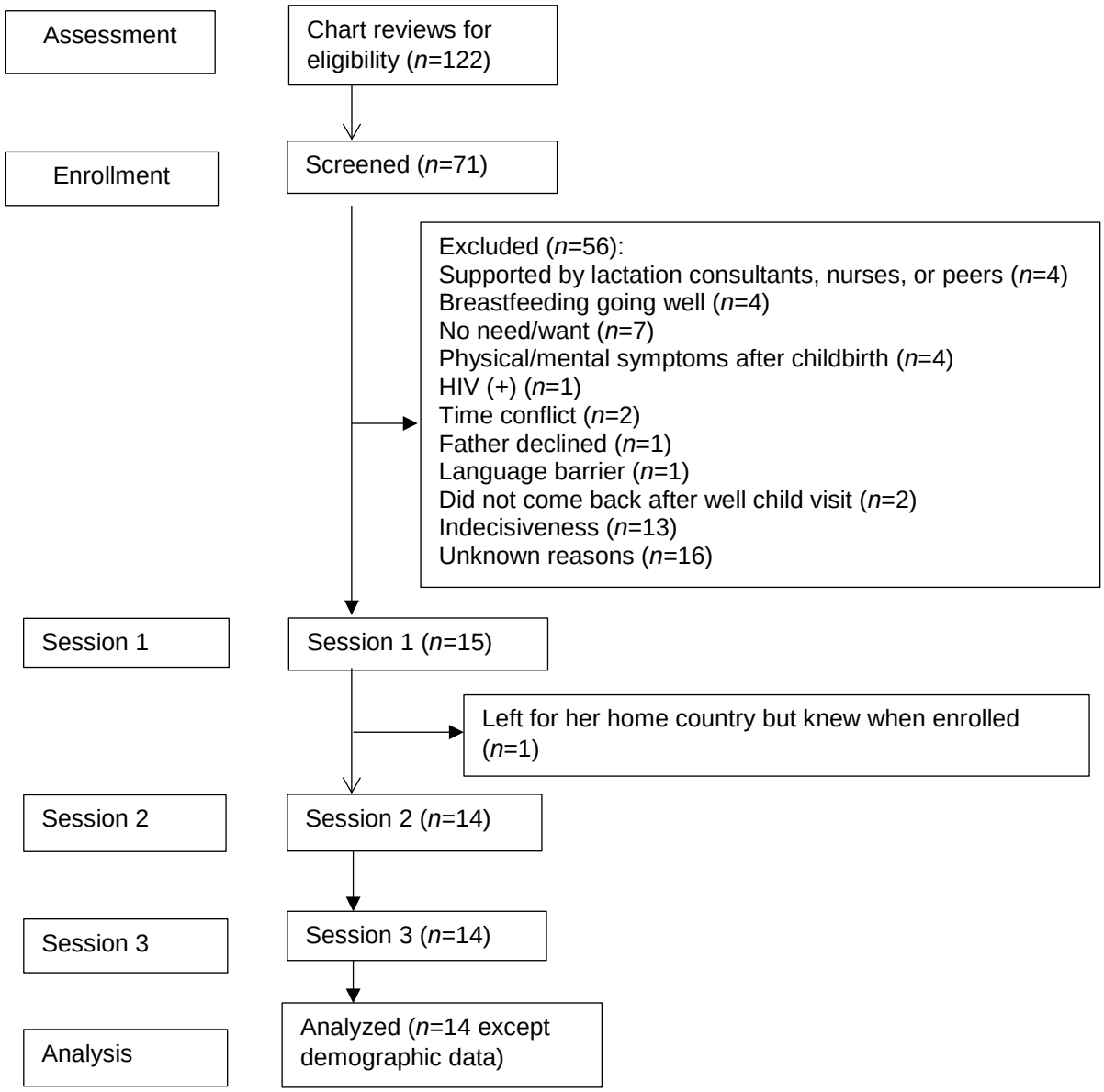
A total of 56 eligible mothers declined enrollment: four mothers said they already went to the lactation services or obtained support from nurses or peers, seven mothers said they did not want or need the study, two mothers said they could not keep up with the appointments, four mothers said their breastfeeding practice was going well, four mothers had either headache, fatigue, cold, maternity blue and one mother was HIV positive. One mother had a language barrier. Sixteen mothers declined for unknown reasons. Two mothers showed interest when introduced to the study. Although they were invited to come back after their well child visit, they did not return. None of the professional referrals were enrolled. Thirty five mothers kept the brochure. Of those, 13 mothers said they would call the investigator if they were interested but none of them called to schedule their own appointment based on the information in the brochure (see Figure 4.2). Due to low enrollment, the IRB modifications were made and accepted three times, including inclusion and exclusion criteria, recruitment and enrollment script, and additional recruitment site.

Study aim 2: fidelity and dosage. The protocol from the educator's manual was followed as it was initially written. After each home intervention session, the performance evaluation sheet was checked by the investigator to ensure the intervention was delivered in the way it was specified.

Each home intervention session was estimated to take one to one and a half hours but it often went over two hours in Session 1 depending on the mother's breastfeeding practice, including one mother (6%) who had a history of inverted nipples, six mothers (40%) who had perceived insufficient milk, one mother (6%) who had lower back pain, and one mother (6%) who had difficulty latching resulted from nipple confusion.

Study aim 3: Adherence. Eight mothers (57%) established and sustained breastfeeding directly on the breast. Within those mothers, two mothers supplemented with formula either through a finger feeding, a tube feeding, or a bottle as recommended by either their pediatrician or the lactation consultant. One mother completely switched to breastfeeding directly on the breast when adequate milk supply was confirmed on Day 8.

Figure4.2. Recruitment Flow Diagram



The other mother continued occasional formula supplementation until Day 18. She could not resolve her perception of not producing enough milk even though adequate milk supply was confirmed during Session 1 and 2. She did eventually establish and sustain breastfeeding directly on the breast because she was able to persevere with her breastfeeding practice even during formula supplementation either through a finger feeding, a tube feeding, or a bottle.

One mother (7%) pumped breast milk during family visits during the second week and let the family feed the infant in a bottle. One mother (7%) who had nipple pain and blood tinged breast milk fed pumped milk in a bottle. Two mothers (13%) started pumping breast milk and stored it in freezer bags on Day 24 and 25. One mother introduced a pacifier on Day 21. She also bottle fed the infant with breast milk on Day 25. Two mothers (13%) could not keep the infant close to them at night. The other mothers (87%) kept their infants in the same room as parents either in a bassinet or a crib. Nine mothers (60%) slept with the infant in the same bed. One mother (7%) was able to keep the feeding logs only for the first week. She could not keep up with the rest of the logs because she had in laws who came to visit them. One mother (7%) kept her own feeding logs on her phone, but unable to transfer them over to the paper and pencil ones. One mother (7%) kept her own feeding logs on her computer and transferred them over to the designated ones during the sessions.

There were six mothers (43%) who had difficulty breastfeeding directly on the breast. Those are summarized in the case review in Appendix I.

Study aim 4: acceptability. All 15 participating mothers attended all three sessions except one participant who went back to her home country within 2 weeks after childbirth. For Session 1, the majority of mothers thought there was a lot of good information about breastfeeding benefits except three mothers (21%) who thought they already knew the information. Seven mothers (50%) felt they gained knowledge about the normality and expectation of breastfeeding and about infant behaviors by responding to them through breastfeeding directly on the breast. Eight mothers (57%) felt the knowledge helped resolve concerns and skills about not producing enough milk.

For Session 2, taking care of yourself, the majority of mothers (50%) said they did not have time to do most things listed but they know they should. There was good feedback from the mothers about our

discussion, including how to get some sleep while the infant is sleeping, to take a shower every day, and to make sure she eats well. These self-behaviors are linked to gaining family support.

For Session 3, to reflect on all of the sessions and sustain breastfeeding behavior, most of the mothers (93%) described they were satisfied at what they had accomplished including three mothers (21%) who were not able to establish exclusive breastfeeding directly on the breast. One mother (7%) who had difficulty with latching felt it had been challenging. Only one mother, who was multiparous mother (7%) felt Session 3 was unnecessary.

Sessions 1, 2, and 3 were applicable. There was one mother who had a history of inverted nipples (7%) who stated that Session 2 was the most applicable to her. She felt that way because she did not achieve breastfeeding directly on the breast but instead fed her infant with pumped breast milk in addition to formula milk in a bottle.

The location, the timing, the duration, and the interval were good overall. All mother (100%) stated home is the best place. Four mothers (29%) commented on the timing. One mother (7%) who had perceived insufficient milk, said that the interval between Session 1 and Session 2 could have been shorter just to know everything she was doing was ok. There was one mother (7%) who had excruciating nipple pain in the first week who had the same comment. One multiparous mother (7%) needed the most help within the first week because of nipple pain and uncertainty about milk supply coupled with infant weight loss. She also suggested it would be good to check in one week after because of the infant's fussiness. One mother (7%) who had difficulty with latching wanted to have an additional session after the third session. One father (7%) joined all three sessions and four fathers (27%) joined one session. One maternal mother (7%) joined all three sessions.

All mothers (100%) said that the feeding logs were helpful for increasing their awareness of infant patterns, including feeding, sleeping, and crying. Tracking the number of excretions was useful to assess whether the infant was getting enough milk. There were times some of them got behind but they were able to find time to catch up.

Four mothers (29%) already started feeding logs on their own either paper and pencil ones or on their phone or computer. Two mothers (14%) who also participated in the jaundice study at the same time kept a different form of feeding logs along with the one used in the current study. One mother (7%)

preferred the paper and pencil ones because everything can be seen all on one paper. Two mothers (14%) asked for copies of their feeding logs, and one mother (7%) asked for extra feeding logs for another month.

The printed materials provided at the end of each session were marginally useful. Six mothers (42%) reviewed them, including two mothers with their husbands (14%). One mother (7%) reviewed, and tried to memorize them, and checked on information when she had questions. The rest of the mothers (58 %) did not have a chance to review. One mother (7%) preferred to have access to printed materials electronically.

The baby stomach model served as a good visual. One mother (7%) had too much pressure on how much the infant needed to be fed on Day 3 based on information provided by the lactation consultant but referring to the model helped to resolve her concerns.

All of the mothers said it was not challenging at all to attend the three home intervention sessions. All mothers (100%) stated that breastfeeding observations and feedback were reassuring. One-on-one observations helped the mothers make sure of any of their concerns and build confidence that they are doing things right.

The most positive aspects of the three home intervention sessions was having an objective, educated professional observe breastfeeding in the mother's own environment, and give feedback. This provided more information about the feeding process, enabling the mother to ask questions as well as reinforcing the relationship between infant crying behavior and perceived adequate milk supply.

Two mothers (14%) who were not able to successfully breastfeed on the breast described their disappointments, including receiving different advice between lactation consultants and the investigator with emphasis on the infant suckling component of breastfeeding directly on the breast. One mother wanted to know about other alternatives when breastfeeding is not successful such as consultations about a tongue tie, herbal supplementation, and prescriptions to increase milk supply (see Table 4.4).

Analysis of the open-ended questions. The thematic analysis was conducted across the open-ended questions. Twenty two initial codes were generated that later clustered into nine codes. These included: knowledge about infant's behavioral cues, breastfeeding skills, self-care behavior, gaining family support, breastfeeding values, breastfeeding goals, how to tackle obstacles, mother's

Table 4.4. Mothers' Feedback

ID	Comments and Feedback
1	Unable to keep the feeding logs for the last 2 weeks. Gained knowledge about the perception of not producing enough milk and doubts about breastfeeding.
2	Reviewed printed materials and tried to memorize them. Preferred to have the first 2 appointments in the first week.
3	NA
4	Usefulness of the feeding logs by getting to know about the pattern of the baby but getting harder for the last 2 weeks. Already knew about breastfeeding benefits in session 1.
5	Preferred to have the first 2 appointments in the first week because of nipple pain and uncertainty about adequate milk supply along with infant weight loss and 1 week after because of fussy feeding.
6	Anticipated the visits to ask questions. Reassured by breastfeeding observations and feedback.
7	Gained a different perspective and was reassured it was unnecessary to add formula or pumped breast milk after getting over the perception of not producing enough milk. Side lying feeding to gain sleep.
8	Preferred to have the first 2 appointments in the first week.
9	Reassured by breastfeeding observations and feedback. Reinforced by having face to face meetings, encouragement and opportunities to ask questions.
10	Keeping the feeding logs was hard but the most beneficial. Having less pain in the perineal area and enable to rest during side lying feeding.
11	Anticipating the visits to ask questions. Reassured by breastfeeding observations and feedback.
12	Gained skills about feeding on demand. Usefulness of the feeding logs by getting to know about the pattern of the baby.
13	Keeping the feeding logs was hard in the beginning but were useful for getting to know about the patterns of the baby. Gained knowledge and skills about self-care. Wanted to know about other alternatives when breastfeeding is not successful.
14	Usefulness of the feeding logs by getting to know about the pattern of the baby. Reassured by breastfeeding observations and feedback.
15	Usefulness of the feeding logs by getting to know about the pattern of the baby. Wanted to have another session after session three.

readiness to go back to work, and more information about increasing breast milk supply when deciding not to directly breastfeed. These codes identified five themes: What increased breastfeeding directly on the breast, self-care improvement, gaining breastfeeding confidence, getting ready to return to work, and alternatives when deciding not to directly breastfeed.

What increased breastfeeding directly on the breast. This is defined as the components of the intervention that actually used by the mothers to increase breastfeeding directly on the breast. It consisted of four codes: knowledge about infant's behavioral cues, breastfeeding skills consisted of breastfeeding on demand, keeping the infant close at night to breastfeed, and assessing the breast milk supply by keeping a track of diaper changes.

Eleven mothers (79%) reported that knowledge about infant behavioral cues such as crying, hunger cues and satiation cues, feeding frequency, and sleep patterns were valuable.

One mother stated, *"specific information about hunger cues were encouraging for me to respond before my baby cries."* Another mother stated, *"I like learning about the cluster feedings for the first time and learning about what his crying is about, the cues that can be taken away from him. "*

Eleven mothers (79%) commented on breastfeeding skills. One mothers stated, *"I think the biggest, uh, the most helpful part was the reinforcement I needed to feed her on demand, on her schedule, and to have her very close to me at night in order to do that. Uh, that resulted in us changing our sleep arrangement which is a pretty big adjustment to me, uh, in order to do that. And then I think that helped to increase my milk supply and to become more comfortable with breastfeeding because I was doing it more often. It's just more practice. Really."*

Another mother stated, *"how to keep my breast milk supply up by letting him cluster feeding, knowing that he was cluster feeding and it was not just me not giving him enough milk from my breast. That was a good thing to know. He's going to go through a growth spurt and need to feed every hour, it's nothing to do with you, that was a good thing for me to learn because I was getting a little bit stressed out because I was not producing enough, yeah."*

Self-care improvement. This is defined as the self-care behaviors mothers implemented to facilitate their recovery from delivery and meeting their own needs. It consisted of five codes: getting more sleep, gaining family support, maintaining good hygiene, and nutritious intake, and breastfeeding in a side lying position.

Three mothers (21%) reported that they were trying to stay in bed longer in the morning until the baby woke up and/or to take a nap when the baby was sleeping.

One mother who had a forceps delivery stated that, *"Um, learning how to do a side lying feeding even though I didn't keep up with that when you taught that to me I was still injured from giving birth so it would be to get off of my tail bone and off of my perineal area was, it was really great, really beneficial during that time because I was in a lot of pain (giggling) so that was really great. A side lying feeding and co-sleeping which probably had the biggest change the day to day interactions because it allowed us getting more sleep which allowed my mood to be better and yeah it was good."*

Five mothers (36%) reported that they were more likely to ignore taking care of themselves when their focus is on the baby. It was a good reminder how important it is to take care of themselves, to fit this in the schedule while they are in the recovery period. Two mothers (14%) reported that they have advanced in making efforts to feed themselves.

All mothers (100%) spoke of the importance of gaining family support to breastfeed their baby. One mother stated that, *"…. also just thinking more about my family support and how I can ask people to help me here and how I can appreciate what people are doing to help."*

Breastfeeding confidence. This is defined as mother's ability to breastfeed her infant directly on the breast. It consisted of four codes: how the mothers feel about breastfeeding their infant, values of breastfeeding, feeding during the time the infant is being fussy, and the length of time the mothers want to continue to breastfeed their infant.

Eight mothers commented on breastfeeding confidence as follows:

"I feel good. I definitely um, a big value in it just the behaviors and the bonding, and really thinking about kind of a check list for baby crying, has been helpful that really have that back of my mind as he starts fussing."

"I feel more confident and more like, I can do it so."

"I feel really good about it. Happy that it's working (giggling)"

"I feel good about it. I feel maybe a little more empowered about it like knowing how good it is for him, makes me feel like I really want to feel to do it as long as I can and feed him as much as I can."

The length of time the mothers want to continue to breastfeed their infant include four mothers (29%) who said about 1 year, two mothers (14%) who said as long as the baby wants and four mothers (43%) who said longer than 1 year.

Getting ready to return to work. This is defined as the mother's readiness to go back to work after maternity leave was over while at the same time breastfeeding her infant. Five mothers (36%) reported that starting to think about returning to work early was beneficial.

One mother who had a maternity leave for 13 weeks stated that, *"I feel a little more comfortable now that he had a couple of bottles and he is being able to switch back because I was kind of worried about that. Um, and the pumping started to do that a little bit and that's going well cause I was going him nursing at the breast has not been an issue but I was not sure the pumping is going to be like."*

Alternatives when deciding to not directly breastfeed. This is defined as additional information requested from the mother who discontinued breastfeeding directly on the breast in the first month postpartum.

One mother stated that, *"Um, I don't know but I'm still wondering, if I made my decision earlier what I wanted to do with my breastfeeding like should I take a prescription or having a supplement, if I made my decision earlier, I wonder if I could have produced more milk or not. I understand this program is meant for helping breastfeeding mothers but if I had the information about what is available when the mother is not producing enough milk, here is all the options you can think about right in front of me because I didn't know if I don't make my decision quick enough, my body is going to shut down. That was a kind of, oh, shoot (giggling)."*

Study aim 5: logistics. The first appointment was made when the mothers enrolled in the study and during the following home intervention sessions, the other two appointments were scheduled. The average days of home intervention sessions were shown in Table 4.5. Three mothers (21%) requested phone calls or text messages to remind them the day before the next visits. Only one mother (7%) actually called the investigator, asking about the infant being fussy during breastfeeding on Day 20.

Table 4.5. Days of Home Intervention Sessions

	M (Days)	Range (Days)
Session 1	5.57	4 - 8
Session 2	12.78	11 - 15
Session 3	26.93	25 - 29

Intervention Outcome Results

Study sim 6: measure sensitivity and intervention change over time. This section contains demographic data on the study participants and pretest-posttest results for evaluating Study Aim 6.

Demographics. The demographic data includes a total of 15 mothers who enrolled in the study. However, all subsequent statistical analyses includes only the 14 mothers who completed the all of the sessions. Demographics is shown in Table 4.6.

The majority of mothers were Caucasian (*n*=9, 60%), married, living with her husband. The mother's country origin includes USA, Brazil, Canada, Hungary, Japan, Romania, Saudi Arabia, and Thailand. The average age was *M* = 33.3 (*SD* = 4.4 years; *range* = 25-41). Mother's education level in the sample was high, with 92% of the mothers completing higher than college education. None of the mothers participated in the WIC program. The majority of mothers had either full time or part time jobs (*n*=9, 60%). Fourteen mothers were primiparous (93%), having either normal vaginal delivery (*n*=10, 67%), forceps (*n*=1, 6.7%), or C-section (*n*=3, 20%). One mother, who was multiparous (6.6%) delivered vaginally, breastfed her previous child on the breast for 14 months and naturally weaned.

The majority of mothers (*n*=11, 79%) had normal pre-pregnancy BMI with an average of 22.44 (*SD* = 3.6; *range* = 18.8-32.8). However, three mothers (27%) who had normal pre-pregnancy BMI gained from 18.41 to 24.95 kg which was beyond the recommended weight gain (CDC, 2014). One mother who was obese before pregnancy, 32.8 for BMI (6.7%) gained 32.21 kg during pregnancy. The majority of the mothers were healthy but four mothers (27%) had health problems including a history of kidney cancer, hypothyroidism, chronic hypertension, and gestational hypertension. The majority of mothers had the intention to breastfeed on the breast from 6 months to 1 year (*n*=11, 73%). The majority of mothers initiated breastfeeding on the breast less than 2 hours after delivery (*n*=13, 87%). None of the mothers smoked before pregnancy. Nine mothers (60%) consumed alcohol before pregnancy.

All infants were born at term averaging 40.0 weeks (*SD* = 1.4; *range* = 39.6-41.5). The average infant weight was 3,478 grams (*SD* = 507.3; *range* = 2,438-4,372). The majority were healthy (*n*=11, 73%) but four infants (27%) had health problems, including hyperbilirubinemia, respiratory distress due to meconium staining, and shadows on bilateral kidneys identified through ultrasound during pregnancy.

Table 4.6. Demographics

Variable	*M (SD)*	Range
Mother		
Age	33.3 (4.4)	
Ethnicity, n (%)	9 Caucasian, Non-Hispanic (60%)	
	3 Asian (20%), 1 Arab (6.7%)	
	1 Asian & Hispanic (6.7%)	
	1 Non-Hispanic Caucasian & Asian (6.7%)	
Education, n (%)	1 completed high school (6.7%)	
	4 completed college (27%)	
	6 completed master's degree (40%)	
	3 completed PhD degree (20%)	
Marital status, n (%)	14 married (93%), 1 cohabiting (6.7%)	
Parity, n (%)	14 primiparous (93%), 1 multiparous (6.7%)	
Type of delivery, n (%)	11 NVD (73%), 1 forceps (6.7%), 3 C-section (20%)	
Pre-pregnancy weight (kg)	60.49 (8.7)	52-84
Pre-pregnancy BMI	22.44 (3.6)	18.8-32.8
weight gain (kg)	17.35 (6.05)	10.0-32.2
Smoking before pregnancy	No: 100%	
Drinking before pregnancy	Yes: *n*=9, 60% No: *n*=6, 40%	
WIC status	No: 100%	
Roomed in	Yes: *n*=14, 93% No: *n*=1, 6.7%	
First breastfeeding (hours)	< 2: *n*=13 (87 %)	
	3-6: *n*=1 (6.7 %), >12: *n*=1 (6.7 %)	
Method of feeding in hospital	13 breastfeeding (87%)	
	1 formula feeding (6.7%) 1 breast milk feeding plus formula feeding (6.7%)	
First considered about BF	15 during pregnancy (100%)	
Intentions to breastfeed	10 breastfeeding on the breast (67%)	
	5 breastfeeding on the breast plus breast milk feeding (33%)	
Planned breastfeeding duration	6 months -1 year: n=11 (73%)	
	> 1 year: *n*=4 (27%)	
	Yes: *n*=13 (87%)	
Intention to return to work/school	No: *n*=2 (13%)	
Employment status	5 full-time (33%), 4 part-time (27%), 6 N/A (40%)	
Infant		
Gestational age	40.0 (1.43)	37.1-41.5
Birth weight (g)	3478.3 (507.35)	2438.0-4372.0
Health problems	Yes: *n*=4 (27%), No: *n*=11 (73%)	

Note. BF=breastfeeding

Tests of Change over Time. Descriptive statistics are shown in Table 4.7. The results of one-way within-subjects ANOVA are shown in Table 4.8. Study measures of participating mothers are shown in Appendix J. Appendix J also contains the scores at three time points for each participating mother on the following measures: LATCH, Modified BSES-SF, and Perceived Adequate Milk Supply Questionnaire.

Recall that each of the N = 14 participating mothers were observed feeding their infants in their homes at various times of the day between 9:30 to 14:30, at three time points, including pretest (Time 1 with an average home intervention session Day 6), midtest (Time 2 with an average home intervention session Day 13), and posttest (Time 3 with an average home intervention session Day 27). The time of day that each mother was observed was determined individually at a time that was most convenient for each mother. When breastfeeding occurred more than once during a session, the investigator scored the first practice before the feedback was given. Although the investigator-teaching to mothers during observations was planned to occur after their infant breastfed, there were several times when the infant was not quite ready to feed at the observation onset. For these occasions, the investigator provided teaching before the infant breastfed and recorded that this deviation from procedures had occurred. As a check to make sure that there were no significant differences between teaching timeframes (i.e., mothers who received teaching before vs. after breastfeeding), a series of 2-group t-tests were conducted on three breastfeeding observation outcomes (Sensitivity to Cues, Response to Child's Distress, and the LATCH) at each time point: pre-intervention (pretest), 1 week (midtest), and 2 weeks after midtest (posttest). Without adjusting for multiple comparisons, it appeared that there was a significant difference favoring mothers who were taught prior to breastfeeding on Sensitivity to Cues at posttest (by a difference of .71 points on this scale), $t(6) = -2.50$, $p = .047$ (unequal variances assumed due to differences in variances). However, after adjusting for nine comparisons using the Dunn-Sidak procedure (very similar to Bonferroni but slightly more powerful), this difference is not statistically significant.

Finally, recall that each mother was measured on two self-reports, including modified version of the Breastfeeding Self-Efficacy Scale Short-Form and a brief self-report measure of perceived adequate milk supply. For each of these scales, one-way within-subjects analyses of variance (ANOVAs) in which Time was treated as the within-subjects, fixed factor (three measurement occasions: pretest, midtest, and posttest) were conducted. For all ANOVAs, Mauchley's test was used to determine whether sphericity

was a tenable assumptions; in cases where sphericity was violated, adjusted *F*-tests are used (Greenhouse-Geisser) to control the Type I error rate to .05. Finally, for each significant main effect, Sidak's post-hoc pairwise *t*-tests (with alpha level adjusted for multiple comparisons) were used to determine the location of mean differences between time points. These analyses provided a description of if and when change occurred during the breastfeeding intervention.

Table 4.7. Descriptive Statistics

Measure	Time	*n*	*M*	*SD*	Median	Theoretical range	Observed range
NCAFS Feeding Scale							
Sensitivity to Cues	1	14	13.14	1.70	13.5	0-16	11-16
	2	14	14.50	1.02	14	0-16	13-16
	3	14	15.64	0.63	16	0-16	14-16
Response to Child's Distress	1	14	9.57	0.75	10	0-11	8-10
	2	14	9.79	0.58	10	0-11	8-10
	3	14	10.00	0.00	10	0-11	10
LATCH	1	14	7.86	2.11	9	0-10	2-10
	2	14	8.14	2.03	9	0-10	3-10
	3	14	8.50	2.10	10	0-10	4-10
Modified BSES-SF	1	14	59.57	13.02	63.5	16-80	25-80
	2	14	61.92	12.70	68.5	16-80	31-75
	3	14	68.07	14.90	77	16-80	32-80
Perceived Adequate Milk Supply							
Current adequacy	1	14	4.71	1.68	5.5	1-6	2-6
	2	14	5.14	1.61	6	1-6	1-6
	3	14	5.07	1.38	6	1-6	1-6
Future adequacy	1	14	4.86	1.23	5	1-6	2-6
	2	14	5.07	1.38	5.5	1-6	1-6
	3	14	4.93	1.64	6	1-6	1-6
Relationship	1	14	2.43	1.70	2	1-6	1-6
	2	14	3.71	1.64	3.5	1-6	1-6
	3	14	4.93	1.77	6	1-6	1-6

Table 4.8. One-Way Within-Subjects ANOVA of Outcomes Measures

Variable	Time 1 M ± SD (95% CI)	Time 2 M ± SD (95% CI)	Time 1 & 2 *p*	Time 3 M ± SD (95% CI)	*F* (df, df)	Time 1 & 2 & 3 *p*
NCAFS Feeding Scale						
Sensitivity to Cues	13.14 ± 1.70 (12.16-14.13)	14.50 ± 1.02 (13.91-15.09)		15.64 ± 0.63 (15.28-16.01)	(1.43,18.58)	.001***
Response to Child's Distress	9.57 ± 0.76 (9.14-10.01)	9.79 ± 0.58 (9.45-10.12)		10.00 ± 0.00 (10.00-10.00)	(1.37,17.80)	0.18
LATCH	7.86 ± 2.11 (6.64-9.07)	8.14 ± 2.03 (7.16-9.64)		8.50 ± 2.10 (7.29-9.71)	(2,26)	0.23
Modified BSES-SF	59.57 ± 13.02 (52.05-67.09)	61.93 ± 12.71 (54.59-69.27)		68.07 ± 14.90 (59.47-76.68)	(1.37,17.75)	0.046*
Perceived Adequate Milk Supply						
Current adequacy	4.71 ± 1.68 (3.74-5.69)	5.14 ± 1.61 (4.21-6.07)	0.306	5.07 ± 1.73 (4.07-6.07)	(2,26)	0.48
Future adequacy	4.86 ± 1.23 (4.15-5.57)	5.07 ± 1.38 (4.27-5.87)	0.64	4.93 ± 1.64 (3.98-5.88)	(2,26)	0.87
Relationship	2.43 ± 1.70 (1.45-3.41)	3.71 ± 1.64 (2.77-4.77)	0.018	4.93 ± 1.77 (3.90-5.95)	(2,26)	< 0.001***

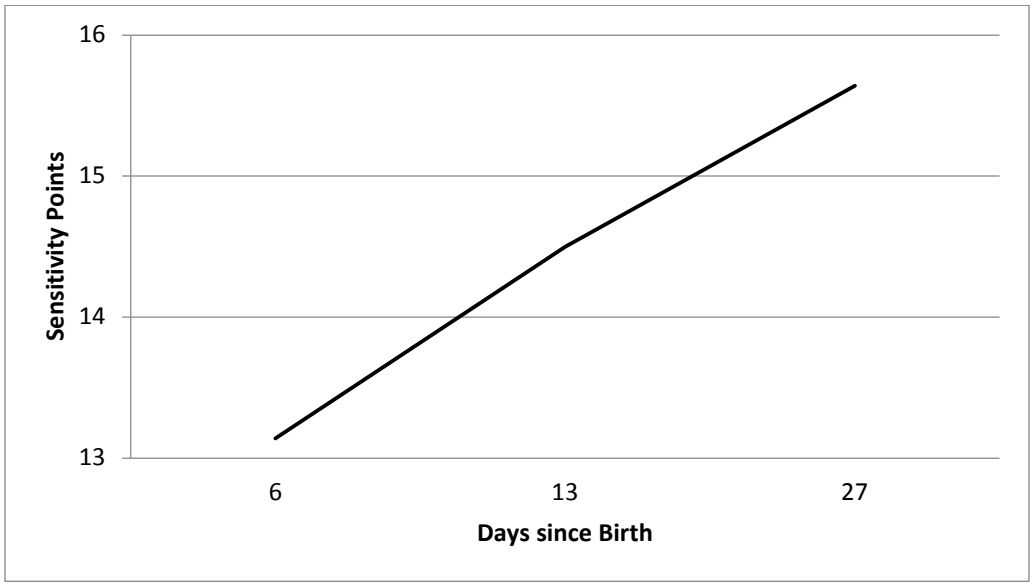
Note. n=14. SD = standard deviation, CI = confidence interval, Time 1 = Day 6, Time 2 = Day 13 Time 3 = Day 27

*p < .05. **p < .01.***p<.001

Sensitivity to infant behavioral cues. The one-way ANOVA on sensitivity to infant behavioral cues showed a significant main effect of Time on scores, Greenhouse-Geisser Adjusted $F(1.43, 18.58) = 12.01$, $p < .001$, partial eta-squared = .48. This indicates that there was significant overall mean differences over time. Follow-up tests across all mothers showed that Time 3 (posttest, average Day 27) differed significantly from both Time 1 (pretest, average Day 6) and Time 2 (midtest, average Day 13). Figure 4.3

below shows the mean change for sensitivity over time. What is clear is the linear trend (with no plateauing), and the test for the linear trend supports this Greenhouse-Geisser Adjusted $F(1.43, 18.58) = 12.01$, $p < .001$, partial eta-squared = .48. Sensitivity at posttest (Day 27) was significantly higher than at pretest (Day 6), Dunn-Sidak adjusted $t(26) = -4.70$, $p < .05$, as was posttest (Day 27) higher than midtest (Day 13), Dunn-Sidak adjusted $t(26) = -3.47$, $p < .05$. Midtest (Day 13), however, was not significantly higher than pretest (Day 6) ($p > .05$).

Figure 4. 3. Mean Change over Time for Sensitivity



Examination of individual-level data qualitatively showed three patterns of change over time on this measure, including: improvement, maintenance, and backsliding. Ten mothers (71%) improved and maintained their sensitivity. For example, ID 4, who had a history of inverted nipples and early introduction of bottles and pacifier use during the infant's hospitalization with meconium aspiration, could not sustain her breastfeeding practice. Although, she consistently improved her sensitivity to the infant's satiation cues, resulted in an appropriate termination of the bottle feeding.

Two mothers (14%) lowered their sensitivity in Session 2 but improved in Session 3. For example, ID 1 joined the study with a full score for sensitivity. However, in Session 2 when her breast milk production increased, the mother was concerned about the infant choking with too much milk coming out at once so the infant was not allowed to latch on to the areola deep enough or allowed to suckle without interruption. In Session 3, she regained her sensitivity to the infant's behavioral cues again. ID 7 was still

confused about satiation cues and non-nutritive sucking present before terminating breastfeeding in Session 2. However, she was able to obtain those skills by the end of Session 3.

There are two mothers (14%) who had 1 point reduced scores during the last two sessions. Their points were taken off because both mothers did not express satiation cues verbally before terminating breastfeeding as indicated by the scale. The infant's positioning of ID 11 was almost flat because she placed the infant on the nursing cushion in Session 3.

Responsiveness to infant behavioral cues through breastfeeding directly on the breast. One-way ANOVA results for mother's responsiveness to infant behavioral cues though breastfeeding directly on the breast revealed no change over time during the intervention ($p > .05$). On a qualitative basis, the patterns of each mother were examined and found that four mothers (29%) tended to improve their responsiveness whereas eight mothers (57%) appeared to maintain a full score throughout the study period. Finally, two mothers (14%) lowered their scores in Session 2. Specifically, ID 7 was still confused about satiation cues and non-nutritive sucking present before terminating breastfeeding. Overall, it appeared that all of the mothers were responsive to infant distress either through breastfeeding directly on the breast or supplementing with formula in a bottle.

Breastfeeding technique. One-way ANOVA results for mothers' breastfeeding technique also revealed no change over time during the intervention ($p > .05$). The examination of the qualitative data for patterns found that mothers varied tremendously in their breastfeeding practices. For example, ID 4, who had a history of inverted nipples, had a hard time obtaining a proper latch-on even with a nipple shield. She kept pumping. However, since she could not sustain her breastfeeding practice, including directly breastfeeding on the breast, her milk production was reduced. As a result, audible swallowing was not heard. However, her positioning was improved. ID 11, who had been using a nipple shield since hospitalization, could not sustain her breastfeeding practice without the nipple shield even though the infant was able to latch on correctly without it in Session 2. Similarly, ID 14 had the same issue. ID 8, who had excruciating nipple pain on Day 5, discontinued breastfeeding directly on the breast for over 24 hours and started pumping during that time. She used a nipple shield until the pain subsided. She did this from her own research. In Session 2 which took place on Day 11, audible swallowing was not heard on one side. On Day 15, the infant was not able to regain his birth weight so formula feedings were

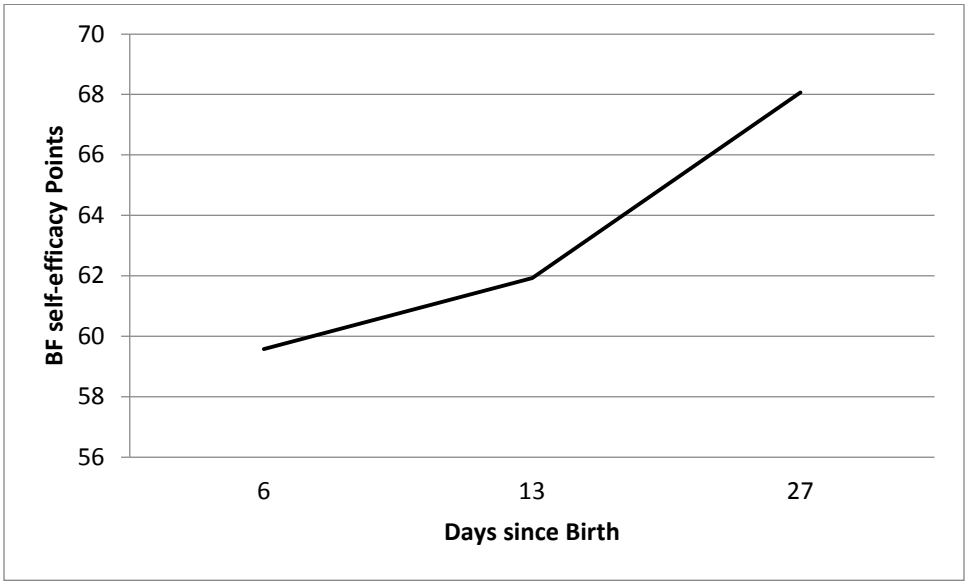
started while she fed pumped breast milk. The number of times she was directly breastfeeding on the breast decreased day by day and the amount of her breast milk was decreased as evidenced by no presence of audible swallowing. ID 13, who completely discontinued breastfeeding directly on the breast at night since Day 6 and switched to formula feedings in a bottle due to the infant's weight loss, was never able to re-attain a proper latch-on. Then she finally discontinued breastfeeding directly on the breast except occasional feeding while at the same time continued expressing her breast milk. As a result, her milk supply was reduced daily. ID 15 whose infant was away from the breast for 24 hours and longer within one week because of a poor latch, resulted in nipple confusion and was not able to obtain proper latch on. The mother initiated a cup feeding as well as a finger feeding on Day 26 from her own research. The infant had frenotomy in his third week of life. During Session 3, with the help of positioning and latch-on during a skin to skin contact, the infant was able to grasp the whole areola for the first time. ID 12, who had nipple pain and blood tinged breast milk, switched to pump breast milk and fed it in a bottle in Session 2. The mother was not able to put the infant's neck to her arm so the infant was not able to attach to the mother's breast close enough. However, this was improved by Session 3.

The mothers who were able to establish and sustain breastfeeding directly on the breast (n=8, 57%) improved their breastfeeding technique to a full score by the end of Session 3.

Breastfeeding Self-Efficacy. Results showed that there was a significant main effect of Time on breastfeeding self-efficacy using the modified BSES-SF, Greenhouse-Geisser Adjusted $F(1.37, 17.75) = 4.16$, $p = .046$, partial eta-squared = .24. Follow-up comparisons showed that Time 2 (midtest, Day 16) and Time 3 (posttest, Day 27) differed significantly, $t(26) = -3.203$, $p < .05$. Figure 4.4 shows the means of breastfeeding self-efficacy over time. Cronbach's alpha estimated with the current sample for this modified version of the Breastfeeding Self-Efficacy Scale Short Form was .95.

Again, looking at the qualitative patterns in the data showed that the mothers who have established and sustained breastfeeding directly on the breast (n=8, 57%) increased their confidence level in breastfeeding throughout the sessions. ID 1 lost her confidence in Session 2 because of the concern about choking with increased amount of milk but she regained her confidence after she confirmed there is a supply demand relationship. ID 7 was not sure when the infant finished breastfeeding, especially during the time of fussiness in Session 2 but she regained her confidence as

Figure 4.4 Mean Change over Time for Breastfeeding Self-Efficacy

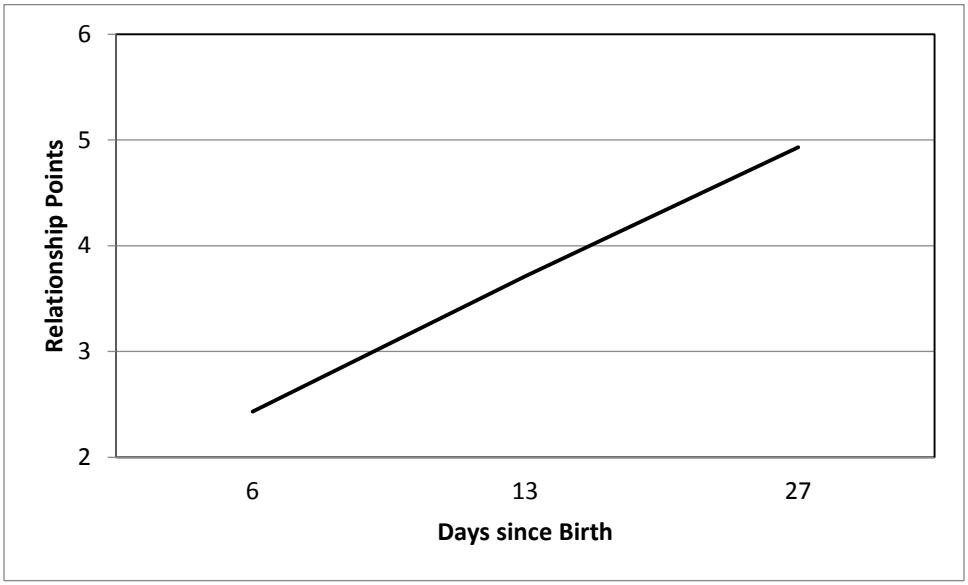


well. The scores of the two mothers decreased because ID 8 and ID 13 were not able to persevere with their breastfeeding practice directly on the breast which resulted in actual low milk supply. In contrast, ID 15 had adequate milk supply but the infant was not able to latch because of nipple confusion, leading to lower breastfeeding confidence in the mother in Session 2. In Session 3, she gained confidence in a proper latch-on.

Perceived adequate milk supply. Two calculations were made of the patterns over time for each of 3 items. The comparison between Time 1 (pretest, average Day 6) and Time 2 (midtest, average Day 13) is important because it gives the first outcome measure of whether or not the intervention has affected the mother's views of 3 items which were directly linked to the literature on reasons for the discontinuation of breastfeeding. The results are shown in Table 4.8. In the first analysis, a paired *t*-test was used to compare the baseline (pretest, Day 6) with post immediate Time 2 (midtest, Day 13). The results showed no significant effect on mother's current or future perceived adequate milk supply over time. However, the relationship between the mother's view of infant crying and its link to her perceived milk supply was significantly altered to the improved clinical direction ($p < .05$). In the second analysis, one-way ANOVA results for mothers' current or future perceived adequate milk supply also revealed no change over time during the interventions ($p > .05$). However, there was a significant main effect on Time on the relationship between infant crying and adequate milk supply, $F(2, 26) = 11.48$, $p < .001$, partial eta-

squared = .47. Follow-up pairwise comparisons revealed that Time 1 (pretest, average Day 6) and Time 3 (posttest, average Day 27) differed significantly, $t(26) = -4.23$, $p < .01$. Figure 4.5 shows a display of the means of the relationship between infant crying and perceived adequate milk supply over time.

Figure 4.5. Mean Change over Time for the Relationship between Infant Crying and Perceived Adequate Milk Supply



Qualitative inspection of each mother's trajectory showed that the mothers who have established and sustained breastfeeding directly on the breast consistently increased their perceived adequate milk supply scores. They were able to change their attitudes towards the relationship between infant crying behavior and adequate milk supply. Some of these mothers had difficulty understanding the relationship between infant crying and their breast milk supply but they were able to understand the concept by Session 3. There is one exception, ID 1 who was not able to change her misunderstanding of the information provided.

Scores remained low for those mothers who were not able to increase and sustain their breast milk supply. For example, ID 15 who was not able to obtain a proper latch-on wonders if she could sustain her breast milk supply now and for the future. ID 11 doubted the relationship in Session 2 because the infant had been fussy even during breastfeeding. ID 8 had actual low milk supply and wondered the relationship between infant crying and adequate milk supply.

Exclusive Breastfeeding Directly on the Breast in the First Month Postpartum. The number of infants at different ages with each feeding method was provided in Table 4.9. Exclusive breastfeeding directly on the breast in the first month postpartum was measured by the feeding logs and breastfeeding observations. In the first week, five mothers (33%) exclusively breastfed directly on the breast, in the second week, 6 mothers (43%) and in the third week for 8 mothers (57%) which remained the same throughout the first month postpartum.

Table 4.9. Number of Infants at Different Ages with Each Method of Feeding

		EBF				Complimentary Feeding	
Ages (weeks)	Number of infants in the study (n)	DBF (n, %)	DBF +BM (finger, tube, cup or bottle) (n, %)	DBF with nipple shield (n, %)	DBF with nipple shield + BM (bottle) (n, %)	DBF + BM (bottle) + FF (bottle) (n, %)	BM + FF (n, %)
1	14	5 (35)	2 (14)	2 (14)	2 (14)	3 (21)	
2	14	6 (43)	2 (14)	2 (14)	2 (14)	2 (14)	
3	14	8 (57)	1 (7)	2 (14)		2 (14)	1 (7)
4	14	8 (57)	1 (7)	2 (14)		1 (7)	2 (14)

Note. EBF: exclusive breastfeeding either breastfeeding on the breast or expressed breast milk, complimentary feeding: breast milk plus non-human milk, DBF: directly breastfeeding on the breast, BM: breast milk feeding, FF: formula feeding

The frequency of breastfeeding in the first month postpartum ranged from 10.16 to 10.32 and night time breastfeeding from 6 pm to 6 am from 4.67 to 5.37. The frequency of breastfeeding varied widely among breastfeeding mothers. For example, at the fourth week postpartum, three mothers breastfeed between 12.5 and 15.2 during 24 hours and at night between 6.33 and 7 whereas four mothers breastfeed between 6.6 and 8.6 during 24 hours and at night between 3 and 3.6. A decrease in crying episodes was noted at three weeks of life including night time crying. Twenty four hour sleep ranged from 12.65 to 13.63 while night time sleep from 6.55 to 6.98 (see Table 4.10). Note that one mother was not able to keep the feeding logs for the last 2 weeks.

Post Hoc Analyses. Post hoc analyses were examined for the other four subscales of the NCAST Feeding Scale and correlations of each item in the Perceived Adequate Milk Supply Questionnaire as well as between the Perceived Adequate Milk Supply Questionnaire and Modified BSES-SF.

Table 4.10. Feeding Patterns for Mothers with Exclusive Breastfeeding Directly on the Breast

1 week (Day 5-7) , *n*=5				2 weeks (Day 8-14), *n*=6		
	M	*SD*	Range	*M*	*SD*	Range
Feedings-24 hour	10.27	1.03	9-11.5	10.3	2.79	6.86-13.83
Feedings-night	5.37	0.71	4.33-6.00	4.72	1.22	3.43-6.17
Feedings-day	4.9	0.89	4.00-6.00	5.55	1.69	3.43-7.67
Cry-24 hour	4.37	4.04	0.67-10.67	4.51	3.81	0.57-10.67
Cry-night	2.53	2.48	0.00-5.67	2.15	1.83	0.00-4.83
Cry-day	1.97	2.12	0.50-5.67	2.19	2.08	0.29-5.83
Sleep-24 hour	13.63	1.66	11.00-15.00	13.53	2	10.90-16.43
Sleep-night	6.73	0.81	5.50-7.67	6.98	0.99	5.43-8.00
Sleep-day	6.9	1.36	5.33-8.00	6.62	1.17	5.57-8.43
urination	8.33	1.35	7.00-10.33	8.62	2.33	6.29-12.14
stool	5.07	3.53	1.00-10.33	5.17	2.39	1.43-8.50

3 weeks (Day 15-21), *n*=7				4 weeks (Day 22-26), *n*=7		
	M	*SD*	Range	*M*	*SD*	Range
Feedings-24 hour	10.32	3.53	6.29-15.33	10.16	3.56	6.60-15.2
Feedings-night	5.27	1.88	3.00-8.17	4.67	1.92	3.00-7.00
Feedings-day	5.33	1.62	3.29-7.43	5.54	1.71	3.60-8.20
Cry-24 hour	2.89	2.08	0.43-5.83	2.54	1.75	0.75-6.00
Cry-night	1.28	1.06	.29-2.83	1.4	0.79	0.50-2.80
Cry-day	1.6	1.15	0.00-3.00	1.26	1.06	0.25-3.20
Sleep-24 hour	12.65	2.36	9.57-15.14	13.16	3.22	8.60-16.30
Sleep-night	6.55	1.33	5.00-8.43	6.71	1.84	4.25-8.80
Sleep-day	6.1	1.23	4.29-7.86	6.48	1.5	3.80-8.20
urination	7.93	3.11	4.33-13.43	7.51	3.53	3.00-14.20
stool	4.32	2.27	1.57-8.33	4.03	2.58	0.25-7.00

NCAST Feeding Scale. In addition to the two subscales, additional analyses in one-way ANOVA were carried out for the other four subscales from the NCAST Feeding Scale. The results are shown in Table 4.11. The results showed that there were a significant main effect of Time on the subscales of mother's Cognitive Growth Fostering, and infant's Clarity of Cues, and Responsiveness to Caregiver over time. The total score of the NCAST Feeding Scale was significantly different over time during the intervention.

Table 4. 11. Post Hoc One-Way Within-Subjects ANOVA of Other NCAST Feeding Scale

Variable	Time 1 M ± SD (95% CI)	Time 2 M ± SD (95% CI)	Time 3 M ± SD (95% CI)	*F* (df, df)	Time 1 & 2 & 3 *p*
NCAFS Feeding Scale					
Social-Emotional Growth Fostering	11.50 ± 1.09 (10.87-12.13)	11.86 ± 1.17 (11.18-12.53)	12.29 ± 0.91 (11.76-12.81)	(2,26)	0.189
Cognitive Growth Fostering	4.93 ± 1.07 (4.31-5.55)	5.79 ± 1.31 (5.03-6.54)	6.57 ± 1.28 (5.83-7.31)	(2,26)	0.003**
Clarity of Cues	10.00 ± 0.88 (9.49-10.51)	10.14 ± 1.17 (9.47-10.82)	10.86 ± 0.86 (10.36-11.36)	(2,26)	0.025*
Response to Caregiver	4.14 ± 1.23 (3.43-4.85)	5.07-1.21 (4.38-5.77)	5.21-1.19 (4.53-5.90)	(2,26)	0.022*
Total Score of NCAST Feeding Scale	53.29 ± 4.02 (50.96-55.61)	57.14 ±3.78 (54.96-59.33)	60.57 ±2.93 (58.89-62.26)	(2,26)	0.000***

Note. n=14. SD = standard deviation. CI = confidence interval.
*$p < .05$. **$p < .01$. ***$p < .001$

Relationship between each item in the Perceived Adequate Milk Supply Questionnaire. Correlations for each item in the Perceived Adequate Milk Supply Questionnaire were examined. The results were shown in Table 4.12. There were statistically significant correlations between the mother's current perceived milk supply and the mother's perceived milk supply for the future at Time 1 (pretest), 2 (midtest), and 3 (posttest). There were no statistically significant correlations between the mother's perception of the relationship between infant crying behavior and the adequacy of her milk supply and the mother's current perceived milk supply and the mother's perceived milk supply for the future.

Relationship between the Perceived Adequate Milk Supply Questionnaire and Modified BSES-SF. Correlations between the Perceived Adequate Milk Supply questionnaire and the Modified BSES-SF

Table 4.12. Correlations between Perceived Adequate Milk Supply Questionnaire and Modified BSES-SF

Time 1

Measure	*1*	*2*	*3*	*4*
1. Current adequacy	-	.69**	0.19	.69**
2. Future adequacy		-	0.44	.57*
3. Relationship			-	0.09
4. Modified BSES-SF				-

Time 2

Measure	*1*	*2*	*3*	*4*
1. Current adequacy	-	.72**	0.1	0.99**
2. Future adequacy		-	0.21	0.67**
3. Relationship			-	0.15
4. Modified BSES-SF				-

Time 3

Measure	*1*	*2*	*3*	*4*
1. Current adequacy	-	.95**	0.23	0.95**
2. Future adequacy		-	0.18	0.92**
3. Relationship			-	0.09
4. Modified BSES-SF				-

n=14

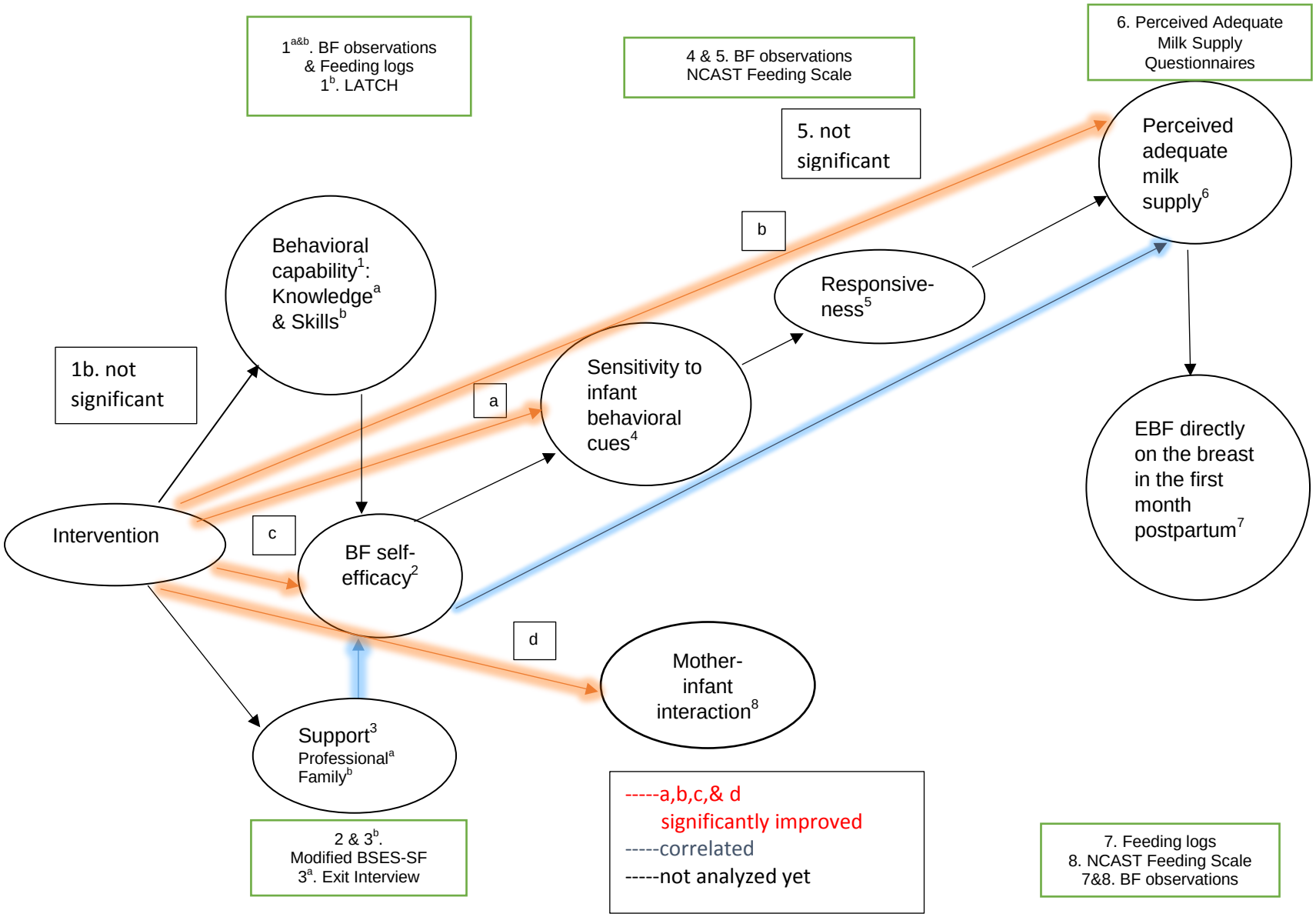
*p < .05. **p < .01.

were examined. The results were shown in Table 4.12. There were statistically significant correlations between the mother's current perceived milk supply, mother's perceived milk supply for the future and breastfeeding self-efficacy at Time 1 (pretest), 2 (midtest), and 3 (posttest). There were no statistically

significant correlations between the mother's perception of the relationship between infant crying behavior and the adequacy of her milk supply and breastfeeding self-efficacy.

Tests of Theoretical Model. Figure 4.6 shows the summary of the tests of the theoretical model. The measures used are shown corresponding to each variable. Each arrow indicates the variables that were significantly improved, correlated, or not analyzed yet. Those variables that were not analyzed need to be examined for a future study.

Figure 4.6. Tests of Theoretical Model



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Chapter 5

Discussion

Introduction

The study results indicate that a three session, time limited home intervention with no prior therapeutic relationship established with the mothers was feasible and positively changed the mothers' sensitivity to infant behavioral cues, breastfeeding self-efficacy, and her perception of the relationship between infant crying and adequate milk supply in the first month postpartum. The exceptions are summarized in the case reviews in Appendix I. This chapter contains a discussion of the feasibility results, a discussion of the intervention outcome results, study limitations, research implications, implications for nursing practice, and recommendations.

Feasibility Results

Five specific aims of feasibility were examined in the current study: 1) recruitment, 2) fidelity and dosage of the intervention, 3) adherence, 4) acceptability, and 5) logistics. The study was feasible. However, there were particular challenges encountered in the recruitment methods. Each of these areas will be addressed separately.

Recruitment

Three particularly challenging issues emerged in recruitment. First, the initial plan for recruitment through an intermediary, i.e., the receptionists handing out the brochure when the mothers checked in and then asking the mothers to approach the investigator in the waiting room did not work; therefore, it had to be modified. Second, there was a competitive resource that competed with the intervention. Providers referred breastfeeding mothers to the lactation consultants at the same recruitment site. As a result, the providers did not refer breastfeeding mothers and infants to this study. After 2 months, when there was ongoing difficulty with recruitment, the investigator contacted the clinical director and the clinical manager to elicit their help. However, these channels continued to be non-productive. Third, three other recruitment sites were initially identified for recruiting potential participants. The first site, Northwest Hospital Childbirth Center which is affiliated with UWMC, was approached, but declined to participate because they were already participating in a different study, and were unable to extend their resources to another study. At the second site, the Mother and Baby unit at UWMC, the investigator presented the research study to the OBGYN MDs. Prior to that, the investigator met with the interim nurse manager on

the same unit. This channel was eventually opened after an extended period of time, but, by then, the study's recruitment goal had been reached. At the third site, Providence Regional Medical Center Everett, there was a chain of email exchanges with the clinical research manager as well as the nurse manager. However, this channel did not open because of large administrative costs, $1,350.

Given these recruitment challenges, three modifications are recommended in future studies. First, a minimum of five recruitment sites need to be obtained prior to initiating the study. This prevents overreliance on one or two sites, which is inherently unstable. Face-to-face meetings with providers and administrators on site are needed, including a brief presentation of the research study. This will provide an opportunity for personnel at the clinical sites to know more about the research study, and to ask questions. This might open new channels for recruitment and provide an opportunity for clinical staff to refer participants into the study.

Second, future studies need to recruit more diverse clientele. Multiple recruitment sites that include diverse populations must be secured. This will require more organizational planning by the investigator, including gathering information on the facility's demographic information, population trends, and other ongoing research studies. Additionally, the inclusion of primiparous mothers as well as multiparous mothers who report breastfeeding problems or concerns or challenges will improve recruitment efficiency.

Third, the recruitment approach should be modified. During the recruitment stage of the study, the recruitment process was modified to allow the investigator to directly approach the mothers instead of having the receptionists give the mothers the brochure, and waiting for mothers to approach the investigator in the waiting room. All 15 mothers and infant dyads were enrolled in the study after being directly approached by the investigator. None of the mothers called to schedule their own appointment based on the information in the brochure. This indicates that offering home interventions through a face-to-face approach might be an ideal way of reaching out to them, especially because they are busy taking care of their infants and themselves.

Fidelity and Dosage of the Intervention

The intervention was delivered as planned by using the educator manual followed by assessing fidelity and dosage using the performance checklist. No changes are recommended.

Adherence

The mothers who established exclusively breastfeeding directly on the breast adhered firmly to the intervention protocol. In contrast, those mothers who had difficulties with breastfeeding directly on the breast followed advice from other sources. No changes are recommended.

Acceptability

All mothers who attended Session 1 also attended Session 2 and 3, except one mother who went back to her home country. Session 1 was provided within 8 days postpartum. However, some mothers asked for more help during the first week postpartum. In future studies, providing two interventions during the first week might be ideal for those mothers who are uncertain about their milk supply coupled with infant weight loss.

Mothers kept the feeding logs over the 3 weeks of the study. This suggests acceptability of the logs. It also suggests there was more benefit than burden in maintaining such logs, a finding consistent with results from a previous study (Pollard, 2011).

Field observations suggest that several modules should be created, especially for mothers who may need more intervention than was provided during the current study. For example, side lying position was most suitable for mothers with complicated lacerations and those who were tired and not fully recovered from delivery. Mothers with a C-section preferred a football position. While they are concerned about their milk supply because of delayed onset of lactation, it is important to help them persevere with their breastfeeding practice. With modules for mothers who have different types of delivery, the intervention could be more individualized. In addition, strategies for infant fussiness should be added in Session 3.

Logistics

The logistics for scheduling appointments and providing reminder calls and text messages prior to the appointments were successful. No changes are recommended.

Intervention Outcome Results

This section discusses the theoretical model of the intervention and the methods that were used.

Theoretical Model of the Intervention

Evidence from this study suggests that an intense but time limited home intervention by a nurse educator has the potential to positively impact breastfeeding mothers and their infants. There are three plausible reasons why this intervention may have impacted outcomes. First, structuring the intervention sessions using Bandura's social cognitive theory involved engaging the mothers in interactive tasks and skills that added to their self-efficacy. The current results are similar results to those in a previous study by Knonborg, Vaeth, Olsen, Iversen, and Harder (2007). Kronborg et al. (2007) found that mothers in the experimental group were more confident in their ability to breastfeed without quantifying the amount of breast milk, and more likely to exclusively breastfeed for a longer duration than mothers in the control group. In addition, the current study helped mothers become more sensitive to their infant's behavior, and responded by unrestricted breastfeeding directly on the breast. This suggests that mothers no longer attributes their infant's crying to the mother's milk supply. Second, even though the intervention specifically targeted mother's sensitivity and responsiveness to infant behavior to breastfeeding, there was a diffusion benefit to other areas of the mothers' behavior. In post hoc analyses, there were significant improvements on three other subscales of the NCAST Feeding Scale. More specifically, the total NCAST Feeding Scale score significantly improved during the time of breastfeeding establishment, and improvements were sustained during the first month postpartum. Third, maternal readiness to learn which according to Rubin's theory of maternal role attainment occurs concomitantly with Lactogenesis II was the perfect timing for the intervention sessions to take place.

Methods

There are two strengths in the measures that were used. First, based on the feeding logs, there were six different methods of breastfeeding identified within 1 month postpartum. Structured breastfeeding observations along with the feeding logs provided the most accurate information about operational definitions of breastfeeding. Exclusive breastfeeding includes breastfeeding directly on the breast or expressed breast milk. However, this had to be further delineated into different categories for the breastfeeding self-efficacy interventions in terms of assessing the amount of breast milk consistent with previous literature (Noel-Weiss, Rupp, Cragg, Bassett, & Woodend, 2006). This study identified different methods of breastfeeding, including the use of mechanical devices which need to be collected and analyzed.

Second, a combination of feeding logs and interviews during the feeding log review sessions provided accurate interpretation about breastfeeding as described in a previous study (Wallace et al., 2006). This prevented recall bias and misclassification, thus making classification easier, resulting in increased internal validity.

Study Limitations and Research Implications

This is a pilot feasibility study that used a single group, three-occasion pretest-posttest design. All results must be viewed with caution. There are five obvious threats to the validity of study results. First, it is possible that other factors produced the observed outcomes. For example, some of the mothers, especially those who had difficulty with breastfeeding sought help from the lactation consultant either before or after enrollment into this study. These consultation sessions represent a historical threat to the validity of study results (Polit & Beck, 2012). Second, because of the demographic population available in the recruitment site, results should be limited to mothers in their 30s and infants from highly educated and middle or upper socioeconomic classes. Results cannot be generalized to mother-infant dyads involving vulnerable populations such as young, socially, fiscally, or educationally challenged mothers and infants. Third, mothers who participated in this study had strong intentions to exclusively breastfeed directly on the breast. Therefore, results do not generalize to mothers who initially are less well motivated or want different types and methods of feeding. Fourth, the use of self-report measures may result in a self-enhancement bias. Fifth, the feeding logs may have caused/influenced mothers' behavior which in turn, may have affected study outcomes.

There are four research implications that emanate from the study results. First, the study participants were only followed for the first month postpartum. Future studies need to extend data collection up to the first 6 months postpartum to track the longer term study outcomes. Second, the study results of the Perceived Adequate Milk Supply Questionnaire were limited to only a three-item measure. Future studies need to expand on the item content of this short self-report measure, adding more items for each of these dimensions in order to be more sensitive to changes. Third, the absence of significant changes on measures of responsiveness to infant behavioral cues through breastfeeding directly on the breast likely occurred because of ceiling effects on the baseline measures. Additional measures may be

needed to pick up responsiveness for high performing mothers. Fourth, a larger study with a more rigorous research design is needed to further test the intervention.

Implications for Nursing Practice

There are two nursing practice implications from the study results. First, there were significant improvements in the mother's sensitivity to infant behavioral cues as well as the mother's attitudinal changes in the relationship between infant crying behavior and the mother's perceived adequate milk supply. This resulted in increased maternal confidence in her ability to breastfeed her infant with minimum intervention dosage. The content of the intervention can be taught by nurses, including public health nurses or nurses in well-child clinics who have been trained in breastfeeding practices in the context of maternity nursing. Nurses doing this intervention will need to be educated concerning infant behaviors, including feeding frequency, sleep-wake cycles, crying patterns, and their association with breastfeeding skills. These consist of breastfeeding on demand, keeping the infant close at night to breastfeed, and assessing breastfeeding behavior in response to infant behavior as well as milk supply without actually measuring it. Second, based on study results, nurses should consider providing more opportunities for mothers to practice breastfeeding directly on the breast. Helping mothers to keep their infants close to them all the time, especially at night, will facilitate breastfeeding on demand (McKenna & McDade, 2005). Infant-led breastfeeding practice during skin-to-skin contact will naturally increase breast milk supply (Moore, Anderson, & Bergman, 2007).

Recommendations

There are two reasons why home for the preference of home intervention sessions over other types of delivery services. First, the participating mothers stated that it is an arduous task to go to outside appointments in the early postpartum because they are not physically recovered yet, and they are just assimilating their infant into the household. Mothers who can visit the lactation services are limited to those who have transportation, family support, and insurance. Having a lactation trained nurse at well-child clinics could enable mothers to ask questions and to obtain information about the feeding process. It might also reduce the burden for mothers to travel. However, the current study suggests home intervention sessions are an ideal venue. Having an objective, educated professional observe breastfeeding in the mother's own environment facilitates individualized feedback, reinforcing

breastfeeding practice in response to their infant behavior, and ensuring mothers can build skills as well as confidence in breastfeeding. Emails, text messages, and phone calls can be used only as subsidiaries. Considering the fact that breastfeeding takes practice, face-to-face delivery at home should be the first choice. Second, this program needs to be carried out as it was developed in addition to one more session in the first week postpartum. When considering the fact that perceived insufficient milk is the main reason for early breastfeeding discontinuation, coupled with infant weight loss in which mothers wonder if they are producing enough milk for their infant, this is the time period that most support is needed. This program encouraged mothers to persevere with breastfeeding even while supplementing with formula which is often necessary during initial infant weight loss. The use of mechanical devices were discouraged when proper latch-on and infant suckling was observed. Mechanical devices actually caused nipple confusion (Neifert, Lawrence & Seacat, 1995) which was often erroneously attributed to a tongue tie. When mothers choose breastfeeding directly on the breast, infant-led breastfeeding through skin-to-skin contact was encouraged. No expression or pumping was required. As such, this program is distinguished from the work of a lactation consultant.

Breastfeeding not only contains health benefits and protective effects for both mother and infant, but also facilitates the relationship between mother and infant as shown in the current study. Breastfeeding is not just to survive, but to thrive for both mother and infant as it is a natural process. Breastfeeding does not need any technology or mechanical devices which often inhibit the ability of both mother and infant to breastfeed. In sum, breastfeeding builds human attachment, the uttermost love in which humans need to thrive.

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Appendix A

Educator Manual

Protecting Your Ability to Breastfeed Your Baby

Session 1: Building on your sensitivity and responsiveness to your baby's behavior through breastfeeding

Introduction

Hi, how are you? How is your baby doing? It is great to be here with you today.

[Before starting the session, ask the mother if it is ok to start audio tape recording the session. If yes, thank her and proceed.]

I am going to work with you today about breastfeeding. I will be giving you information as well as supporting your abilities the best that I can. I do not want to forget any important material so I will be looking at the manual from time to time.

We know every mother wants the best for her baby. You have chosen to breastfeed your baby. My goal is for us to work together during 3 home intervention sessions to help you establish breastfeeding in response to your baby's behavior and continue to breastfeed your baby for the length of time we know is best for both you and your baby.

Part 1. Questionnaires, Breastfeeding Observations and Feedback

Questionnaires

As part of this research project, the first thing I would like to ask you is to fill out the questionnaires.

[Make sure the mother fills out the following questionnaires: demographic data, the Perceived Adequate Milk Supply Questionnaire and Modified Breastfeeding Self-Efficacy Scale Short Form.]

After that I would like to observe you breastfeeding your baby whenever your baby is ready to nurse. Then we will move on to today's session. During my observation, I will be using a checklist to help me learn about your breastfeeding and share any suggestions I might have for us to discuss.

What questions, if any, do you have about this information so far (internal cue)?

[While mothers are filling out the questionnaires, clean hands with sanitizer as prep and get the NCAST Feeding Scale ready. Check each questionnaire to see if there is any missing data. After that, observe her breastfeeding her infant whenever the infant is ready to nurse and check the NCAST Feeding Scale. When breastfeeding occurs more than once during a session, score the first practice before feedback is given. The subsequent observations will be recorded in the clinical notes.

Reverse order is fine if the infant is ready to nurse or already nursing. If the infant is not ready to nurse, proceed with the education portion of today's session and record when breastfeeding observations take place.]

Breastfeeding Observations and Feedback

Could you tell me what thoughts or comments you had while breastfeeding your baby?

[Then give feedback on breastfeeding observations, e.g., 1) You positioned your baby in a safe way and your baby was able to move his/her arms. 2) The skin-to skin contact between you and your baby was maintained. 3) You had good eye-to-eye contact with your baby. 4) You smiled, talked, made eye contact with your baby while breastfeeding. 5) You were right about knowing when your baby was ready to eat. 6) You knew when your baby was finished eating after being breastfed. 7) Your positioning and latch-on were good. 8) Your baby seems satisfied after being breastfed because his/her arms are relaxed and he/she is getting drowsy.]

[Help the mother if she has breastfeeding difficulties as follows.]

How to latch on:

[Demonstrate with your thumb and two forefingers by grasping the whole areola by using the breast model] When you think your baby is ready to nurse, you can bring your baby to the breast (skin to skin contact) as your baby opens up his/her mouth wide and then latch on (infant led feeding). Help your baby to get as much as the areola into his/her mouth as possible. Your baby's lips will be flared out on the breast and his/her nose attached to the breast when latched on correctly.

Improper latch on and/or nipple confusion:

[Demonstrate with your thumb and two forefingers by grasping only the nipple by using the breast model] When your baby is not latched on correctly, you are more likely to have nipple pain. Bottle fed babies will suck like this if the bottle and a pacifier are introduced too early within 1 month after birth. This causes nipple confusion between the breast and the bottle.

Ending breastfeeding:

While demonstrating with your thumb and two forefingers by grasping the whole areola, slide the areola and the infant's mouth when the infant stopped suckling, release suction pressure, and take the infant's mouth off the breast. This will help prevent nipple pain.

Nipple pain:

If your baby latches on correctly, grasping the whole areola into the mouth, your baby can suck more efficiently. After each feeding, put some breast milk onto your nipples. This will promote the healing process. Please avoid washing your nipples with soap when you are taking a shower because this will dry out your nipples, causing cracked nipples.

Positioning:

If mother is tired, having perineal incision pain or pain from a c-section, demonstrate a side lying position.

Inverted nipples:

Check for the retraction to determine if the nipples are true inversion (the nipples unable to be everted) or retractile inversion (can be everted). Help mother with latch-on. Even though mother has inverted nipples, teach her that the infant feeds with the areola, not the nipple. Good positioning with the whole areola placed well into the infant's mouth will sometimes work. If the nipples are too hard, encourage to stimulate the nipple before each feeding by pulling back into her chest with the thumb and the two forefingers beneath. Pumping or manual expression can be used to pull out the nipple. Use a nipple shield during feeding and pump after breastfeeding.

When mothers are supplementing with formula feeding:

Check for audible swallowing and the number of wet and dirty diapers. If there is adequate milk supply, encourage her to persevere with the intervention protocol. If it is in the transition of lactogenesis II, tell

her it is ok to supplement with formula but encourage her to persevere with the intervention protocol before adding formula or expressing breast milk.

[Invite mother's comments on your feedback on your observation]
What would you want to tell me about this feedback?

Could you tell me what the feedback I gave you? (Debriefing and self-reflection which is key to understand breastfeeding self-efficacy. She needs to internalize the information.)

[Help mother with skills as needed by using the infant model. Let mother know to feel free to breastfeed her infant as needed.]

Education Portion of Today's Session

Here is the outline for today [give her the outline for session 1].

Let's talk about what we are going to do today. Today, in this first session, we will focus on what benefits breastfeeding provides for both you and your baby. We will also discuss some of the most common concerns you might have about your baby's behavior such as crying, the frequency of breastfeeding and sleep patterns. We will also discuss how to breastfeed your baby in response to your baby's behavior. At the end of the session, you will be asked to keep a brief feeding log for 3 weeks of your baby's feeding. At the end of the session, I will give you printed material about everything we discussed today. During our meetings, we will work together on ways you can add to your skills and better understand breastfeeding in response to your baby's behavior. [See Table 1]

What questions, if any, do you have about this information so far (internal cue)?

Part 2. What Breastfeeding Gives You and Your Baby

Let's talk about what benefits you and your baby can get from breastfeeding.

What do you think the value of breastfeeding is?

Breastfeeding is a natural way to feed your baby and you and your baby learn how to do this by responding to each other. Breastfeeding begins when you draw your baby closer to your breasts. In return, your baby responds through sucking. The close skin to skin contact helps you and your baby stay connected and builds a strong relationship. When your baby has such close contact with you, it gives your baby a sense of security that later allows him to feel safe and be ready to explore his surroundings.

There are two hormones that affect the success of breastfeeding: prolactin and oxytocin.

Prolactin makes breast milk. Oxytocin causes mother's milk to letdown. Your baby's sucking helps your body to secrete prolactin. Prolactin reduces your stress level. As your baby continues to suck, it stimulates the release of oxytocin.

Oxytocin induces slight sleepiness and mild euphoria. In other words, you feel better, more relaxed and calmer. Oxytocin fosters a close relationship with your baby through cuddling, touching, kissing, gazing, and talking. This is called bonding. Babies who have experienced affectionate interaction with their mothers are less anxious and more interactive with their own children in their future parenting. Your child is also more trusting of others and has a more positive attitude toward their surroundings later in life, possibly because your child's brain was influenced by oxytocin early in life.

Both breastfeeding and close skin contact decrease stress hormones, build higher pain thresholds and boost your own immune system as well. This, in turn increases milk production while at the same time conserve energy to provide more nurturing.

What questions, if any, do you have about this information so far (internal cue)?

Table 1. Session Outline

Session 1: Building on your sensitivity and responsiveness to your baby's cues through breastfeeding

- Part 1: Questionnaires, breastfeeding observations and feedback
- Part 2: What breastfeeding gives you and your baby
- Part 3: The most common concerns you might have that relate to your baby's behavior

1. Crying
2. Feeding frequency
3. Sleep patterns

- Part 4: How to breastfeeding your baby in response to your baby's behavior

Adding to your skills in:

1. Establishing breastfeeding behavior
2. Responding to your baby's hunger cues
3. Satisfying your baby through breastfeeding
4. Increasing your confidence in your milk supply

- Part 5: Feeding logs

Session 2: Adding to your ways to take care of yourself

- Part 1: Questionnaires, breastfeeding observations and feedback, and feeding log review
- Part 2: Taking care of you
- Part 3: Gaining your family's support for your breastfeeding
- Part 4: Planning to return to work or school

Session 3: Establishing and sustaining breastfeeding behavior

- Part 1: Questionnaires, breastfeeding observations and feedback, and feeding log review
- Part 2: Mother's feedback on what she gained & challenges from the program

Breastfeeding transmits immunity and protects your baby against infectious diseases. Breast milk has protective effects against obesity, type I and II diabetes, and leukemia in later childhood and throughout life. **There is a dose-response relationship which means the longer you breastfeed your baby, the more protective effects can be provided.**

Breastfeeding mothers also receive health benefits such as rapid uterine involution which refers to the contraction and decreased size of the uterus to its pre-pregnancy size, resulting in decreased amount of blood loss which is called lochia. Lochia may continue for up to 4 weeks after delivery. The blood flow may increase during breastfeeding due to oxytocin release which stimulates uterine contraction. Uterine involution takes approximately 4 to 6 weeks postpartum. Other health benefits include weight loss back to pre-pregnancy size which can be expected within 6 months postpartum, child spacing, decreased chance of developing type II diabetes, breast cancer, ovarian cancer and postpartum depression. [See Figure 1]

The longer you breastfeed your baby, the more health benefits and protective effects can be provided for both you and your baby because there is a dose-response relationship.

If you were to describe breastfeeding benefits in one sentence, what would that be?

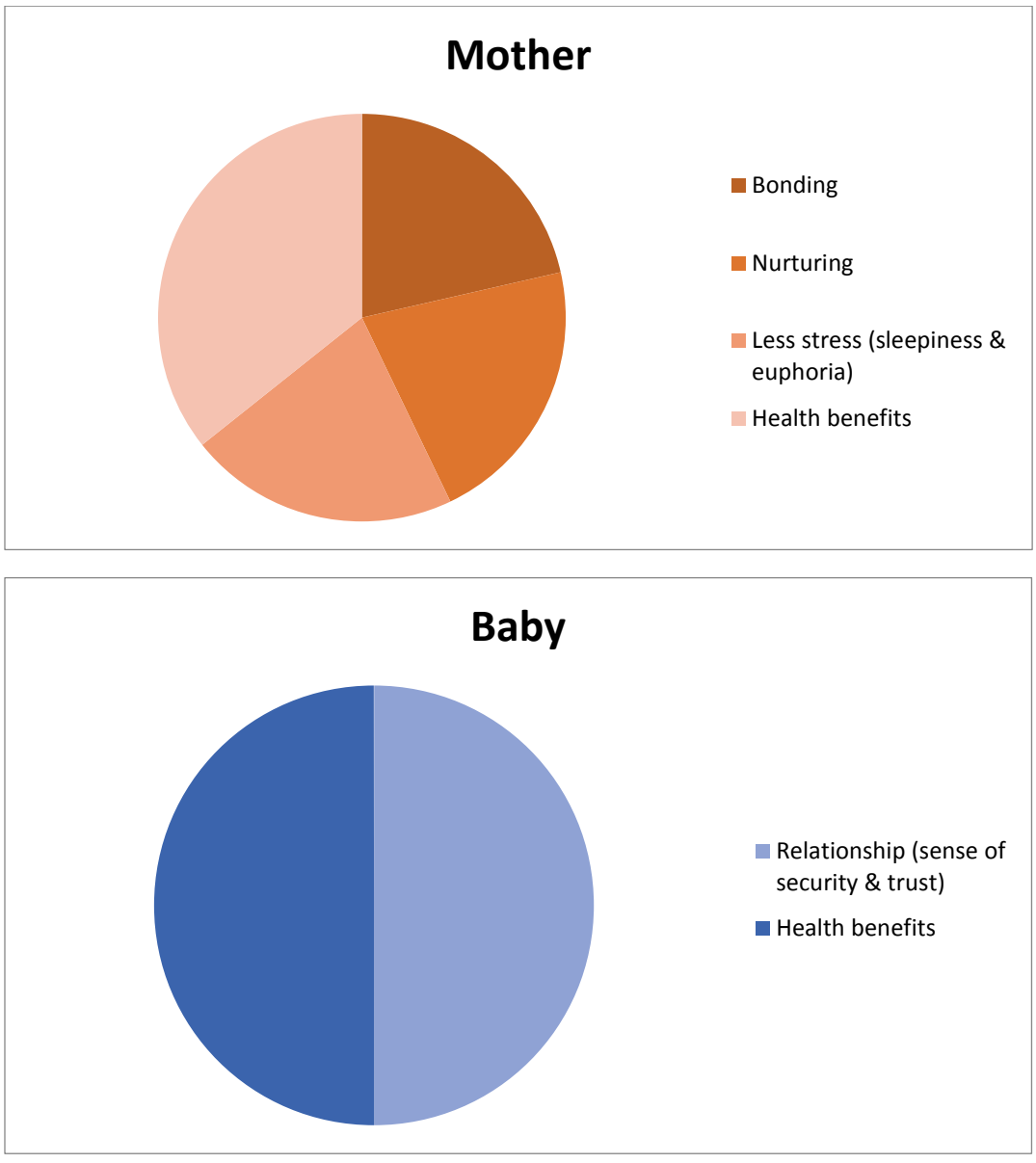
Part 3. The Most Common Concerns You Might Have That Relate to Your Baby's Behavior

Now let's talk about some of the most common concerns you might have about your baby's behavior.

[Invite the list from mother]

What concerns, if any, do you have about your baby's behavior at this point?

Figure 1. Health Benefits and Protective Effects on Mother and Infant from Breastfeeding



Let's start with crying.

1. Crying

Your baby cries for various reasons: the need to eat, burp, sleep and seek comfort through sucking and wanting to be held. Babies cry because this is their only way of communicating with you. Crying is normal. The crying pattern of healthy babies is characterized by an increase until about the first 3 months, with a peak around 6 to 8 weeks after birth, followed by a gradual decrease until 4 months. Babies tend to cry more in the evening. Your baby's crying is the most challenging for you to face as a mother.

How was it like to have your baby crying?

The baby doesn't know how to stop crying on his/her own. If you let your baby cry, your baby will learn to cry harder until his/her needs are met.

However, your baby's crying depends on how you respond to your baby's crying. Relatively little crying was reported when mothers were in close physical contact with their babies, constantly holding or carrying them as well as breastfeeding them. If mothers sense their baby's needs and quickly respond to their babies, they can get quieter. You have the ability to offer breastfeeding at short intervals. As time goes by, your ability to interpret your baby's cries get easier. Babies who are responded to quickly learn to cry less and are able to send more clear cues about the reason they are crying as a result.

In your own words, what do you think helps your baby not to cry so much?

2. Feeding frequency

What concerns, if any, do you have about your baby's feeding frequency?

In the first few days, babies need to be breastfed very often when they sleep only for a short time. This is known as cluster feeding. This is because their tiny stomach can hold only a small amount of breast milk. [Show prop] The first day your baby may only be able to hold a marble ball size of milk at one time, by day 3, a ping pong ball size and by day 10 an egg size.

The number of times you may breastfeed decreases between 1 and 3 months whereas the length of each breastfeeding decreases from 1 to 6 months even though the milk intake remains constant. This may result from increased stomach capacity and eating more efficiently. It is expected that frequent breastfeeding occurs only during the first few weeks. As the baby grows older, the mother will breastfeed less frequently and there will be a longer time between breastfeeding.

In your own words, what do you think you can expect concerning about your baby's feeding frequency?

3. Sleep patterns

What concerns, if any, do you have about your baby's sleep patterns?

During the first 6 months, your baby sleeps from 12 to 16 hours a day. It is common to have days and nights mixed up. Many breastfed babies nurse to sleep and wake up 1 to 3 times during the night. The frequent and short periods of sleep are normal. Babies sleep differently than adults. They do not immediately fall into a deep sleep. Instead, babies go through light sleep and then a transitional sleep and eventually go into a deep sleep. Light sleep is called REM (rapid eye movement) and deep sleep is called non-REM (non rapid eye movement). During light sleep, babies wake up easily. You might have experienced this if your baby woke up immediately after your baby was put down. In order to go into a deep sleep stage, babies need to be either breastfed, rocked, or gently tapped on the back. The sleep cycle for babies is twice as short as for adults. This is the reason why babies wake up so frequently. Wakefulness is thought to be a protective mechanism against Sudden Infant Death Syndrome called SIDS. SIDS is defined as the sudden death of an infant less than 1 year of age with unknown reasons. As babies grow older, they begin to go directly into a deep sleep stage. Demand feeding helps babies get sleep wake cycles organized.

We are going to talk about sleep arrangements next.

In your own words, why do you think your baby easily wakes up?

Part 4. How to Breastfeed Your Baby in Response to Your Baby's Behavior

Now let's talk about how to breastfeed your baby in response to your baby's behavior.
What concerns, if any, do you have about your baby's night time feeding and sleep arrangement?

1. Establishing Breastfeeding Behavior

[In case mothers have engorgement, read this first. Use the breast cloth model as needed. You have engorgement such as pain, redness, firm and tender on palpation. Engorgement occurs 3 to 5 days postpartum when breast milk starts to be produced. This can happen if you are not feeding your baby as frequently as you need to.

Nipple pain: Approximately 96% of breastfeeding mothers experience nipple pain in the first 6 weeks postpartum, especially in first time breastfeeding mothers. Nipple pain is to be expected during the first week of breastfeeding because the baby is grasping the nipple, causing the breast tissue to stretch. However, when the baby is positioned and latched on correctly, the baby can grasp the areola and start to suck more efficiently, followed by a let-down reflex. Nipple pain can be reduced gradually by the 7th days postpartum for most mothers.]

In order to establish your breast milk supply both infant sucking and breast milk removal are required. When babies are breastfed according to their hunger cues, without restrictions on the frequency and length of breastfeeding, milk supply will meet baby's needs. The more breast milk you use up, the more your body tries to make.

Breast milk is more likely to be produced at night so night time feeding is really helpful to sustain your breast milk supply. Sleeping close to your baby will facilitate breastfeeding. This may mean the baby sleeping in a crib or bassinet near your bed within arm's reach of you. This way your baby can get fed before being fully awaken and go back to sleep without difficulty.

Since your baby is close to you, your sleep cycles will be synchronized with your baby. You will be more sensitive to your baby's needs, more responsive to meet your baby's needs, sense your baby breathing, anticipate the feeding, nurse and soothe your baby back to sleep before your baby fully wakes up. You can get some sleep, also.

In your own words, how will that work for you to keep your baby close to you at night?

2. Responding to Your Baby's Hunger Cues

What do you observe in your baby, if any that makes you think your baby is ready to nurse?

If you interpret crying as being caused by hunger, you can respond to your baby immediately by breastfeeding him/her on demand. **Increased alertness, sucking movements, finger sucking, mouthing, rooting, a clenched fist, and flexion of arms and legs are early signs of hunger cues and signal that your baby is indeed ready to breastfeed.** Paying attention to early hunger cues is important. But these may be subtle cues so new mothers might miss some of these cues. When they

miss this opportunity, the baby gets fussy and starts crying which may make it difficult to breastfeed. If your baby starts to cry, try to calm your baby first and then breastfeed.

3. Satisfying Your Baby through Breastfeeding

What do you observe in your baby, if any that makes you think your baby is finished nursing?

When babies are breastfed based on hunger cues, they are more likely to self-regulate their intake. In other words, they do not get overfed. Anything extra will be spit up. **Audible swallowing during breastfeeding will be heard if the baby is getting a sufficient amount of breast milk. The average number of dirty diapers (>3 stools/day after 3rd or 4th day of life) and wet diapers (6-8 pees/day) are expected when the baby is getting enough milk.** But a small deviation will be expected which is perfectly fine.

When babies are full, their arms and legs will be relaxed and they should be getting drowsy. However, there may still be some nonnutritive sucking called comfort sucking present.

Could you tell me, in your own words, that tells you that your baby wants to be fed and is satisfied after being breastfed?

4. Increasing Your Confidence in Your Milk Supply

What do you observe in your baby, if any that makes you think you are not producing enough milk?

Mothers tend to think their babies are crying and fussing because they are still hungry after being breastfed. They attribute this to low breast milk supply. As a result, they start supplementing with formula feedings. Formula feeding actually causes lower breast milk production because babies do not suck on the breast as well after being formula fed. Ultimately, this results in the mother stopping to breastfeed her baby. Constant crying along with frequent feeding demands and wakefulness causes mothers to wonder whether their babies are getting enough breast milk.

The perception of not producing enough breast milk in response to your baby's behavior is very common among mothers. **You may be concerned about your breast milk supply. However, it is important to remember that the more you breastfeed your baby, the more breast milk is produced.** If you are not sure your baby is getting enough milk, you can check for **audible swallowing and the number of dirty and wet diapers**. **In order to increase breast milk supply, you can increase the frequency and length of breastfeeding. Forget the clock. There should be no restrictions on breastfeeding. Keep your baby close to you all the time, especially at night and breastfeed on demand. Do not supplement with formula feedings or use a pacifier unless medically indicated in the first month to avoid nipple confusion.**

If your baby continues to cry during breastfeeding, help your baby burp. Frequent burping is necessary due to the baby's small stomach capacity. This can be done whenever suckling slows down or before switching to the other side of the breast. This is called the burp and switch technique. It is important to breastfeed your baby on both sides.

If your baby continues to cry after being breastfed, you can do cluster feedings, breastfeed your baby until your baby falls asleep, keep holding your baby, or rock your baby before going to sleep. Review the positioning and latch on technique. Efficient sucking requires a baby grasps the areola well into his mouth and compress the areola where the milk sinuses are located with his mouth and jaw. If you take these approaches, you are more likely to get over your perception of not producing enough milk. If your baby is still crying after several hours, please call me. I will refer you to your health care provider to rule out illness.

In your own words, what strategies you can apply to manage of your perception of not producing enough milk?

Here are Tip sheets for today. You will find it helpful what we discussed today.

As you think about the work we did today together-what are the main ides you take away with you?

Part 5. Feeding Logs

The feeding logs I will leave with you today will help you know the pattern of your breastfeeding. Mothers are able to figure out patterns they didn't know existed when they start to record events. They are able to identify when their baby stops crying and becomes content. Using the feeding logs will help you understand the pattern of your breastfeeding and your baby's behavior. You are asked to keep 3 week's record of your baby's feeding, outputs including the number of dirty and wet diapers, sleep and crying episodes.

Try to keep the feeding logs in a convenient place. Record what you and your baby are doing every 4 to 6 hours. Try to be as accurate as possible. For example, if you breastfed your baby at 6 o'clock in the morning, put BF (breastfeeding on the breast) in this cell.

For your baby's outputs, when your baby pees, draw an (X) in this column. When your baby poops, draw an (X) in this column. For sleeping, draw a line from when your baby went to sleep until your baby woke up. For crying episode, place an (X) for each crying episode that last longer than 1 minute.

For the space below, you can write any concerns you might have about your breastfeeding such as difficulty latching, engorgement, nipple pain, concerns about milk supply, sleepy baby, crying and fussiness and so on.

Your accuracy on the feeding logs will help with the interpretation. Keeping the feeding logs is not only helpful for you and your baby but also is helpful for other future mothers and babies. At our next meeting we will go over the feeding logs to see the pattern of your breastfeeding as well as how you were responding to your baby's behavior.

In any, what might get in the way of completing the feeding logs? (Pause)

How the feeding log can still get completed?

If you have any questions, please do not hesitate to call me. Remember, if any questions arise for you about today's session or the feeding logs, I am available to you anytime on my cell phone or text message. If I am not available, please leave a voice message. I will return your call as soon as possible.

Your next visit will be on (date). We will go over the feeding logs and see how you and your baby are doing with breastfeeding. We are also going to discuss ways you can take care of your own needs. Thank you. Bye.

Session 2: Adding to Your Ways to Take Care of Yourself

It is great to be here with you again.

[Before starting the session, ask the mother if it is ok to start audio tape recording the session. If yes, thank her and proceed.]

The main purpose of today's visit is to check in with you and to see how your breastfeeding is going. After that, we are going to discuss adding to your ways to take care of yourself.

Part 1: Questionnaires, Breastfeeding Observations and Feedback and Feeding Log Review

Questionnaires

Like the last visit, the first thing I would like to ask is to fill out the questionnaires. After that I would like to observe you breastfeeding your baby whenever your baby is ready to nurse. Then we will move into today's session.
[Make sure the mother fills out the following questionnaires: the Perceived Adequate Milk Supply Questionnaire and Modified Breastfeeding Self-Efficacy Scale Short Form.]

What questions, if any, do you have about this information so far (internal cue)?

[While mothers are filling out the questionnaires, clean hands with sanitizer as prep and get the NCAST Feeding Scale ready. Check each questionnaire to see if there is any missing data. After that, observe her breastfeeding her infant whenever the infant is ready to nurse and check the NCAST Feeding Scale. When breastfeeding occurs more than once during a session, score the first practice before feedback is given. The subsequent observations will be recorded in the clinical notes.

Reverse order is fine if the infant is ready to nurse or already nursing. If the infant is not ready to nurse, proceed the education portion of today's session and record when breastfeeding observations take place.]

Breastfeeding Observations and Feedback

Could you tell me what thoughts or comments you had while breastfeeding your baby?

[Then give feedback on breastfeeding observations building on session one.
[Invite mother's comments on your feedback on your observation]
What would you want to tell me about this feedback?

Could you tell me what the feedback I gave you? (Debriefing and self-reflection which is key to understanding breastfeeding self-efficacy. She needs to internalize the information.)

[Help mother with skills as needed. Let mother know to feel free to breastfeed her infant as needed.]

Feeding Log Review

Let's talk a little bit about how your breastfeeding is going since my last visit. What concerns have you experienced since my last visit?

Let's go over the feeding logs.

Was it possible for you to keeping the feeding logs? (If not, what got in the way?)

Let's look over the type of your feeding? (Breast milk only, formula milk only or both?)

How did you feed your baby (method)? (Does your baby eat directly at your breast or do you express milk and use a bottle?)

Could you tell me how your night time feedings are going?

Where does your baby sleep at night?

[If it is applicable, ask] How does that work for you when you keep your baby close to you at night to breastfeed?

Tell me about your baby's crying episodes.

When did your baby cry?

Could you figure out a pattern to your baby's crying? (Is there anything unique to your baby or the environment that would suggest your baby is over stimulated?)

What skills did you use to soothe your baby when he/she cried? (How was your baby soothed when he/she cried?)

Did your baby cry after being breastfed? If yes, how did you cope with the situation?

[Reading your baby's cues accurately and responding to them quickly are an important skill. That keeps your baby quieter and content.]

How do you feel about your baby's crying now?

How did you decide if your baby was getting enough milk?

[Audible swallowing and the number of wet and dirty diapers. If it is applicable, tell the mother that we heard audible swallowing while you were breastfeeding just a minute ago. Let's count the number of wet and dirty diapers.]

[Reinforce that crying is not related to the adequacy of her breast milk supply because infants cry with various reasons. Only audible swallowing, the number of dirty and wet diapers and infant's weight can count for that.]

Breastfeeding is an important way of improving your sensitivity to your baby's cues and responding to meet the needs of your baby. In return, your baby will learn how to send clear cues and responding back to you. By responding to each other, you and your baby can learn from one another and modify and adapt to each other's behavior. As a result, you and your baby can develop a positive interaction which helps to build a strong relationship.

Part 2: Taking Care of You

[Give outline.]

Let's take some time together to explore what you have done to take care of yourself.

Mothers experience decreased sleep in the newborn period. Caring for your baby contributes to that reduced amount of sleep. (For multiparous, you have an older child who also needs your attention.)

Could you tell me how you make up reduced amount of sleep?

Many breastfeeding mothers can adjust to the reduced amount of sleep by keeping their baby close at night and napping during the day when their baby is sleeping.

Let's look at the feeding logs to see what sleep patterns your baby has.

Short naps throughout the day will help you gain sleep you might be missing at night. Based on our findings, when do you think you plan to get rest?

A newborn period which is up to the first month postpartum is a time to learn from each other so try to avoid being multi-task oriented at first. Taking care of yourself adequately will make you better able to help your baby as well as (for multiparous, your older child and) husband deal with the adjustments that result from having a new baby in the household.

Here are some suggestions you can think about.

Discourage too many visitors. Disconnect the phone when you are busy breastfeeding your baby. Add a message to let others know when is the best time to call you. Well-meaning friends and relatives will understand this.

Continue to eat nutritious foods and a balanced diet. Always have something on hand to drink when you are thirsty.

What additional ways you would like to add to your self-care? (Maintaining hygiene, emptying the bladder, having a regular bowel movement etc.)

(For multiparous, if you are tired and want to get rest but your older child is still active, make sure the room is safe. If you can lay down for a short time, that would be great. If your husband is around, you can ask him to take charge of the older child.)

Part 3: Gaining Your Family's Support for Your Breastfeeding

Let's talk about family support.

In what way, if any, does your family support your decision to breastfeed your baby?

Tell me about significant others in your family that could help you.

How do they feel about you breastfeeding your baby?

People close to you, including your husband and significant others can have a positive influence on supporting breastfeeding mothers when they are able to support and encourage them.

What can you say to let them know how important breastfeeding is for you?

There are things they can do to build a relationship with their breastfed babies such as holding, cuddling, talking, rocking, and walking their babies. They can change diapers and bathe the baby. Massage is another technique to decrease crying. They can help with household tasks including cooking, doing the dishes, sweeping, doing the laundry etc.

Could you tell me who prepares meals?

In what way, if any, does your family support you breastfeeding your baby?

Part 4: Planning to Return to Work or School

When I asked you to participate in this study, you said you plan to go back to work/school but want to continue to breastfeed your baby so here are some things you can think about.

First of all, breastfeeding may actually take less time than formula feeding. There is no preparation required. Mothers who breastfeed have fewer absences from work than mothers who formula feed because of the protective effects of breastfeeding. Both you and your baby will be healthier.

After returning from work/school, breastfeeding your baby on the breast on demand at home is really important. Cluster feeding is helpful to maintain breast milk supply after work and on the weekends. Keep your baby close to you, especially at night so you can breastfeed your baby easily and you can get rest at the same time.

Talk to your boss at work about pumping and ask for privacy. Get help from family for household tasks. Find a caregiver who can support your breastfeeding efforts and tell that person not to microwave the breast milk, to hold your baby during feedings and not to overfeed when you are due to be coming home soon.

If you cannot breastfeed your baby directly on the breast while you are working or at school, it is good if you can become skilled at expressing milk, either by pumping or hand expressions, and store the breast milk in freezer bags before returning to work/school.

Collect breast milk in a clean bottle and store it. At room temperature you can save it up to a half day long but in the freezer, you can keep it for 6 to 12 months. It is good if you start collecting breast milk 2 weeks before you go back to work/school. No bottle feeding or a pacifier use in the first month to avoid nipple confusion. The first bottle should be introduced after 1 month. Feeding 1 to 2 bottles of breast milk a week is good enough for your baby to take the bottle.

What strategies of managing breastfeeding do you think you can apply while you are at work/school?

Here are Tip sheets for today. You might find it helpful to remind you about what we discussed today.

As you think about the work we did today together-what are the main ides you take away with you?

Here are feeding logs for the next 2 weeks.

Again, your accuracy on the feeding logs will help with the interpretation. Keeping the feeding logs is not only helpful for you and your baby but is also helpful for other future mothers and babies.

If you have any questions, please do not hesitate to call me. Remember, if any questions arise for you about today's session or the feeding logs, I am available to you anytime on my cell phone or text message. If I am not available, please leave a voice mail message. I will return your call as soon as possible.

The next visit will be the last one which will take place on (date) at (time). We will go over the feeding logs and see how you and your baby are doing with breastfeeding. At the end of the session, I'd like to ask you how you felt about the program.

Thank you. Bye.


Session 3: Establishing and sustaining breastfeeding behavior

It is great to be here with you again.

[Before starting the session, ask the mother if it is ok to start audio tape recording the session. If yes, thank her and proceed.]

The main purpose of today's visit is to check in with you and to see how your breastfeeding is going. At the end of the session, I'd like to ask you how you felt about the program.

Observe breastfeeding whenever the infant is ready to nurse or already nursing. If the infant is not ready to nurse, proceed with the education portion of today's session and record when breastfeeding observations take place. Give feedback as needed. Ask "what thoughts or comments do you have about breastfeeding your baby?"

Part 1: Questionnaires, Breastfeeding Observations and Feedback and Feeding Log Review

Let's talk a little bit about how your breastfeeding is going since my last visit. What concerns have you experienced since my last visit?

Was it possible for you to keeping the feeding logs? (If not, what got in the way?)

Could you share with me what you learned from the feeding logs? [Encourage the mother to have self-reflection about her breastfeeding practice, augment with the following information, booster session as needed]

Let's look over the type of your feeding? (Breast milk only, formula milk only or both?)

How did you feed your baby (method)? (Does your baby eat directly at your breast or did you express milk and use a bottle?)

Could you tell me how your night time feedings are going?

Where does your baby sleep at night?

How does that work for you when you keep your baby close to you at night?

Tell me about your baby's crying episodes.

When did your baby cry?

Could you figure out a pattern to your baby's crying? (Is there anything unique to your baby or the environment that would suggest your baby is over stimulated?)

What skills did you use to soothe your baby when he/she cried? (How was your baby soothed when he/she cried?)

Did your baby cry after being breastfed? If yes, how did you cope with the situation?

[Repeat if needed: Reading your baby's cues accurately and responding to them quickly are an important skill. That keeps your baby quieter and content.]

How do you feel about your baby's crying now?

How did you decide if your baby was getting enough milk?

Checking for audible swallowing, the number of dirty and wet diapers and baby's weight is the only things that counts to measure adequate milk supply.

You and your baby have adequately established breastfeeding. Exclusive breastfeeding which refers to only giving breast milk is recommended for the first 6 months. After baby food is introduced, partial breastfeeding is recommended for as long as you wish. The American Academy of Pediatrics set up no limits and the World Health Organization recommend breastfeeding for 2 years or beyond.

If you have a cold, sore throat or a fever, you can take medicine and continue to breastfeed. Most medicines are safe but when you are not sure whether the medicine is transferable to breast milk, call the Pediatric Care center and talk to the nurse.

The most common problem throughout the course of breastfeeding is feeling you are not producing enough milk. When you feel you are not producing enough milk, now you have knowledge and skills you can put into practice. It is important to remember that the more you breastfeed your baby, the more breast milk is produced. Check for audible swallowing and the number of dirty and wet diapers. In order to increase breast milk supply, you can increase the frequency and length of breastfeeding. There is no need to schedule feedings. There should be no restrictions on breastfeeding. Keep your baby close at night and breastfeed on demand.

When you feel uncomfortable, such as having pain in your breast, your baby's sucking will most likely resolve the problem but if it doesn't, call the lactation consultant at the UW medical center.

Let's talk a little bit about your self-care.

How do you manage reduced amount of sleep?
What does your diet look like? How much water do you drink a day?
How does your family support you to breastfeed your baby?

You have completed the 3 sessions. How does it feel to see the work you have accomplished?
What questions, if any, do you have about breastfeeding? [Give tip sheet.]

Finally, I would like to ask is to fill out the questionnaires.

[Make sure the mother fills out the following questionnaires: the Perceived Adequate Milk Supply Questionnaire and Modified Breastfeeding Self-Efficacy Scale Short Form.]

Part 2: Mother's Feedback on What She Gained and Challenges from the Program

[Additionally at the end of the third home intervention, open-ended questions will be asked about the participating mother's perception of the intervention.]

Lastly, I would like to ask you about how you felt about the program. Your feedback will be helpful for the program.

1) What, if anything, did you gain from participating in the program?

2) What were the disappointments you had about the program?

3) In your own words, please tell me what you thought about each of the three intervention sessions with me [A list of the three sessions will be provided against which they will be asked to comment.]

4) To what extent, if at all, were sessions 1, 2 and 3 applicable to you?

5) Please comment on the location (home), the timing (within 5-8 days postpartum, 2 weeks postpartum and 1 month postpartum), the duration (1-1.5 hours for the first intervention session and 1-1.25 hours for the second and third intervention session) and the interval between intervention sessions in the program?

6) Please comment on the intervention materials used in the program.

7) How challenging was it for you to keep the feeding logs for 3 weeks?

8) How did you feel about me observing you breastfeed?

9) How challenging was it for you to attend the three home intervention sessions?

10) What, if anything, were the positive aspects of the three home intervention sessions?

11) Given what you have learned, how do you feel about breastfeeding your baby? How long would you like to continue to breastfeed your baby now?

12) Is there anything else you would want us to know about?

Thank you so much for answering questions and having participated in this study. I appreciated you stayed with the program and supported this research study. Your contribution is valuable to help other future mothers and babies.

If you have any questions regarding breastfeeding, please call the lactation consultants at UWMC at 206-598-4628. Please remember not to share the materials with others. I wish you and your baby the best. Bye.

Resources

- La Leche International: www.illusa.org, 1-877-452-5324 (1-877-4 LA LECHE)
- UW Lactation Services: www.uwmedicine.org/services/obstetrics/lactation-services, 206-598-4628
- WIC: www.doh.wa.gov/Youand YourFamily/WIC.aspx, 866-632-9992
- Breastfeeding Coalition of Washington (WithinResearch) : www.breastfeedingwa.org, 206-284-2465

Appendix B

Demographic Questionnaire ID _____

Today's date: ___ /___ /_____

1) Name: _____ Phone number: _____ Address:_____

2) Age: _____

3) Ethnic Group (Check all that apply): □ American Indian or Alaska Native □ Asian □ Black or African American □ Native Hawaiian or Other Pacific Islander □ Hispanic or Latino □ Non-Hispanic Caucasian □ Other (Please specify:)

4) Country of origin: _____

5) How long have you been in the US? _____

6) Education Level: □ some high school education □ completed high school □ some college □ completed college □ some graduate school □ completed graduate school □ completed professional degree/PhD

7) Marital status: □ married □ cohabiting □ single

8) Parity: □ primiparous □ multiparous

9) Type of delivery: □ Normal vaginal delivery (Episiotomy: □ Yes □ No, Incision: □ Yes □ No) □ vacuum extraction □ forceps □ induction □ c-section

10) Length of pregnancy: _____weeks

11) Length of labor & delivery (hours): _____

12) Total amount of blood loss (ml): _____

13) Weight gain: _____ pre-pregnancy weight: _____

14) Height: _____

15) Baby's date of birth: _____

16) Gender: □ male □ female

17) Birth weight (kg): _____ First well-child visit (kg): _____

18) Height (cm): _____

19) Newborn health problems: □ Yes □ No if yes, describe ( )

20) Roomed in: □ Yes □ No

21) First breastfeeding after delivery (hours): □ <2 □ 3-6 □ 7-12 □ >12

22) Method of feeding in hospital: □ breastfeeding on the breast □ expressed milk □ both □ formula feeding only □ all of them □ others ( )

23) Advised on breastfeeding by health care providers after childbirth: □ Yes □ No

24) Asked if wanted to breastfeed in delivery room by health care providers: □ Yes □ No

25) When first considered how to breastfeed your baby: □ during pregnancy □ after childbirth

26) Intentions: □ breastfeeding at breast □ expressed milk □ both □ some formula milk □ do not know □ others ( )

27) Planned breastfeeding duration (month): □ < 6 weeks □ 6 weeks to 3 months □ 3 months to 6 months □ 6months to 1 year □ >1 year

28) Intention to return to work/school: □ Yes □ No if yes, when ( )

29) Employment status: □ full-time (job title:) □ part-time (job title:) □ unemployed

30) Student status: □ full-time □ part-time □ N/A

31) WIC participation: □ Yes □ No

32) Smoking before pregnancy: □ Yes □ No

33) Drink alcohol before pregnancy: □ Yes □ No

Appendix C

NCAST Feeding Scale

NCAST
FEEDING SCALE
Birth to One Year Only

Information applies to caregiver
Race/Ethnic Heritage (See back page)
Marital/Partner Status ☐ Married ☐ Single

Person Observed ____ Age ____ Educ.
☐ Mother ☐ Father
☐ Other ____
Major Caregiver ☐ Yes ☐ No
Type of Feeding ☐ Breast ☐ Bottle ☐ Solid
Usual Feeding Time ☐ Yes ☐ No
Length of Time Feeding *(circle minutes)*
10 or Less 11-19 20-29 30 or more

Setting
☐ Home
☐ Clinic
☐ Other ____
Were Others Present?
☐ Yes
☐ No
If yes, specify ____

Child's Name ____
Child's Age *(in months)* ____
Child's Sex ____
Child's Birth Order *(circle)*
1 2 3 4 5 or More
Child's State at Beginning of Feeding *(circle)*
Quiet Sleep Active Sleep Drowsy
Quiet Alert Active Alert Crying

I. SENSITIVITY TO CUES	YES	NO
1. Caregiver positions child so that child is safe but can move his/her arms .		
2. Caregiver positions child so that the child's head is higher than hips.		
3. Caregiver positions child so that trunk-to-trunk contact is maintained during more than half of the breast or bottle feeding (50%).		
4. Caregiver positions child so that eye-to-eye contact is possible.		
5. Caregiver's face is at least 7-8 inches or more from the child's face during feeding except when kissing, caressing, hugging, or burping the child.		
6. Caregiver smiles, verbalizes, or makes eye contact with child when child is in open-face-gaze position.		
7. Caregiver comments verbally on child's hunger cues prior to feeding.		
8. Caregiver comments verbally on child's satiation cues before terminating feeding.		
9. Caregiver varies the intensity of verbal stimulation during feeding.		
10. Caregiver varies intensity of rocking or moving the child during the feeding.		
11. Caregiver varies the intensity or form of touch during the feeding.		
12. Caregiver allows pauses in feeding when the child shows potent disengagement cues or is in the pause phase of the suck-pause rhythm of sucking.		
13. Caregiver slows the pace of feeding or pauses when child shows subtle disengagement cues.		
14. Caregiver terminates the feeding when the child shows satiation cues or after other methods have proved unsuccessful.		
15. Caregiver allows child to suck and/or chew without interruption.		
16. Caregiver only offers food when the child is attending.		
TOTAL YES ANSWERS		

II. RESPONSE TO CHILD'S DISTRESS ☐ Yes ☐ No (Potent Disengagement Cues Observed)		
17. Caregiver stops or starts feeding.		
18. Caregiver changes the child's position.		
19. Caregiver makes positive or sympathetic verbalization.		
20. Caregiver changes voice volume to softer or higher pitch.		
21. Caregiver makes soothing non-verbal efforts.		
22. Caregiver diverts child's attention by playing games, introducing toy, or making faces.		
23. Caregiver avoids making negative verbal responses.		
24. Caregiver avoids making negative comments to home visitor about child.		
25. Caregiver avoids yelling at child.		
26. Caregiver avoids using abrupt movements or rough handling.		
27. Caregiver avoids slapping, hitting, or spanking the child.		
TOTAL YES ANSWERS		

III. SOCIAL-EMOTIONAL GROWTH FOSTERING	YES	NO
28. Caregiver pays more attention to child during feeding than to other people or things in the environment.		
29. Caregiver is in "en face" position for more than half of the feeding.		
30. Caregiver succeeds in making eye contact with child once during feeding.		
31. Caregiver's facial expression changes at least twice during feeding .		
32. Caregiver engages in social forms of interaction (play games with child) at least once during the feeding.		
Caregiver uses positive statements in talking to child during the feeding.		
Caregiver praises child or some quality of the child's behavior during the feeding.		
35. Caregiver [illegible] gestures, [illegible] or changes the pitch of his/her voice during the feeding.		
36. Caregiver laughs or smiles during the feeding.		
Caregiver uses gentle forms of touching during the feeding.		
Caregiver smiles, verbalizes or touches child within five seconds of child smiling or vocalizing at caregiver.		
39. Caregiver avoids compressing lips, grimacing, or frowning when making eye contact with child.		
40. Caregiver avoids slapping, hitting, shaking, or grabbing the child or child's extremities during the feeding.		
41. Caregiver avoids making negative comments or uncomplimentary remarks to the child or home visitor about the child or child's behavior.		
TOTAL YES ANSWERS		

IV. COGNITIVE GROWTH FOSTERING		
42. Caregiver provides child with objects, finger foods, toys, and/or utensils.		
43. Caregiver encourages and/or allows the child to explore the breast, bottle, food, cup, bowl, utensils, or the caregiver during feeding.		
44. Caregiver talks to the child using two words at least three times during the feeding.		
45. Caregiver verbally describes food or feeding situation to child during feeding.		
46. Caregiver talks to child about things other than food, eating, or things related to feeding.		
47. Caregiver uses statements that describe, ask questions or explains consequences of behavior, more than commands, in talking to child.		
48. Caregiver verbally responds to child's sound within five seconds after child has vocalized.		
49. Caregiver verbally responds to child's movement within five seconds of child's movement of arms, legs, hands, head, trunk.		
50. Caregiver avoids using baby talk.		
TOTAL YES ANSWERS		

NCAST
FEEDING SCALE
Birth to One Year Only

Information applies to caregiver
Race/Ethnic Heritage (See back page)
Marital/Partner Status ☐ Married ☐ Single

Person Observed _____ Age _____ Educ.
☐ Mother ☐ Father
☐ Other _____
Major Caregiver ☐ Yes ☐ No
Type of Feeding ☐ Breast ☐ Bottle ☐ Solid
Usual Feeding Time ☐ Yes ☐ No
Length of Time Feeding *(circle minutes)*
10 or Less 11-19 20-29 30 or more

Setting
☐ Home
☐ Clinic
☐ Other _____
Were Others Present?
☐ Yes
☐ No
If yes, specify _____

Child's Name _____
Child's Age (*in months*) _____
Child's Sex _____
Child's Birth Order (*circle*)
1 2 3 4 5 or More
Child's State at Beginning of Feeding (*circle*)
Quiet Sleep Active Sleep Drowsy
Quiet Alert Active Alert Crying

I. SENSITIVITY TO CUES	YES	NO
1. Caregiver positions child so that child is safe but can move his/her arms .		
2. Caregiver positions child so that the child's head is higher than hips.		
3. Caregiver positions child so that trunk-to-trunk contact is maintained during more than half of the breast or bottle feeding (50%).		
4. Caregiver positions child so that eye-to-eye contact is possible.		
5. Caregiver's face is at least 7-8 inches or more from the child's face during feeding except when kissing, caressing, hugging, or burping the child.		
6. Caregiver smiles, verbalizes, or makes eye contact with child when child is in open-face-gaze position.		
7. Caregiver comments verbally on child's hunger cues prior to feeding.		
8. Caregiver comments verbally on child's satiation cues before terminating feeding.		
9. Caregiver varies the intensity of verbal stimulation during feeding.		
10. Caregiver varies intensity of rocking or moving the child during the feeding.		
11. Caregiver varies the intensity or form of touch during the feeding.		
12. Caregiver allows pauses in feeding when the child shows potent disengagement cues or is in the pause phase of the suck-pause [illegible] of sucking.		
13. Caregiver slows the pace of feeding or pauses when child shows subtle disengagement cues.		
14. Caregiver terminates the feeding when the child shows satiation cues or after other methods have proved unsuccessful.		
15. Caregiver allows child to suck and/or chew without interruption.		
16. Caregiver only offers food when the child is attending.		
TOTAL YES ANSWERS		

II. RESPONSE TO CHILD'S DISTRESS ☐ Yes ☐ No (Potent Disengagement Cues Observed)		
17. Caregiver stops or starts feeding.		
18. Caregiver changes the child's position.		
19. Caregiver makes positive or sympathetic verbalization.		
20. Caregiver changes voice volume to softer or higher pitch.		
21. Caregiver makes soothing non-verbal efforts.		
22. Caregiver diverts child's attention by playing games, introducing toy, or making faces.		
23. Caregiver avoids making negative verbal responses.		
24. Caregiver avoids making negative comments to home visitor about child.		
25. Caregiver avoids yelling at child.		
26. Caregiver avoids using abrupt movements or rough handling.		
27. Caregiver avoids slapping, hitting, or spanking the child.		
TOTAL YES ANSWERS		

III. SOCIAL-EMOTIONAL GROWTH FOSTERING	YES	NO
28. Caregiver pays more attention to child during feeding than to other people or things in the environment.		
29. Caregiver is in "en face" position for more than half of the feeding.		
30. Caregiver succeeds in making eye contact with child once during feeding.		
31. Caregiver's facial expression changes at least twice during feeding .		
32. Caregiver engages in social forms of interaction (play games with child) at least once during the feeding.		
[illegible] uses positive statements in talking to child during the feeding.		
Caregiver praises child or some quality of the child's behavior during the feeding.		
35. Caregiver [illegible] tones, [illegible] or changes the pitch of his/her voice during the feeding.		
36. Caregiver laughs or smiles during the feeding.		
[illegible] Caregiver uses gentle forms of touching during the feeding.		
[illegible] Caregiver smiles, verbalizes or touches child within five seconds of child smiling or vocalizing at caregiver.		
39. Caregiver avoids compressing lips, grimacing, or frowning when making eye contact with child.		
40. Caregiver avoids slapping, hitting, shaking, or grabbing the child or child's extremities during the feeding.		
41. Caregiver avoids making negative comments or uncomplimentary remarks to the child or home visitor about the child or child's behavior.		
TOTAL YES ANSWERS		

IV. COGNITIVE GROWTH FOSTERING		
42. Caregiver provides child with objects, finger foods, toys, and/or utensils.		
43. Caregiver encourages and/or allows the child to explore the breast, bottle, food, cup, bowl, utensils, or the caregiver during feeding.		
44. Caregiver talks to the child using two words at least three times during the feeding.		
45. Caregiver verbally describes food or feeding situation to child during feeding.		
46. Caregiver talks to child about things other than food, eating, or things related to feeding.		
47. Caregiver uses statements that describe, ask questions or explains consequences of behavior, more than commands, in talking to child.		
48. Caregiver verbally responds to child's sound within five seconds after child has vocalized.		
49. Caregiver verbally responds to child's movement within five seconds of child's movement of arms, legs, hands, head, trunk.		
50. Caregiver avoids using baby talk.		
TOTAL YES ANSWERS		

Appendix D

The LATCH Score ID_____

	0	1	2
Latch	Too sleepy or reluctant No latch achieved	Repeated attempts Hold nipple in mouth Stimulate to suck	Grasps breast Tongue down Lips flanged Rhythmic sucking
Audible swallowing	None	A few with stimulation	Spontaneous and intermittent<24 hours old Spontaneous and frequent >24 hours old
Type of nipple	Inverted	Flat	Everted (after stimulation)
Comfort (Breast/Nipple)	Engorged Cracked, bleeding, large blisters or bruises Severe discomfort	Filling Reddened/small blisters or bruises Mild/moderate discomfort	Soft Tender
Hold (Positioning)	Full assist (staff holds infant at breast)	Minimal assist (i.e., elevate head of bed; place pillows for support) Teach one side; mother does other Staff holds and then mother takes over	No assist from staff Mother able to position/hold infant

Appendix E

Modified Breastfeeding Self-Efficacy Scale Short Form ID_____

How confident are you about breastfeeding your baby? Circle the answer that is the best for you with 1= not at all confident, 3=somewhat confident and 5=always confident. Each sentence starts with "I can always."

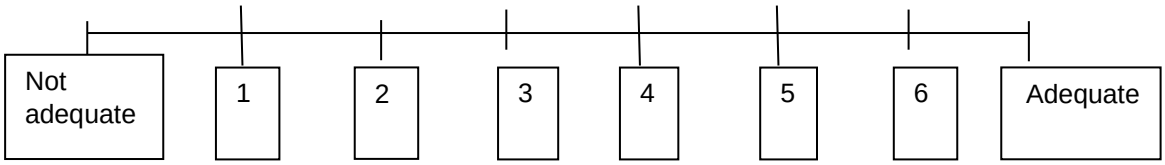
1	Determine that my baby is getting enough milk.	1	2	3	4	5
2	Successfully cope with breastfeeding like I have with other challenging tasks.	1	2	3	4	5
3	Breastfeed my baby without using formula as a supplement.	1	2	3	4	5
4	Ensure that my baby is properly latched on for the whole feeding.	1	2	3	4	5
5	Manage the breastfeeding situation to my satisfaction.	1	2	3	4	5
6	Manage to breastfeed even if my baby is crying.	1	2	3	4	5
7	Keep wanting to breastfeed.	1	2	3	4	5
8	Comfortably breastfeed with my family members present.	1	2	3	4	5
9	Be satisfied with my breastfeeding experience.	1	2	3	4	5
10	Deal with the fact that breastfeeding can be time-consuming.	1	2	3	4	5
11	Finish feeding my baby on one breast before switching to the other breast.	1	2	3	4	5
12	Continue to breastfeed my baby for every feeding.	1	2	3	4	5
13	Manage to keep up with my baby's breastfeeding demands.	1	2	3	4	5
14	Tell when my baby is finished breastfeeding.	1	2	3	4	5
15	Keep my baby close to me at night to breastfeed.	1	2	3	4	5
16	Get support from my family to breastfeed my baby.	1	2	3	4	5

Appendix F

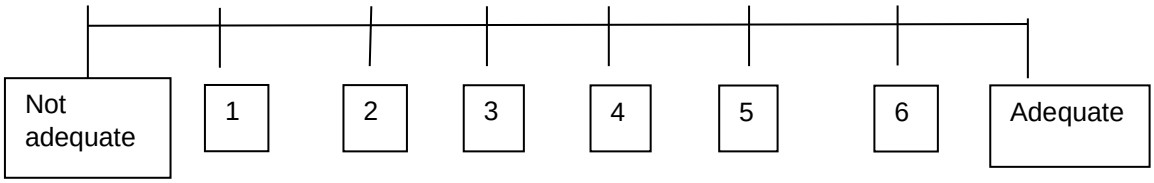
Perceived Adequate Milk Supply Questionnaire ID _____

Please answer the following questions.

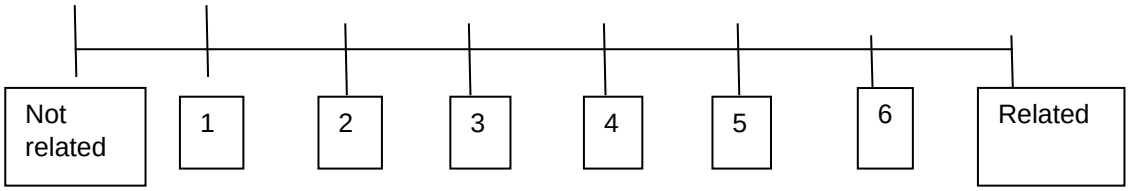
1. To what extent do you think you have an adequate milk supply to breastfeed your baby now?



2. To what extent do you think you can produce adequate amount of milk to feed your baby for the length of time you know is best?



3. To what extent do you think your baby's crying is related to the adequacy of your milk supply to breastfeed your baby?



Appendix G

Feeding Logs

Feeding Type: BF: Breastfeeding, BM(ml): Expressed Breast Milk, FF(ml): Formula Feeding, Specify Feeding Method											
		sleep: ↔	crying: x	pee & ¡	poop: x						
/	Day					/	Day				
Time	Feeding	Sleep	Crying	Pee	Poop	Time	Feeding	Sleep	Crying	Pee	Poop
AM 12						AM 12					
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
11						11					
PM12						PM12					
1						1					
2						2					
3						3					
4						4					
5						5					
6						6					
7						7					
8						8					
9						9					
10						10					
11						11					
Total						Total					

Appendix H

Performance Checklists

Protecting Your Ability to Breastfeed Your Baby: Home Intervention

Criteria for Review of Delivery of Program

Reviewer: _____ Session Date: _____

Date Reviewed: _____ Interventionist: _____

SESSION 1: Building on Your Sensitivity and Responsiveness to Your Baby

Directions for scoring: In the space before each item, mark: **2** if behavior is present, **1** if behavior partially present (behavior is ineffective or misleading), **0** if behavior is absent or misinformation is given, and **NA** if not applicable.

NEW IN-SESSION WORK:

____ 1. Ask mother what her response was in breastfeeding her baby after breastfeeding observations.

____ 2. Give feedback on breastfeeding observations.

____ 3. Discuss what benefits mother and her baby can get from breastfeeding.

____ 4. Invite mother to comment on her response to breastfeeding benefits for both mother and baby.

____ 5. Ask mother what concerns she might have about her baby's behavior.

____ 6. Discuss the most common concerns mother might have that relate to her baby's behavior (crying, feeding frequency, and sleep patterns etc.)

____ 7. Invite mother to share how it is like to have her baby crying/frequent feeding/ being wakeful.

____ 8. Ask mother what she observes in her baby that tells her that her baby wants to be fed.

____ 9. Discuss how to establish breastfeeding behavior in response to baby's behavioral cues.

____ 10. Invite mother to comment on her response to night time feeding and sleep arrangement.

____ 11. Invite mother to comment on her response to her baby's hunger cues and satiation after being breastfed.

____ 12. Ask mother what she observes in her baby that makes her think she is not producing enough milk.

____ 13. Discuss when she feels she is not producing enough milk.

____ 14. Invites mother to reflect on/review how it felt to hear about the strategy to manage not producing enough milk.

____ 15. Invite mother to review Tip Sheets.

____ 16. Invite mother to identify what key ides she takes away with her from the session.

ASSIGNING FEEDING LOGS:

____ 17. Instruct mother on how to keep feeding logs.

____ 18. Invite mother to make a specific plan to keep feeding logs.

____ 19. Invite mother to identify potential barriers to keep feeding logs.

Protecting Your Ability to Breastfeed Your Baby: Home Intervention

Criteria for Review of Delivery of Program

Reviewer: _____ Session Date: _____

Date Reviewed: _____ Interventionist: _____

SESSION 2: Adding To Your Ways to Take Care of Yourself

Directions for scoring: In the space before each item, mark: **2** if behavior is present, **1** if behavior partially present (behavior is ineffective or misleading), **0** if behavior is absent or misinformation is given, and **NA** if not applicable.

CHECKING-IN:

____ 1. Ask mother how her breastfeeding is going since the last visit.

____ 2. Check in with mother on breastfeeding her baby.

____ 3. Give feedback on breastfeeding observations.

____ 4. Check in with mother on the feeding logs.

____ 5. Invite mother to share what she learned from the feeding logs.

NEW IN-SESSION WORK:

____ 6. Ask mother how she makes up reduced amount of sleep.

____ 7 Invite mother to list her current self-care activities.

____ 8. Discuss how to take care of her.

____ 9. Invite mother to comment on her in response to the pattern of her baby's sleeping.

____ 10. Invite mother to make a specific plan to get rest.

____ 11. Invite mother to list additional ways she would like to add to her self-care.

____ 12. Discuss how to gain family support.

____ 13. Invite mother to describe how she might more effectively gain support from her family she has identified.

____ 14. Ask mother if she is planning on going back to work or school.

____ 15. Discuss a strategy for breastfeeding management while she is gone.

_____ 16. Invite mother to reflect on/review how it felt to enact the strategy of manage breastfeeding while she is gone.

____ 17. Invite mother to review Tip Sheets.

____ 18. Invite mother to identify what key ides she takes away with her from the session.

ASSIGNING FEEDING LOGS:

____ 19. Invite mother to make a specific plan to keep feeding logs.

____ 20. Invite mother to identify potential barriers to keep feeding logs.

Protecting Your Ability to Breastfeed Your Baby: Home Interventions

Criteria for Review of Delivery of Program

Reviewer: _____ Session Date: _____

Date Reviewed: _____ Interventionist: _____

SESSION 3: Establishing and Sustaining Breastfeeding Behavior

Directions for scoring: In the space before each item, mark: **2** if behavior is present, **1** if behavior partially present (behavior is ineffective or misleading), **0** if behavior is absent or misinformation is given, and **NA** if not applicable.

CHECKING IN:

____ 1. Ask mother how her breastfeeding is going since the last visit.

____ 2. Check in with mother on breastfeeding her baby.

____ 3. Give feedback on breastfeeding observations.

____ 4. Check in with mother on the feeding logs.

____ 5. Invite mother to share what she learned from the feeding logs.

____ 6. Invite mother to share what, if anything she learned about her baby from the feeding logs.

____ 7. Check in with mother on managing reduced amount of sleep.

____ 8. Check in with mother on her self-care.

____ 9. Invite mother to describe how she gained family support to breastfeed her baby.

NEW IN-SESSION WORK:

____ 10. Ask mother how it feels to see the work she has accomplished.

____ 11. Applaud the mother for all the work she has done.

____ 12. Remind mother not to share program materials with others.

Appendix I

Case Review

One mother (7%) had a history of inverted nipples resulted in lack of elasticity. Both nipples were protruded since she became pregnant. She did a nipple massage and used a nipple shield as the lactation consultant suggested since she was in the hospital but this did not sustain feeding more than a couple of minutes on Day 7. The infant had nipple confusion because she had been primarily fed formula and complementary extracted breast milk in a bottle and using a pacifier during the infant's hospitalization with meconium aspiration. Because of nipple confusion and lack of elasticity, the infant became frustrated and started crying so was not able to obtain a proper latch. The lactation consultant also told her to pour some breast milk in a syringe through the holes of the nipple shield but she could not do it without help. The infant had a frenectomy in her third week of life. However, the infant continued to have difficulty in breastfeeding on the breast. One mother (7%) completely stopped breastfeeding directly on the breast on Day 6. The infant was losing weight so the lactation consultant suggested that she supplement feedings with 10 ml of formula with a syringe after breastfeeding and then to collect expressed breast milk with a syringe. At the second well-child visit on Day 5, the infant lost 16% of his birth weight and the pediatrician suggested the mother increase formula feedings. While she was vigorously supplementing with formula, she was discouraged to breastfeed the infant and completely stopped directly breastfeeding on the breast on Day 6 for 54 hours. She was not able to do night time feedings at all. She continued to express her breast milk as recommended by the lactation consultant. The investigator repeatedly taught her to keep breastfeeding the infant directly on the breast even while supplementing with formula but she did not follow through with this suggestion. One mother (7%) had excruciating nipple pain on Day 5 and stopped breastfeeding directly on the breast. She started pumping her breast milk and used a nipple shield on Day 6 until the pain was subsided, resulting in actual low milk supply as evidenced by improper weight gain in her infant. She did this through her own research. Two mothers (13%) had been using a nipple shield since they were in the hospital and were using it on and off even when the infants was able to latch on correctly during Session 1. They felt the benefits of using a nipple shield were they could see how the infants are suckling and visualize the amount of breast milk supply. During Session 2, one infant was not able to latch directly on the breast correctly without a nipple shield because of nipple confusion.

The use of nipple shield and a flat positioning caused one mother to have nipple pain on Day 26 and then she sought help from the lactation consultant. She also followed up with the lactation consultant's concern the infant was tongue tied. One mother (7%) never obtained proper latch on after childbirth. In the hospital, she was encouraged to use a nipple shield. She had been electrically pumping breast milk as recommended by the lactation consultant and fed it in a bottle. She discontinued directly breastfeeding on the breast for 24 hours on Day 5. During Session 1, Day 6, direct breastfeeding on the breast was taught in the beginning of each feeding to help the infant get over nipple confusion because of bottle feeding the infant with breast milk. However, the mother could not sustain her breastfeeding practice. She initiated a cup feeding as well as a finger feeding on her own with an invented device on Day 26 when it was confirmed that the infant was properly gaining weight at the second well-child visit. The mother occasionally practiced breastfeeding directly on the breast. She complained about nipple pain due to electronically expressing her breast milk. The infant had a frenectomy in his third week of life. During Session 3, with the help of positioning and latch-on during skin to skin contact, the infant was able to grasp the whole areola for the first time and suckled both breasts for a couple of minutes.

There are five issues that are commonly seen in the mothers who had difficulty breastfeeding directly on the breast. First, those mothers who were not able to establish breastfeeding directly on the breast stopped breastfeeding directly on the breast either before/during/after lactogenesis II occurred. Second, when either the mother or infant loses a window of opportunity before/during/after lactogenesis II, it was difficult to persevere with breastfeeding practice. When health care providers attempt to use mechanical devices, they should inform mothers about the benefits, risks, long term effects, and consequences that are possible. Health care providers also need to inform mothers that how and when to stop using any recommended devices. However, in reality, it is hard to discontinue a mechanical device once it has been implemented into mother's breastfeeding practice. For example, neither mother whose nipples were soft and protruded could discontinue the nipple shield. Nipple confusion, caused by mechanical devices (Neifert, Lawrence & Seacat, 1995) is often attributed to tongue tie. The use of nipple shield is not sterile so it has the potential to affect the protective and health benefits for both mother and infant. Nipple shield use is controversial (Chertok, Schneider, & Blackburn, 2006; Hanne, Wilson, & Norwood, 2013, Eglash, Ziemer, & Chevalier, 2010) and future research is warranted. Without

proper knowledge and skills, mechanical devices will merely do harm and interrupt a mother's ability to breastfeed her infant as well as an infant's ability to breastfeed. Third, breast milk removal either through manual expression or pumping should be considered when mothers choose breastfeeding directly on the breast. Interestingly, many mothers asked in Session 1 if they needed to pump their breast milk after breastfeeding as it was recommended by their health care providers. One mother stated, "…*they were telling me to feed him like 47 ml every three hours or something when he was only 3 days old. And I realized that was too much for his little stomach so maybe feel like and then like when I saw the lactation consultant, I pumped 6 ml and I felt inadequate because based on I need to give to him 47 but it was colostrum which was more nutritious so*…" Again, both infant suckling and breast milk removal are necessary in order to increase breast milk supply as well as establishing breastfeeding directly on the breast. It is important to provide more opportunities to breastfeeding directly on the breast. Fourth, in terms of infant physiological weight loss, a previous study found that syringe feeing with 10 mL of formula after breastfeeding during the transition to lactogenesis II is reasonable (Flaherman et al., 2013). Flaherman found the mothers in their experiment group are more likely to breastfeed at 3 months postpartum. For the current study, two mothers (14%) who were concerned about perceived insufficient milk along with infant weight loss up to 13%, supplemented with occasional formula with various amount from 10 mL up to 35 mL either through finger, tube, or bottle. Because they were able to persevere with breastfeeding directly on the breast during formula feeding, their infants regained their birth weight, and continued to gain weight thereafter, and they were able to establish directly breastfeeding on the breast by Day 18. Fifth, most families were supportive for the mother to breastfeed the infant. However, the husbands who believed it was unnecessary to breastfeed had an influence on the mother's breastfeeding decision, corroborating information in the literature (Britton, McCormick, Renfrew, Wade, & King, 2007). In fact, when the mothers were facing breastfeeding difficulties, those mothers quit breastfeeding directly on the breast. This indicates that their outcome expectations (goals) as well as expectancies (values) may not be strong enough to withstand any difficulties experienced. This issue should be introduced during pregnancy and addressed during home intervention sessions.

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Appendix J

Study Measures

ID	1			2			3			4			5			6			7			8		
Time	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Sensitivity to Cues	16	13	16	11	16	16	12			12	14	16	12	15	15	14	14	16	14	13	15	14	14	16
Response to Child's Distress	10	9	10	10	10	10				8	10	10	10	10	10	9	10	10	10	8	10	10	10	10
The LATCH Score	9	10	10	9	10	10	7			2	3	4	8	10	10	9	9	10	6	9	10	9	9	8
Modified BSES-SF	80	74	80	53	69	77	38	61		25	41	45	66	75	80	68	68	77	58	66	68	64	61	55
Perceived Adequate Milk Supply	13	13	12	5	17	18	6	10		9	14	8	14	15	17	11	13	17	10	14	17	12	12	8

ID	9			10			11			12			13			14			15		
Time	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Sensitivity to Cues	11	16	16	16	15	15	14	15	14	13	16	16	14	14	16	12	14	16	11	14	16
Response to Child's Distress	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	10	10	8	10	10
The LATCH Score	9	9	10	9	10	10	9	9	8	9	8	10	8	7	5	9	7	8	5	5	6
Modified BSES-SF	51	60	80	72	70	77	69	73	68	63	70	80	53	31	32	59	70	73	63	57	61
Perceived Adequate Milk Supply	11	13	18	15	16	17	18	17	18	13	18	18	8	4	8	11	16	18	18	15	15

LATCH

ID	1			2			3			4			5			6			7			8		
Time	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Latch		-1					-1			-2	-1	-1							-1					
Audible swallowing										-1	-2	-2											-1	-1
Type of nipple										-2	-2	-2												
Comfort	-1			-1			-1			-1	-1	-1	-1			-1	-1		-1	-1		-1		-1
Hold							-1			-2	-1		-1						-2					
Total (10)	9	9	10	9	10	10	7			2	3	4	8	10	10	9	9	10	6	9	10	9	9	8

ID	9			10			11			12			13			14			15		
Time	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Latch							-1	-1	-1					-1	-2		-1	-1	-1	-1	-1
Audible swallowing														-2	-2		-1	-1	-2	-2	-1
Type of nipple																					
Comfort	-1	-1		-1					-1	-1	-1		-2			-1				-1	-1
Hold											-1				-1		-1		-2	-1	-1
Total (10)	9	9	10	9	10	10	9	9	8	9	8	10	8	7	5	9	7	8	5	5	6

Modified BSES-SF

	ID	1			2			3			4			5			6			7		
	Time	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1	knowing baby getting enough milk	5	5	5	3	4	5	2			1	3	1	4	4	5	4	5	5	4	4	4
2	coping with BF	5	5	5	4	5	5	1			2	2	3	4	4	5	5	5	5	3	4	4
3	not using formula	5	5	5	2	5	5	2			1	2	1	5	5	5	3	5	5	1	3	5
4	proper latch on	5	5	5	4	5	5	1			1	1	3	3	5	5	4	4	5	3	4	4
5	BF situation to my satisfaction	5	4	5	2	4	4	2			1	1	2	4	5	5	4	3	5	2	3	3
6	BF even when baby is crying	5	4	5	3	4	5	2			2	1	2	3	4	5	3	4	5	5	4	4
7	keep wanting to BF	5	5	5	5	4	5	5			4	4	5	5	5	5	5	4	5	5	5	5
8	BF comfortably with family	5	5	5	4	3	3	5			4	4	5	5	5	5	4	3	4	5	5	5
9	be satistfied with BF	5	3	5	4	4	5	1			2	2	3	3	5	5	4	4	5	4	4	4
10	admit that BF as time-consuming	5	5	5	4	4	5	5			4	3	4	4	4	5	5	5	5	3	4	5
11	swithing to the other breast	5	4	5	4	4	5	2			1	4	3	4	5	5	5	4	5	2	5	5
12	continue to BF	5	5	5	2	5	5	1			3	3	2	5	5	5	5	5	4	2	4	5
13	keeping up BF demands	5	5	5	1	4	5	2			1	2	2	4	5	5	3	3	5	3	4	4
14	tell when baby finished BF	5	4	5	2	4	5	2			1	1	1	3	4	5	4	4	4	3	3	3
15	keep baby close at night	5	5	5	5	5	5	2			5	5	5	5	5	5	5	5	5	5	5	4
16	support from family for BF	5	5	5	4	5	5	3			2	3	3	5	5	5	5	5	5	4	5	4
	Total (80)	80	74	80	53	69	77	38			25	41	45	66	75	80	68	68	77	58	66	68

	ID	8			9			10			11			12			13			14		
	Time	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1	knowing baby getting enough milk	2	4	3	2	5	5	4	4	5	4	4	5	3	5	5	2	1	3	3	4	4
2	coping with BF	4	4	4	3	5	5	5	5	5	5	5	3	4	5	5	4	2	2	4	5	5
3	not using formula	4	4	1	2	4	5	5	5	5	4	5	5	5	5	5	2	1	1	4	5	5
4	proper latch on	4	3	2	2	4	5	4	5	4	3	3	2	2	5	5	2	2	1	4	4	4
5	BF situation to my satisfaction	4	3	3	2	4	5	4	4	5	4	5	3	2	4	5	3	2	2	4	4	5
6	BF even when baby is crying	3	4	5	2	4	5	5	4	5	3	5	4	3	5	5	4	2	2	3	4	4
7	keep wanting to BF	5	3	3	5	5	5	5	4	5	5	5	5	5	4	5	5	2	2	4	5	5
8	BF comfortably with family	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	4	3	3	4	5
9	be satistfied with BF	5	4	3	4	5	5	5	5	5	5	4	4	3	4	5	2	1	1	4	5	5
10	admit that BF as time-consuming	5	4	4	4	5	5	4	4	4	5	5	4	5	4	5	3	3	2	4	4	4
11	swithing to the other breast	2	4	3	1	5	5	4	4	5	5	5	5	4	3	5	3	2	1	2	3	4
12	continue to BF	4	3	4	4	5	5	5	4	5	5	4	3	4	2	5	4	2	2	4	5	5
13	keeping up BF demands	4	3	3	4	5	5	4	4	5	5	5	5	5	4	5	2	1	1	4	5	5
14	tell when baby finished BF	3	4	4	1	4	5	4	3	4	4	5	5	4	5	5	3	1	3	2	3	4
15	keep baby close at night	5	4	4	5	5	5	5	5	5	4	4	5	4	5	5	4	2	2	5	5	4
16	support from family for BF	5	5	5	5	5	5	4	5	5	3	4	5	5	5	5	5	3	4	5	5	5
	Total (80)	64	61	55	51	75	80	72	70	77	69	73	68	63	70	80	53	31	32	59	70	73

Modified BSES-SF Continued

	ID	15		
	Time	1	2	3
1	knowing baby getting enough milk	4	4	4
2	coping with BF	4	3	2
3	not using formula	4	3	3
4	proper latch on	2	1	4
5	BF situation to my satisfaction	3	3	3
6	BF even when baby is crying	1	3	2
7	keep wanting to BF	5	4	5
8	BF comfortably with family	5	4	3
9	be satistfied with BF	5	4	4
10	admit that BF as time-consuming	5	5	5
11	swithing to the other breast	2	4	4
12	continue to BF	5	4	4
13	keeping up BF demands	5	4	4
14	tell when baby finished BF	4	3	5
15	keep baby close at night	4	4	5
16	support from family for BF	5	4	4
	Total (80)	63	57	61

Perceived Adequate Milk Supply Questionnaire

ID	1			2			3			4			5			6			7			8		
Time	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Current adequacy	6	6	6	2	6	6	4			2	4	2	6	6	6	6	6	6	2	5	6	5	5	3
Future adequacy	6	5	5	2	6	6	4			4	5	2	6	6	6	4	4	5	5	6	6	5	5	4
Relationship between crying and adequacy	1	2	1	1	5	6	2			3	5	4	2	3	5	1	3	6	3	3	5	2	2	1
Total (18)	13	13	12	5	17	18	10			9	14	8	14	15	17	11	13	17	10	14	17	12	12	8

ID		9		10			11			12			13			14			15		
Time	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Current adequacy	5	6	6	6	6	6	6	6	6	6	6	6	3	1	1	5	6	6	6	5	5
Future adequacy	4	6	6	6	6	6	6	6	6	6	6	6	4	1	1	4	5	6	6	4	4
Relationship between crying and adequacy	2	1	6	3	4	5	6	5	6	1	6	6	1	2	6	2	5	6	6	6	6
Total (18)	11	13	18	15	16	17	18	17	18	13	18	18	8	4	8	11	16	18	18	15	15

Appendix K

NCAST Feeding Scale Total Score

ID	1			2			3			4			5			6			7		
Occasion	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
sensitivity to cues (16)	16	13	16	11	16	16	12			12	14	16	12	15	15	14	14	16	14	13	15
response to child's distress (11)	10	9	10	10	10	10	8			8	10	10	10	10	10	9	10	10	10	8	10
social-emotional growth fostering (14)	13	10	11	12	12	13	7			11	12	12	12	13	13	12	12	12	11	13	12
cognitive growth fostering (9)	5	6	5	5	7	8	2			6	7	8	6	7	8	4	5	6	4	4	5
clarity of cues (15)	10	11	12	12	11	11	12			11	11	12	10	12	12	8	10	11	10	9	10
responsiveness to caregiver (11)	4	6	7	5	6	5	4			6	6	6	4	6	6	4	6	7	2	7	5
contingency of mother (15)	12	8	13	9	12	12	8			7	11	14	10	11	13	9	11	12	10	8	11
contingency of baby (3)	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1
contingency of both (18)	13	9	14	10	13	13	9			8	12	15	11	12	14	10	13	13	11	9	12
mother's total score (50)	44	38	42	38	46	48	29			37	43	46	40	45	46	39	41	44	39	38	42
baby's total score (26)	14	17	19	17	17	16	16			17	17	18	14	18	18	12	16	18	12	16	15
total score (76)	58	55	61	55	62	63	45			54	60	64	54	63	64	51	57	62	51	54	57

ID	8			9			10			11			12			13			14		
Occasion	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
sensitivity to cues (16)	14	14	16	11	16	16	16	15	15	14	15	14	13	16	16	14	14	16	12	14	16
response to child's distress (11)	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	10	10
social-emotional growth fostering (14)	13	12	12	10	12	13	12	11	12	11	12	12	12	13	14	11	9	12	12	13	11
cognitive growth fostering (9)	6	4	6	3	7	8	5	6	7	7	6	5	5	7	8	4	3	8	5	6	5
clarity of cues (15)	10	11	11	9	11	11	10	8	11	10	10	9	10	10	11	10	10	11	10	10	10
responsiveness to caregiver (11)	6	4	4	3	4	5	4	4	6	3	4	4	4	4	4	4	3	3	6	6	5
contingency of mother (15)	10	10	12	8	13	12	12	11	11	10	10	10	8	12	13	9	9	12	9	9	12
contingency of baby (3)	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
contingency of both (18)	11	11	13	8	14	13	13	12	12	11	11	11	9	13	14	10	10	13	10	10	13
mother's total score (50)	43	40	44	34	45	47	43	42	44	42	43	41	39	46	48	39	36	46	39	43	42
baby's total score (26)	16	15	15	12	15	16	14	12	17	13	14	13	14	14	15	14	13	14	16	16	15
total score (76)	59	55	59	46	60	63	57	54	61	55	57	54	53	60	63	53	49	60	55	59	57

ID	15		
Occasion	1	2	3
sensitivity to cues (16)	11	14	16
response to child's distress (11)	8	10	10
social-emotional growth fostering (14)	9	12	14
cognitive growth fostering (9)	4	6	6
clarity of cues (15)	10	8	10
responsiveness to caregiver (11)	3	5	5
contingency of mother (15)	7	10	13
contingency of baby (3)	1	1	1
contingency of both (18)	8	11	14
mother's total score (50)	32	42	46
baby's total score (26)	13	13	15
total score (76)	45	55	61