WAITING TO BE WEIGHED:

A PILOT PROJECT COMPARING TWO DIFFERENT INFANT WEIGHING PRACTICES OF COMMUNITY HEALTH NURSES AND THEIR EFFECT ON BREASTFEEDING OUTCOMES

by

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIRMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN NURSING

in

THE FACULTY OF GRADUATE STUDIES

THE UNIVERSITY OF BRITISH COLUMBIA

October 2006

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Abstract

Breastfeeding initiation rates are rising in Canada; however, the duration rates remain far below what is recommended internationally. Maternal breastfeeding confidence has been supported in the literature as a key variable influencing breastfeeding initiation and duration; community health nurses (CHNs) have been identified as positive influences on breastfeeding outcomes. Because breastfeeding has positive effects for mothers and infants, examining specific CHN practices and their effects on breastfeeding outcomes is imperative. A practice that is potentially important for breastfeeding outcomes is newborn weighing at home following discharge from hospital. The literature offers limited research examining the effects of newborn weighing practices on maternal confidence levels, breastfeeding attrition or formula supplementation volumes.

This purpose of this experimental, pretest - posttest feasibility study was to compare breastfeeding self-efficacy, intended duration of breastfeeding and formula supplementation volumes between two groups of mothers and newborns exposed to different weighing protocols in Vancouver, BC. Newborns randomized to a control group were weighed 24 hours following hospital discharge (day two or three postpartum), and subsequent days following until there was a demonstrated weight gain, while those in the experimental group were not weighed until day five postpartum when a gain in weight was anticipated following maternal breast milk establishment. Variables were measured during the initial CHN visit 24 hours post discharge and two weeks later.

Fifty-five women were recruited and randomly assigned to groups. Hypothesis three was partially supported. Although there was no significant difference in volumes of formula

supplementation between groups, the group weighed 24 hours post discharge had significantly higher increases in volumes of formula supplementation from two or three days to two weeks than the five day weight group. Hypotheses one and two were not supported, that is there were no significant differences between groups on breastfeeding confidence and intended breastfeeding duration. There was a trend in the data supporting hypothesis one, which indicated that weighing infants prior to day five would have a negative effect on maternal confidence. Specifically, there was a small decrease in control group confidence and an increase in experimental group confidence over time.

The findings from this small sample size provide support for conducting a larger study to investigate the potential influence of CHN weighing practices on breastfeeding confidence, intended breastfeeding duration and formula supplementation volumes. Implications for nursing practice, education, health policy and future research are discussed.

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Acknowledgement

The completion of this thesis has been a wonderful collaboration between myself, three brilliant scholars, my colleagues, friends and family. First and foremost I would like to acknowledge Dr. Wendy Hall, my committee chair. Your belief in the importance of incorporating clinical practice into research, along with the outstanding support you have provided me throughout this process is an integral part of this thesis being completed. You always made time for me and your trust and passion kept me believing that I could do this. I would also like to acknowledge the support that I received from Dr. Sabrina Wong and Dr. Lynda Balneaves. You have both provided detailed feedback on my chapters and brought insight from outside the maternal child realm which was invaluable. Through your assistance I have been introduced to a whole new world of data analysis and psychometric testing!

To my colleagues at Vancouver Coastal Health, I am forever grateful. In particular, my manager, Karen Arthurs, who supported my return to school and my fellow Evergreen colleagues who supported my endeavors, even when it meant more work for them. To Radhika Bhagat, who believed in the importance of this project and provided encouragement and support to me during my times of frustration, thank-you. I would also like to acknowledge the nurses at Evergreen, Three Bridges, South and Pacific Spirit Community Health Centers who recruited participants for this study.
I could never have done this without all of you.

To my husband Andrew, my design department, I thank-you for trusting that this was important to me and always listening to the good and bad of it all! I had the most beautiful recruitment materials a masters' student could dream of and I promise, no more changes!

To my parents, Darrel and Eila, you have raised me to always take on new challenges and believe that I could achieve any goal I put my mind to. The completion of this degree is a true reflection of this; thank-you for your continuous love and support.. To my brother Chad, for always cheering me on from the other side of the world, the book is now yours to read; and to my good friend Tasha Smith, thank-you for our late night data analysis talks; your excitement for statistics will never cease to amaze me!

I would also like to acknowledge the generous financial support that I have received over the years from the University of B.C. Sheena Davidson Fund, the Government of B.C Nurses Education Bursary and the Vancouver Coastal Health, Vancouver Community Nursing Bursary.

Finally I would like to acknowledge all the women who agreed to participate in this study. Your willingness to support this research, amongst the many other responsibilities of new motherhood, is much appreciated. The insight that you have provided will allow us to reflect on our current nursing practice to ensure we are delivering care which will assist mothers in achieving their breastfeeding goals.

Chapter I

Introduction

Since 1978, the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) have committed to increasing global breastfeeding rates. In 1981, the Innocenti Declaration on breastfeeding was launched, which made breastfeeding a primary health goal for these organizations (WHO, 1981). Although this commitment has spanned twenty years, statistics representing 95 countries and based on 65% of the world's infant population indicate only 35% of infants are exclusively breastfed between zero and four months of age (WHO, 2003). By the fifteenth anniversary of the Innocenti Declaration, global breastfeeding rates had increased by 15%; however, current breastfeeding rates demonstrate an ongoing need for worldwide breastfeeding promotion (O'Brien, 2005).

The benefits of breastfeeding for mothers and infants are well supported in the literature (American Academy of Pediatrics, 2005; Beaudry, Dufour & Marcoux, 1995; Bick, 1999; Bier, Oliver, Ferguson & Vohr, 2002; Blincoe, 2005; Dennis, 2002; Dewey, Heinig & Nommsen-Rivers, 1994; Duncan, Holberg, Wright, Martinez & Taussig 1993; Fewtrell et al., 2002; Grummer-Strawn & Mei, 2004; Horwood, Darlow & Mogridge, 2001; Isaacs, 2005; Klement, Chen, Boxman, Joseph & Reif, 2004; Kramer & Kakuma, 2002; Kull, Almqvist, Lilja, Pershagen & Wickman, 2004; Oddy et al., 2003a; Oddy et al., 2003b; Oddy & Peat, 2003; Oddy et al., 2004; Owen, Martin, Whincup, Smith & Cook, 2005; Scariati, Grummer-Strawn & Fein, 1997; Smith, Thompson & Ellwood, 2002; Van Odijk et al., 2003; Von Kries et al., 1999) Based on extensive empirical evidence for breastfeeding benefits, the Canadian Pediatric Society, the Dieticians of

Canada, and Health Canada (2005) have all endorsed exclusive breastfeeding of healthy term infants for the first six months of life. The American Academy of Pediatrics (2005) and the WHO (2003) also support this recommendation and The Canadian Pediatric Society (2005) and the College of Family Physicians of Canada (2004) have released policy statements based on these recommendations about breastfeeding. Research has documented benefits, such as, decreased respiratory and gastrointestinal illness (Beaudry et. al; Isaacs; Kramer & Kakuma; Oddy et al., 2003a; Smith et al.), and decreased incidence of bacterial infections and otitis media in breastfed infants (Beaudry et al.; Bick; Dewey et al.; Duncan et al.; Scariati et al.). Breastfeeding also provides infants with protection against atopic diseases (Oddy & Peat; Van Odijk et al.), as well as chronic diseases such as asthma, Crohn's, ulcerative colitis and diabetes mellitus (American Academy of Pediatrics; Klement et al.; Kull et al.; Oddy & Peat; Oddy et al., 2004). Although the evidence is considered controversial due to mediating effects of socioeconomic determinants of health, research has supported a correlation between breastfeeding and improved infant cognitive development (Bier, et al.; Fewtrell et al.; Horwood et al.; Oddy et al., 2003b) and decreased incidence of childhood obesity (American Academy of Pediatrics; Grummer-Strawn & Mei; Owen et al.; Von Kries et al.).

With respect to maternal benefits, breastfeeding decreases a woman's risk of postpartum hemorrhage, post-menopausal osteoporosis, and ovarian and breast cancer. It is also assists women with weight loss and child spacing during the time of exclusive breastfeeding (American Academy of Pediatrics, 2005; Blincoe, 2005; Dennis, 2002; Kramer & Kakuma, 2002).

In Canada, over 337,000 live births were reported last year (Statistics Canada, 2005). Following a moderately high breastfeeding initiation rate of 84.5% in Canada, the incidence of breastfeeding steadily declined to only 38.7% of mothers reporting any amount of breastfeeding by six months postpartum (Statistics Canada, 2003). This percentage includes those mothers who would have been exclusively breastfeeding (giving no other form of liquid or solids), partially breastfeeding (combining breastfeeding with formula feeding), as well as those mothers who were token breastfeeding (occasional breastfeeding that provides minimal nutritional value) (Labbok & Krasovec, 1990). In British Columbia, 93.3% of mothers initiated breastfeeding but only 55% reported they breastfed until six months postpartum and, of that, only 28.8% reported exclusive breastfeeding in that time period (Statistics Canada, 2003). A ten-year literature review conducted by Dennis (2002) on attrition factors concluded that, more often than not, the reason given by mothers for discontinuing breastfeeding is that of perceived difficulties rather than maternal choice.

Factors Known to Increase Positive Breastfeeding Outcomes

Positive breastfeeding outcomes have been facilitated by having access to support, both professional and lay, delivering in a hospital with breastfeeding friendly policies in place, being over 25 years of age, having a higher socioeconomic status and increased length of maternity leave. Additionally, being of Caucasian ethnicity, married, having a desire to breastfeed, and confidence in the ability to successfully breastfeed were key variables in supporting positive breastfeeding outcomes (Dennis, 2002). De Oliveira, Camacho and Tedstone (2001) found that intensive interventions that began during the prenatal period and continued through the postpartum period were most

effective at increasing breastfeeding duration. Access to group and individual education sessions as well as home visits coupled with ongoing guidance and support increased positive breastfeeding outcomes.

According to Dennis (1999) the role that self-efficacy, also characterized as confidence, plays in successful breastfeeding was infrequently included in the literature prior to the development of the Breastfeeding Self-Efficacy Scale (BSES). Dennis and Faux (1999) have cited three previous studies (Buxton et al., 1991; Hill & Humenick, 1996; O'Campo, Faden, Gielen & Wang, 1992) examining the relationship between maternal confidence and breastfeeding duration. All three studies reported higher scores on maternal confidence were associated with a significant increase in duration of breastfeeding time. Subsequent studies by Dennis and Faux, Blyth et al. (2002) and Dennis (2002) reported mothers with high BSES scores were more likely to be breastfeeding their infants at one week, six weeks, and four months postpartum than those with low BSES scores. Blyth et al. (2004) completed a follow-up study, again administering the BSES in the prenatal periods, and reported that intended breastfeeding duration and breastfeeding self-efficacy were the two most significant modifiable variables predicting breastfeeding outcomes. The authors recommended that health care providers identify women at high risk of breastfeeding cessation and develop intervention and evaluation strategies based on education and confidence building strategies.

The Role of Nursing in Breastfeeding Outcomes

Nurses providing early breastfeeding support following hospital discharge have been identified as positive influences on breastfeeding outcomes (Kuan et al., 1999; Swanson & Power, 2005; Taveras et al. 2003). Community health nurses (CHNs) in

Vancouver, British Columbia, working in the Infant, Child and Youth program developed by Vancouver Coastal Health, have contact with new mothers within 24-hours following hospital discharge that continues for the days, weeks, or months as the CHN and mother deem necessary.

Recommendations for maternal and newborn postpartum care have been developed by the British Columbia Reproductive Care program (2003). These include access to regular home visits, as well as telephone support and clinic visits, as a means of supporting breastfeeding among new mothers and infants. As a result, CHNs are ideally positioned to provide breastfeeding support. Assisting mothers to correct early breastfeeding problems, as well as educating mothers about the process of breastfeeding are important elements of CHN care which may facilitate successful breastfeeding (Vancouver Coastal Health Authority, 2003). CHNs can also support breastfeeding by discussing potential negative consequences of formula supplementation (Casiday, Wright, Panter-Brick & Parkinson, 2004; Coriel & Murphy, 1988; Hill, 1991; Hill, Humenick, Brennan & Woolley, 1997; Lawson & Tulloch, 1995; Sheehan et al., 1999, 2001; Williams, Innis, Vogel & Stephen, 1999). Early and ongoing in-home and community support for mothers has facilitated increased duration of breastfeeding (McKeever et al., 2002; Porteous, Kaufman & Rush, 2000; Raj & Plichta, 1998; Sheehan et al.; Taveras et al., 2003; Williams et al.).

As early postpartum discharge increasingly becomes the standard of care in Canada due to fiscal restraints in the acute health care sector, CHN support at home will be crucial to assisting breastfeeding mothers. The average maternal and newborn postpartum stay in hospital decreased from 3.6 to 2.4 days from 1991 to 2001 (Health

Canada, 2003). In Vancouver, BC, the percentage of mothers and infants with an average length of hospital stay of less than 48 hours increased from 55.6% to 63.1% between 2000 and 2003 (BC Reproductive Care Program, 2004). A length of stay initiative (Children's and Women's Hospital, BC Women's Hospital and Health Center & Provincial Health Services Association, 2004), implemented in the summer of 2005 by the largest maternity hospital in Vancouver, will continue to increase the numbers of maternal-infant dyads being discharged early. If British Columbia is to increase breastfeeding initiation and duration rates to meet standards recommended by the WHO and Health Canada, CHNs must provide current, evidence-based assistance to new mothers in the early postpartum stages and beyond.

Because breastfeeding has positive effects on mothers and infants and CHNs are essential to supporting breastfeeding, it is important to examine CHN practices and their potential effects on breastfeeding outcomes. One practice that is potentially important for breastfeeding outcomes is newborn weighing. In Vancouver, CHNs weigh newborns during the early postpartum period as part of their regular follow-up care. Generally, the first weight is obtained at 24-hours following discharge from hospital when the initial home visit is completed. Unless arrangements have been made to have follow-up elsewhere, such as the office of the family physician, CHNs will make home visits within the following days to reweigh infants to ensure a pattern of weight gain has been established.

On average, initial postpartum home visits are made on days two or three post birth. Due to fluid shifts in the infant and the time required to produce breast milk, a loss in weight is commonly seen during that time frame (Harding, Cairns, Gupta & Cowan,

2001; Macdonald, Ross, Grant & Young, 2003; Maisels & Gifford, 1983). A subsequent visit may be made within one or two days to determine whether weight loss has subsided. At such visits, a weight gain is anticipated by CHNs because most mothers establish their milk supply by three to five days postpartum (International Lactation Consultant Association, 1999; Lawrence, 1999; Liang & Wong, 2002; Vancouver Coastal Health, 2003).

With primiparous mothers who are breastfeeding, it is common practice for CHNs to require evidence of two weight increases before discontinuing contact with the family. The CHN will generally visit a family again in another one to two days following an initial visit or will telephone the family following a visit to the physician to ensure a pattern of weight gain has been established. The diagram below captures the current weighing practices of CHNs in Vancouver (Figure 1). This pattern of assessing infant weight gain is not a Vancouver Coastal Health policy, but in my clinical experience, is a widely accepted practice among CHNs. The clinical guidelines of Vancouver Coastal Health (2001) only outline what the norms and variances of newborn weight loss/gain would be on any particular day and do not include a policy on weight assessment. To date, there has been no exploration on the effects of CHN weight assessments in the early postpartum period on maternal breastfeeding practices.

Figure 1. **Vancouver CHN Weighing Pattern.**

Birth **End of CHN Care**

PP 0 (hospital) ↓ Birth Weight	PP 1 or 2 (hospital) ↓ Discharge Weight	PP 2 or 3 (CHN) ↓ Weight	PP 3-4 (CHN/GP) ↓ Weight	PP 5-7 (CHN/GP) ↓ Weight

PP = Days postpartum

Significance

Based on my clinical experience as a CHN, I believe that weighing newborns in the early postpartum period, when there is evidence that indicates they will be losing weight, has a negative effect on women's breastfeeding practices and breastfeeding outcomes. Specifically, it is my contention that weighing an infant before postnatal day five decreases a mother's confidence in her breastfeeding abilities and increases the probability of formula supplementation, because mothers are sensitized to their infants' weight loss. I argue that evidence of infant weight loss increases the likelihood that mothers would regard their milk supply as insufficient and supplement the breastfeeding infant with formula. In an effort to assist mothers to increase their breastfeeding duration, it is imperative to examine our assessment practices, specifically infant weighing, with respect to its potential effects on maternal breastfeeding confidence. Because only one study, completed in the United Kingdom, has examined the variable of weighing

practices on breastfeeding outcomes, it is essential to conduct preliminary studies in this area. Evidence about the effects of current weighing practices on maternal breastfeeding confidence will enable CHNs to more effectively support mothers in reaching the recommended infant nutrition goals set forth by the WHO (2001) and Health Canada (2003).

Problem Statement

Breastfeeding initiation rates are rising in Canada; however, the duration rates remain far below the recommended six month timeframe. In an effort to increase breastfeeding duration rates and to improve the health of mothers and newborns, it is imperative that we consider how nursing practice may affect women's confidence in their breastfeeding ability.

The maternal/child literature provides very limited research examining the effects of weighing practices during the initial postpartum period on maternal confidence levels, breastfeeding attrition or formula supplementation volumes. Empirical evidence supports breastfeeding as the best nutritional choice for infants up to six months of age and beyond (Canadian Pediatric Society, Dieticians of Canada and Health Canada, 2005); therefore, it is critical to explore potential barriers to this goal.

There is very limited evidence about whether weighing newborns in the first two to five days postpartum, when a drop in neonatal weight is anticipated, reduces maternal breastfeeding confidence, increases formula supplementation, and ultimately increases breastfeeding attrition.

Research Questions

This feasibility study examined the relationship between current weighing practices and maternal breastfeeding confidence. The researcher conducted this study in an effort to inform CHN practice as well as increase knowledge about policies that can help mothers sustain breastfeeding. The following three primary questions were used to guide the research process:

1. What is the effect of standard versus delayed weighing practices postpartum on a mother's confidence level in breastfeeding her newborn?
2. What is the effect of standard versus delayed weighing practices postpartum on a mother's intended duration of exclusively breastfeeding her newborn?
3. What is the effect of standard versus delayed weighing practices postpartum on the volume of formula supplementation provided to newborns?

The original research questions which referred to "three to five" days postpartum were altered to fit the eligibility criteria.

In addition to the primary research questions for the study, the researcher also investigated the feasibility of delaying weighing newborns until day five in the Vancouver community health district. Preliminary exploration of the validity and reliability of the Breastfeeding Self-Efficacy Scale – Short Form (BSES-SF) (Dennis, 2003) and use of a 24-hour feeding diary for recording supplementation volumes was also addressed. The following research questions serve as secondary questions:

1. What is the feasibility of delayed weighing of newborns until day five postpartum in the Vancouver community health district?

2. Is the BSES-SF a valid and reliable instrument for measuring maternal breastfeeding confidence during the postpartum period?
3. Is the 24-hour feeding diary a reliable instrument for measuring formula supplementation volumes?

Hypotheses

The directional hypotheses for this study were:

1. A delayed weight group (weight at five days) will have significantly higher breastfeeding confidence compared to a standard weight group (weight at two or three days).
2. A delayed weight group (weight at five days) will have significantly longer intention to exclusively breastfeed their newborns compared to a standard weight group (weight at two or three days).
3. A delayed weight group (weight at five days) will administer significantly lower volumes of formula supplementation to their infants compared to a standard weight group (weight at two or three days).
4. Delayed weighing of newborns by community health nurses will operate as a feasible way of delivering postpartum homecare services in the Vancouver area.
5. The BSES-SF will be a valid and reliable instrument for measuring maternal breastfeeding confidence in the postpartum period.
6. The 24-hour feeding diary will be a reliable instrument for measuring formula supplementation volumes given to an infant.

Purpose

The purpose of this feasibility study was to compare breastfeeding self-efficacy scores, intended duration of breastfeeding and formula supplementation volumes between two groups of mothers. In addition, the feasibility of delayed weighing practices and the use of the BSES-SF and the 24-hour feeding diary for measuring breastfeeding self-confidence and formula supplementation volumes was also analyzed. The mothers were exposed to different newborn weighing practices to determine the effects of community health nursing newborn weighing practices on maternal breastfeeding self-efficacy, intention to exclusively breastfeed, and formula supplementation volumes.

Assumptions

Multiple factors may influence the success of breastfeeding: the infant's health and behaviour; the presence and attitudes of support people; and the mother's physical and psychological state. While it was impossible to control for all influences, it was assumed that the variables measured in this study were important for breastfeeding outcomes. Through random assignment to groups, it was assumed that any potential confounding variables and the variables of interest affecting the dependent variable were equally distributed between the two groups.

It was assumed that the mothers in this study recognized the health benefits of breastfeeding and, therefore, preferred to breastfeed their infants. It was assumed that the mothers aimed to exclusively breastfeed their infants and, therefore, wanted to limit formula supplementation. It was also assumed that CHNs were providing mothers with correct breastfeeding information and following all standards of the maternal and newborn care paths established by Vancouver Coastal Health (2001), as well as the study

protocols. In addition, there was an assumption that the CHNs who were following the participants were promoting exclusive breastfeeding and supporting the mothers to reach this goal. It was assumed that the 24-hour feeding diaries would provide valid documentation of formula supplementation volumes. Finally, it was assumed that the participants would complete the questionnaires honestly and thoroughly.

Theoretical Framework

Breastfeeding self-efficacy is described by Dennis (1999) as a mother's perceived ability to successfully breastfeed her newborn. This perceived ability is the basis for success and, therefore, a predictive variable in determining breastfeeding outcomes. Dennis developed the Breastfeeding Self-Efficacy Framework as a way to describe how breastfeeding self-efficacy influences thoughts and actions towards breastfeeding.

A mother's breastfeeding self-efficacy, or confidence, is influenced by four sources of information (Bandura, 1977; Dennis, 1999). The first source of information is vicarious experience, or access to modeled behaviours that positively support breastfeeding. An example of this would be a breastfeeding support group. The second source of information is verbal persuasion. This is the verbal encouragement from influential support people. The third sources of information are the mother's physiological and psychological states. Fatigue, pain, stress and anxiety are important factors that influence coping strategies during difficult times. The final source of information, which affects breastfeeding self-efficacy, is that of performance accomplishments. These are the personal experiences which a mother has had with breastfeeding. These experiences are frequently the most powerful sources of efficacy information. According to Dennis, these four sources of information are variables that

health professionals could influence in order to support successful breastfeeding outcomes.

As described by Dennis (1999), self-efficacy is affected by a person's interpretation of his/her performances or desired outcomes. Attention to successful performances or outcomes boosts one's self-efficacy, while attention to unsuccessful performances or outcomes will decrease self-efficacy. For this feasibility study, infant weighing is conceptualized within Dennis's framework as a variable affecting performance accomplishments (Figure 2). The act of weighing an infant prior to the established of a supply of breast milk , and therefore identifying and documenting weight loss, may cause some mothers to see their breastfeeding performance, or anticipated outcome (infant gaining weight as a result of her nourishment), as unsuccessful or unmet. Successful performance experiences have been demonstrated as key to continued breastfeeding duration (Dennis). The influence of early infant weighing practices by CHNs and their effects on performance accomplishment, and, ultimately, breastfeeding confidence was evaluated by this study.

To explain how breastfeeding confidence ultimately influences breastfeeding outcomes, Dennis's (1999) framework first describes how a mother's overall self-efficacy influences her thoughts and actions towards breastfeeding. These thoughts and actions are categorized into four individual responses.

The first individual response is choice of behaviour. A person most often chooses the path by which they are more apt to succeed (Dennis, 1999). Self-efficacy influences a person's choices in life as well as commitment to achieving their goals (Bandura, 1977). According to Dennis, women with higher self-efficacy are more apt to choose to

breastfeed, intend to breastfeed for a longer duration and remain committed to breastfeeding in response to challenges they may encounter.

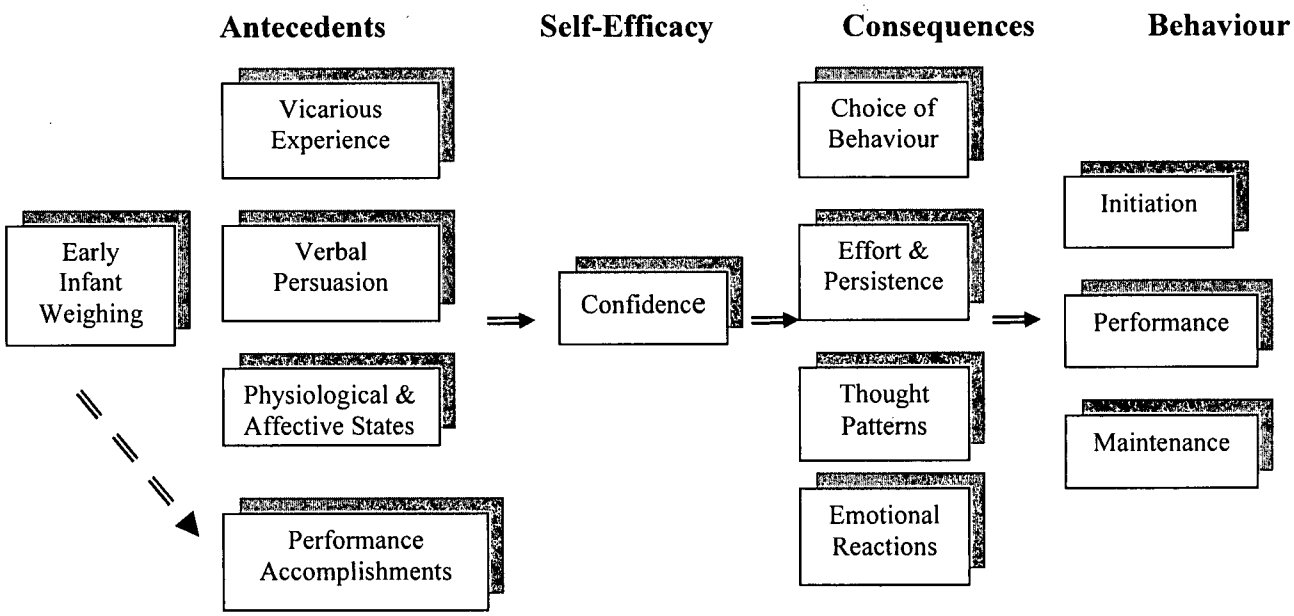
The second response is effort and persistence. Breastfeeding is often a challenge initially and mothers with a strong sense of self-efficacy will be more persistent in their efforts to overcome challenges in order to succeed (Dennis, 1999).

The third response influenced by self-efficacy is thought patterns (Dennis, 1999). Thought patterns are the positive "self-talk" that is often needed to remain optimistic that things will improve and success will be achieved if one perseveres. Bandura (1986) stated that those with higher self-efficacy possess performance enhancing thought patterns that assist them to respond to their difficulties with an analytical approach versus an emotional one. Those with low self-efficacy emphasize their deficiencies while visualizing failure and self-defeat. Bottorff (1990) found the effect of thought patterns to be an influential source on breastfeeding outcomes. This qualitative study indicated that women who were experiencing breastfeeding problems often found themselves in an "internal dialogue" of quitting breastfeeding versus overcoming their challenges to meet their breastfeeding commitments. "Mothers' depend on themselves to find support for their commitment to breastfeeding and often this takes the form of talking oneself into keeping going" (p.207).

The final response is emotional reactions. Emotional reactions fall under the psychological ability to deal with new challenges. While mothers with low self-efficacy may find breastfeeding difficulties to be overwhelming, those with high self-efficacy will view those same difficulties as challenges that they are able overcome (Dennis, 1999).

According to Dennis's Self-Efficacy Framework (1999), these four responses influence outcome behaviours related to breastfeeding initiation, performance, and duration. In summary, Dennis theorizes that more confident mothers are more apt to choose to breastfeed, deal with the challenges that present themselves, be more persistent, and maintain a positive outlook in the midst of difficulties, and intend to breastfeed longer. As a result, a mother's self-efficacy directly influences breastfeeding outcomes. Early infant weighing is conceptualized as diminishing performance accomplishments, in the event that infants lose weight.

Figure 2. **Conceptualization of Weighing within Dennis's Self-Efficacy Framework.**



Summary

Although worldwide breastfeeding rates are on the rise, in Canada less than 30% of mothers achieve the recommendation outlined by the World Health Organization (2001) and Health Canada (2003) of exclusive breastfeeding for the first six months of their infant's life. As a result, it is imperative that research explore the barriers for women to reaching these goals and assist health care professionals in providing effective breastfeeding support. The relationship between CHN weighing practices for newborns and the breastfeeding outcomes of maternal confidence, breastfeeding duration and formula supplementation volumes was evaluated in this experimental, pretest - posttest feasibility study. This chapter included the background to the problem, the significance of the study, a problem statement, purpose, the research questions, the hypotheses, the assumptions underlying the study, and the theoretical framework for the study. The next chapter provides an overview of the literature and theoretical framework that influenced the development of this study. Chapter Three discusses the study and data analysis methods and participant sample. Results of the data analysis are presented in Chapter Four and Chapter Five provides a discussion of the results and implications for practice.

Chapter II

Literature Review

Literature for this study was obtained through searches conducted on the CINAHL, EBSCO-HOST, PUBMED and OVID databases. The databases were searched in July and August of 2004 and again in September 2005 and January 2006. Further articles were collected from reviewing reference lists of individual articles and through colleagues' suggestions of articles pertinent to the topic. In addition, review of the current literature as it became available provided further references. With a few exceptions of classic earlier studies, literature published within the last 15 years was retrieved.

Search terms that were used were breastfeeding and benefits, confidence, commitment, self-efficacy, attrition, and instruments. In addition the terms community health nursing, hospital discharge, newborn weight loss, and hypernatremia were searched.

Vancouver Coastal Health nursing resources were searched for relevant literature. These included nursing care assessment and standards for the Infant Child and Youth program (Vancouver Coastal Health, 2001, 2004) and the breastfeeding orientation manual (Vancouver Coastal Health, 2003). The British Columbia Reproductive Care Program (2003) recommendations were reviewed and the websites of Health Canada and The Canadian and American Pediatric Societies were searched for breastfeeding and newborn health follow-up standards and recommendations.

Breastfeeding Definitions

The expression "breastfeeding" is an umbrella term that defines multiple types of breastfeeding behaviour. Labbock and Krasovec (1990) outlined a breastfeeding

framework (developed by the Interagency Group for Action on Breastfeeding) to define the categories of breastfeeding. According to this framework, breastfeeding behaviour is divided into three categories; full, partial, and token breastfeeding. Token breastfeeding is defined as occasional breastfeeding that provides minimal nutritional value. Partial breastfeeding is subdivided into low, medium and high, determined by the percentage of feeds that are breastfeeds. Low representing less than 20% of all feeds, medium representing 20-80% and high representing 80% of all feeds being breastfeeds. Full breastfeeding is also subdivided into categories; exclusive and almost exclusive. Exclusive breastfeeding is defined as breastfeeding with no other liquid or solid being given to the infant while the term "almost exclusive" incorporates the introduction of vitamins, minerals, water, juice or ritualistic feeds given infrequently to the breastfed infant. One limitation of this framework in a Canadian context is that it is recommend that all breastfed infants are supplemented with Vitamin D on a daily basis to assist with proper development of bones and teeth (Canadian Pediatric Society, Dieticians of Canada, Health Canada, 2005). As a result, the number of mothers "exclusively breastfeeding" is substantially less than in other countries without such nutritional recommendations.

This framework has been adopted by two scholarly breastfeeding journals for reporting studies: The Journal of Human Lactation and the Journal of Nurse-Midwifery (Burgin, 1996). This provides for more consistency of breastfeeding definitions within the literature.

Newborn Weight Loss

Although terms identifying the various types of breastfeeding have been defined in the literature, what constitutes normal newborn weight loss in the breastfed infant is yet to be determined. It has been acknowledged that a loss of up to 10% of birth weight is acceptable, yet there is no published evidence to support this proportion. Two studies (Maisels & Gifford, 1983; Maisels, Gifford, Antle & Leib, 1988) that investigated neonatal jaundice and weight loss have provided guidelines for normal newborn weight loss, with a range of 5.8% to 6.9% being reported. A number of factors, such as lack of randomization of the participants due to pre-selected subjects based on high jaundice levels, insufficient generalizability outside the jaundiced newborn population, and small sample sizes, are limitations for adopting the recommendations from both of these studies.

MacDonald et al. (2003) completed a follow-up study to establish an acceptable amount of newborn weight loss that could be generalized to the healthy newborn population. A maximum weight loss of 12.8% was reported in their study, with an average loss of 6.6%. The median time of maximum weight loss was at 2.7 days post birth. The median time for regaining the birth weight was 8.3 days post birth. Wright and Parkinson (2004) reported the average weight loss of 961 term infants at five days was 1.4% below birth weight, which was less than the average 4-7% reported in previous studies. They concluded that the neonatal weight loss is brief and that few newborns remain 10% below their birth weight at five days old.

The British Columbia Reproductive Care Program (BCRCP) (2003) guidelines suggest that a weight loss of up to 10% in the first ten days postpartum is deemed

acceptable, although a loss beyond 7% warrants close follow-up of an infant's breastfeeding patterns, output, and behaviour. According to BCRCP policy, stabilization of weight is usually seen by three to four days postpartum and a gain of 15-30 grams per day should be evident by day five.

The effects of breastfeeding support on neonatal weight loss, was explored in a Polish study (Mikiel-Kostyro & Mazur, 1999), which found babies born in breastfeeding friendly hospitals regained their birth weight significantly faster then those infants born in non-breastfeeding friendly hospitals. By day seven, 64.3% of infants in the breastfeeding friendly hospital had regained their birth weight versus only 40.6% of infants in the non-breastfeeding friendly hospitals had done so. A translated abstract of a study completed in Croatia demonstrates similar results. Infants, included in the baby friendly programs, had significantly less weight loss, reported in grams, than those who were treated with standard care (Muskinja-Montanji, Molnar-Sabo & Vekonj-Fajka, 1999). Yamauchi and Yamanouchi (1992) also supported the positive effects of breastfeeding friendly hospital policies on newborn weights. They compared breastfed infants who were rooming-in with their mothers and breastfeeding on demand with infants who stayed in the well baby nursery and were brought to their mothers for feeds on a predetermined schedule; they found that infants who were roomed-in had less weight loss than those infants who stayed in the nursery.

Maternal breastfeeding instruction in the postpartum period is another factor that appears to influence weight loss. Avoa and Fischer's (1990) study, based in Zaire, found that as little as one to two minutes of instruction significantly decreased infant weight loss. A difference of 3.8% weight loss in the instructed group versus 6.2% body weight

loss in the control group was reported in their findings. A study in the same geographical location found that postpartum instruction regarding the age at which the infant should first breastfeed also played a factor in weight loss. The shorter the period was prior to initiation of breastfeeding, the less weight loss was seen (Enzunga & Fischer, 1990).

Newborn Weighing Standards

Consensus on the timing of weight assessments and the need for weighing newborns in the first week of life is lacking in the literature. A review of the literature by Liang and Wong (2002) found initial weighing following hospital discharge occurs anytime between three to twenty-one days postpartum. There is consensus that for the majority of infants, extreme weight loss results from poor feeding practices and early intervention and support would correct this occurrence (Cooper, Atherton, Kahana & Kotagal,1995; Dewey, Normmsen-Rivers, Heinig & Cohen, 2003; Harding et al., 2001; Harding, Moxham & Cairns, 2003; Liang & Wong; Livingston, Willis, Abde-Wareth, Thiessen & Lockitch, 2000; Manganaro, Mami, Marrone, Marseglia & Gemelli, 2001; Newman, 1996; Oddy, Richmond & Coulthard, 2001; Sachs & Oddie, 2002;Yamauchi & Yamanouchi, 1992).

Although evidence supports the importance of newborn weight monitoring in the first week of life, health disciplines in diverse countries appear to have different recommendations on newborn weighing. Some studies recommended an infant weight to be taken at 72-96 hours postpartum (Dewey et al., 2003; Harding et al, 2001; Sachs & Oddie, 2002), while others suggested it was more favorable to wait until the infant was greater than five days, ensuring the establishment of the mother's milk supply (Liang & Wong, 2002; Manganaro et al, 2001; Williams, 2002). Several studies reviewed

recommended a weight to be taken in the first week postpartum but were not specific as to what day it should be done (Cooper et al, 1995; Livingston et al., 2000; Oddy et al., 2001).

The American Academy of Pediatrics (2005) has recently released recommendations supporting newborn weighing between three and five days after birth. In British Columbia, a BCRCP (2002) report on the findings of a consensus symposium suggested weight monitoring following newborn stabilization at three to four days and again around seven days of life. At the time of writing this thesis, this recommendation was not implemented as a weighing standard by Vancouver Coastal Heath (VCH).

Practice guidelines for growth monitoring in community settings were co-developed and adopted by VCH in March of 2005 by (Community Nutritionist's Council of British Columbia, Fraser Heath Authority, Dieticians of Canada, Vancouver Coastal Health Infant, Child, and Youth Program, 2005). Those guidelines were based on the use of growth charts published by the Dieticians of Canada, Canadian Pediatric Society and the College of Family Physicians of Canada (2004). The guidelines recommended routine weight monitoring within one to two weeks of birth and then at 1, 2, 4, 6, 9, 12, 18, 24 months and between four and six years. No definition of routine monitoring is given.

In light of the lack of consistency in recommendations, there is extensive discussion about the importance of assessing other breastfeeding factors that demonstrate an infant is breastfeeding well, such as effective latch, evidence of milk transfer (i.e. audible swallowing), output, hydration status, satisfaction after feedings, and assessment of maternal milk supply (American Academy of Pediatrics, 2005; Macdonald et al., 2003;

Newman, 1996; Sachs & Oddie, 2002; Vancouver Coastal Health, 2003; Williams, 2002).

Hypernatremia

One of the primary reasons for postnatal infant weight assessments is to detect and potentially reverse breastfeeding dehydration and hypernatremia within the first weeks of life. Liang and Wong (2002) reviewed the literature over the past two decades and concluded that there was a worldwide increase in the number of infants being diagnosed with hypernatremia as a result of breastfeeding dehydration.

The incidence of hypernatremia varies by jurisdiction. In British Columbia, Livingstone et al. (2000) reported 21 cases (~.0002%) of hypernatremia between 1991-1994 of approximately 92,400 cases seen at the city's breastfeeding center and children's hospital emergency department. A regional population review of all neonatal hospital readmissions within the first month was carried out in 1998 in the United Kingdom. A readmission rate for hypernatremaia at 2.5 per 10,000 live births was reported (Oddy, Richmond & Coulthar, 2001). A follow-up regional review completed by Harding et al. (2003) in another area of the United Kingdom found much higher rates of readmission for hypernatremia then those found by Oddy et al.. An incidence of 1.7 per 1000 births was reported. The authors' state the rate could be as high as 3.4 per 1000 because they only collected data on readmissions within the first ten days of life and only 50% of the infants readmitted for weight loss had a serum sodium level measured.

In the United States, an increased prevalence of infant malnutrition and hypernatremic dehydration due to inadequate volumes of breast milk coincided with the highest rates of breastfeeding in past fifty years (Neifert, 2001). As breastfeeding rates

increase and mother newborn dyads are being discharged home within 24-48 hours post delivery, it is not remarkable to see an increase in diagnosis of newborn hypernatremia, but the concern surrounding this diagnosis must be balanced with the risk. As we have seen from the literature, the neonatal readmission rates for hypernatremia are extremely low in comparison to the number of breastfed infants.

Although health care systems, organization of health services and standards of perinatal care differ significantly throughout the world, multiple studies concur on several factors that may result in an increased incidence of neonatal hypernatremia. These are poor perinatal breastfeeding education, early post-partum discharge, and fragmented postpartum follow-up by CHNs, midwives, and physicians (Cooper et al., 1995; Field, 1991; Hakam, Moza and Maha, 2004; Harding et al., 2001; Harding et al., 2003; Liang & Wong, 2002; Livingstone et al, 2000; Locklin & Jansson, 1999; Oddy et al., 2001; Sachs & Oddie, 2002; Saslow, Pride & Imaizumi, 1995). Moritz, Manole, Bogen and Ayus (2005) argued that the fact that more women are choosing to breastfeed, due to increased promotion through heath authorities, will inevitably lead to an increase in newborns presenting with hypernatremia. As a result of these concerns, recommendations continue to be made for close postpartum follow-up of breastfeeding mothers' and infants within the first postpartum week.

Newborn Weighing Standards and Breastfeeding Outcomes

A review of the literature revealed no research examining the correlation between newborn weighing standards in the first week postpartum and increased maternal anxiety and decreased maternal breastfeeding confidence. The first study addressing weight monitoring and breastfeeding cessation appeared in the literature in January 2006.

McKie, Young and MacDonald (2006) reviewed breastfeeding rates at ten days and six weeks postpartum of infants who lived in an area where routine weight monitoring guidelines had been established in 2001 and infants living in an area where no guidelines had been established. This study found there were no significant differences in breastfeeding cessation between the two groups. The authors in discussing their findings suggested that potential confounding factors, such as differences between baseline breastfeeding rates, differing times of implementation of baby friendly initiatives between the involved hospitals, and cultural issues may have influenced their results. They concluded that as long as support and reassurance is available to breastfeeding mothers during their infants' time of weight loss there would be no negative consequences for breastfeeding outcomes.

Although the McKie et al. (2006) study revealed no correlation between weighing standards and breastfeeding outcomes, many authors would refute this suggestion. Williams (2002) and Oddy et al. (2001) suggested that, no matter how much reinforcement a mother has that the initial weight loss is normal, demonstrating and documenting this weight loss inherently undermines breastfeeding confidence and may lead to abandonment of breastfeeding. Liang and Wong (2002) indicated that daily weighing from birth is both impractical from a service delivery point of view and causes anxiety in parents. Sachs and Oddie (2002) discussed the feedback they received from community midwives on the discouragement felt by mothers when seeing their infant's early weight loss. Oddy et al. received resistance from midwives when they suggested routine weight monitoring to prevent hypernatremia. The midwives feared that documenting weight loss would lead to abandonment of breastfeeding. An article

published by a first time mother in the United Kingdom supported the authors' comments. Katherine Hanss (2004) wrote:

> In those crucial early days, weight measurement is not much help in determining feeding success. I know it is normal for a baby to loose up to 10% of their birth weight and that they may start putting it back on slowly. The way the community midwife dealt with my baby's weight loss (which seemed huge to me but was in fact 8% - well within the normal range) suggested to me that something completely unexpected and abnormal had happened. (p. 22)

The limited evaluation of the effects on parents of early weighing practices suggests further research on the topic is necessary.

Test Weighing and Breastfeeding Outcomes

The use of test weighing, weighing an infant before and after breastfeeding, is a practice used to measure milk transfer between mother and infant. It may be used in the pre-term population when infants are learning to breast feed, or in the term population when there is suspicion about insufficient milk supply or transfer (Neifert, 2001). Yet, evidence of the impact of this practice on breastfeeding confidence has not been studied in the full term population. Hall, Shearer, Mogan, and Berkowitz (2002) studied the effect of in-hospital test weighing of pre-term infants on maternal competence and confidence. No statistically significant differences were found in maternal competence and confidence between mothers who had their infants test weighed and those who did not. Although both groups appeared to have gained significant competence and confidence post hospital discharge, this was attributed to becoming more familiar with infant cues. Data from the test weight group indicated that the mothers had a significant

increase in skill competence in nursing their infant over time, however, this was attributed to the fact that this group started from a lower confidence level post discharge than those mothers in the non-test weight group. The authors suggested that replication of the study with a larger sample may in fact demonstrate that test weighing undermines maternal skill competence.

Although a study of maternal confidence and competence has only been undertaken with the pre-term population, similar results might be found for term infants since becoming familiar with an infant's cues, whether pre-term or term, is part of the learning curve of parenthood. As mothers feel more comfortable addressing their infants' needs, it is possible that they will inevitably be more confident in their parenting abilities. If test weighing contributes to a decrease in maternal competence, weighing in general may in fact also negatively influence these variables.

Self-Efficacy Theory

The self-efficacy framework proposed by Dennis (1999) is grounded in Bandura's (1977) Social Learning Theory. This theory surmised that self-efficacy is dictated by an individual's ability to obtain success at something that he/she aims to achieve. Bandura believed that, since self-efficacy changes depending on the task, there is a need to have a behaviour-specific approach to measuring self-efficacy. As a result of these recommendations, several behaviour-specific self-efficacy frameworks have been created for use in perinatal situations. The Breastfeeding Self-Efficacy Framework provides a theoretical basis for measuring self-efficacy to predict breastfeeding behaviours. Other examples of measures based on behaviour-specific frameworks are the Toddler Care Questionnaire, the Infant Care Self-Efficacy Scale and the Childbirth Self-Efficacy

Inventory. All of these measures have provided support for self-efficacy theoretical frameworks and their value in predicting future behaviour (Dennis).

Self-Efficacy and Breastfeeding Outcomes

Self-efficacy in breastfeeding, also characterized as confidence in breastfeeding, has been supported in numerous studies as a significant factor that influences breastfeeding outcomes. It has been studied during both prenatal and postnatal periods. It has also been studied as a possible mediator between intended breastfeeding duration and perceived milk supply.

Prenatal self-efficacy and breastfeeding outcomes. In preliminary studies examining the relationship between prenatal confidence and breastfeeding, Buxton et al. (1991) found that women with low prenatal self-confidence in their breastfeeding abilities were more likely to discontinue breastfeeding within the first week postpartum. Subsequent studies by O'Campo et al. (1992) and Papinczak and Turner (2000) confirmed these findings and reported prenatal confidence to be an influential variable on breastfeeding duration. Kluka (2004) found confidence to be influential at predicting breastfeeding rates at 24-weeks postpartum while Mitra, Khoury, Hinton and Carothers (2004) reported prenatal maternal confidence had a significant association with breastfeeding intentions of low-income women. Chezem, Friesen and Boettcher's (2003) results failed to support a relationship between confidence and breastfeeding duration, but the instrument they chose (The Maternal Confidence Survey) and the timing of the measurement of confidence (third trimester of pregnancy) may have contributed to the lack of a significant relationship.

Using the Breastfeeding Self-Efficacy Scale, Blyth et al. (2002, 2004) measured breastfeeding self-efficacy during the last trimester of pregnancy and again at one week and four months postpartum. Prenatal self-efficacy was significantly correlated with breastfeeding initiation and exclusivity at one week postpartum. Those mothers with high self-efficacy scores at one week postpartum also had higher breastfeeding rates when measured at four months postpartum versus those mothers with low self-efficacy scores. Their findings are supportive of the self-efficacy theory because they suggest that continued experience with a task increases confidence in achieving that task.

Postnatal self-efficacy and breastfeeding outcomes. Breastfeeding self-efficacy has also been supported as an important variable in studies that examined postnatal associations. Ertem, Votto and Leventhal (2001) measured maternal confidence levels at 48 hours post delivery and again at two and six weeks postpartum. They reported that those women who had higher confidence in their ability to breastfeed for the first two months postpartum were more likely to have continued breastfeeding beyond the first two weeks, while those with lower confidence levels were more likely to have quit breastfeeding by the two week measurement.

Wojnar (2004) also measured confidence levels prior to hospital discharge and reported a positive correlation between higher confidence levels and continued breastfeeding at six weeks postpartum when follow-up telephone interviews were conducted. Loughlin, Clapp-Channing, Gehlbach, Pollard and Vaeth (1985) reported similar results. They found when breastfeeding confidence was measured prior to hospital discharge mothers with higher confidence levels had increased rates of breastfeeding when measured again at eight weeks postpartum then those with lower confidence levels.

Kronborg and Vaeth (2004) measured breastfeeding confidence levels at three weeks postpartum and again at sixteen weeks and reported the cessation rate for mothers with low to moderate self-efficacy to be two times higher than those with high self-efficacy. O'Brien and Fallon (2005) measured breastfeeding self-efficacy in the immediate postpartum period and again at six weeks and found for every one point increase in self-efficacy score there was a six percent decrease in breastfeeding cessation.

Breastfeeding self-efficacy and breastfeeding duration. Relationships have been demonstrated between breastfeeding self-efficacy, experiences and duration. Cohen, Brown, Rivera and Dewey (1999) found that as mothers experienced breastfeeding success their confidence levels increased and their breastfeeding duration increased accordingly.

Breastfeeding confidence has also been negatively correlated with perceived insufficient milk supply. A mother's belief in her ability to provide adequate nutrition for her infant is an important variable when assessing confidence. Hill and Humenick (1996) and Blyth et al. (2002) reported that perceived lack of milk was one of the main reasons women discontinued breastfeeding. Many authors have reported similar results (Dykes, Moran, Burt & Edwards, 2003; Maclean, 1998; Quinn, Koepsell & Haller, 1997; Wood, Sasonoff, & Beal, 1998). Qualitative components of those studies revealed lack of confidence in milk supply as one of the main reasons given by mothers for breastfeeding cessation. Arora, McJunkin, Wehrer and Kuhn (2000) reported uncertainty about adequate milk supply as the second most common reason for weaning, while Cooke, Sheehan and Schmied (2003) reported similar results stating that perceived inadequate milk supply was a significant predictor of weaning between two and six weeks

postpartum. These studies recommended further teaching and support around assessing signs of adequate breastfeeding such as output, satiety, and audible swallowing as a strategy to increase confidence and limit premature breastfeeding cessation.

Support for Breastfeeding by Community Health Nursing

Various support services offered by Community Health Nurses (CHNs) to new mothers have been demonstrated to have significant positive effects on breastfeeding outcomes. Studies have found that mothers who have had access to CHN support in the early postpartum period have been more likely to persevere through difficulties and continue breastfeeding. (Hong, Callister & Schwartz, 2003; Kluka, 2004; Kuan et al.,1999; McKeever et al., 2002; Porteous et al., 2000; Pugh, Milligan, Frick, Spatz & Bronner, 2002; Sheehan et al.,1999; Taveras et al., 2003). Contact with new mothers who are breastfeeding presents an opportunity to provide valuable education, as well as to complete maternal and newborn assessments, identify concerns and refer the family for further follow-up as needed.

Following the immediate postpartum period, services offered by CHNs such as breastfeeding support groups have played a significant role in lengthening breastfeeding duration (Davidson, 1996; Noel-Weiss & Hebert, 2004). A systematic review for the Cochrane Library, completed by Sikorski, Renfrew, Pindoria and Wade (2004), reported a significant correlation between professional support, including nursing, and breastfeeding duration as well as a positive effect, although not significant, on exclusive breastfeeding rates.

Summary

The literature has illustrated the vital role that maternal self efficacy plays in breastfeeding outcomes. Preliminary studies completed by Loughlin et al (1985), Buxton et al (1991), O'Campo et al. (1992), Locklin and Naber (1993), Hill and Humenick (1996), Quinn et al., (1997) and Wood et al., (1998) supported the positive relationship between higher confidence levels and higher breastfeeding initiation rates and increased breastfeeding duration. Numerous studies followed that also supported these relationships (Arora et al., 2000; Blyth et al., 2002; Cohen et al., 1999; Cooke et al., 2003; Kluka, 2004; Kronborg & Vaeth, 2004; Locklin & Naber, 1993; Mitra et al., 2004; O'Brien & Fallon 2005; Papinczak & Turner, 2000; Wojnar, 2004). Results with the Breastfeeding Self-Efficacy Scale have detailed positive relationships between higher breastfeeding self-efficacy scores and increased breastfeeding initiation and duration in participants.

What constitutes normal newborn weight loss in the immediate postpartum period is yet to be determined in the literature. Although a loss of up to 10% of birth weight has been acknowledged, there is no published research to support this figure. The impact of newborn weighing standards on breastfeeding outcomes has been discussed anecdotally in several research articles but, to date, only one published study has investigated this correlation (McKie et al., 2006). The authors concluded that as long as support and reassurance was available to breastfeeding mothers during the time of the infant's weight loss, there would be no negative consequences for breastfeeding outcomes. Variables such as breastfeeding friendly policies, postpartum breastfeeding instruction and

community health nurse support have all been identified as having a positive influence in decreasing newborn weight loss.

Although there is consensus in the literature that every newborn should be weighed during the first two weeks of life, standards of newborn weight measurement in the early postnatal period are inconsistent. By assessing an infant's weight and breastfeeding practices in the first week of life, the ability to detect and potentially reverse neonatal dehydration and hypernatremia is increased. Although the literature illustrates an increased incidence of neonatal hypernatremia, the prevalence of the problem remains low. Evidence has demonstrated the importance of breastfeeding support in the initial postpartum period and the role that CHNs can play in promoting positive breastfeeding outcomes (Kluka, 2004; Kuan et al.,1999; McKeever et al., 2002; Porteous et al., 2000; Pugh et al., 2002; Sheehan et al.,1999; Taveras et al., 2003). Notwithstanding that support, it is important to determine whether the timing of nursing interventions in the community affects breastfeeding confidence and, ultimately, breastfeeding duration.

The next chapter will provide detail about the research design, study goals, research questions, hypothesis, conceptual and operational definitions, sample, ethical approval and considerations, setting, recruitment procedures, study protocol, instruments utilized for analysis, data collection procedures, study limitations and modes of analysis.

Chapter III

Methods

Research Design

This experimental, pretest - posttest feasibility study compared two types of newborn weighing practices employed by community health nurses in Vancouver, B.C. In this experimental design, the variables of breastfeeding confidence, intended duration of breastfeeding and formula supplementation volumes were measured pre and post the weighing intervention.

Study Goals

This feasibility study sought to determine whether weighing infants at five days postpartum was feasible as an element in providing newborn follow-up care and to evaluate whether a 24-hour feeding diary and the breastfeeding self-efficacy measure (BSES-SF) were valid and reliable tools for measuring formula supplementation volumes and breastfeeding confidence respectively. This study was also intended to generate an effect size so that a larger multivariate study could be undertaken utilizing power analysis.

Research Questions

The primary research questions that guided this study were:

1. What is the effect of standard versus delayed weighing practices postpartum on a mother's confidence level in breastfeeding her newborn?
2. What is the effect of standard versus delayed weighing practices postpartum on a mother's intended duration of exclusively breastfeeding her newborn?

3. What is the effect of standard versus delayed weighing practices postpartum on the volume of formula supplementation provided to newborns?

The secondary research questions that guided this study were:

1. What is the feasibility of delayed weighing of newborns until day five postpartum in the Vancouver community health district?
2. Is the BSES-SF a valid and reliable instrument for measuring maternal breastfeeding confidence during the postpartum period?
3. Is the 24-hour feeding diary a reliable instrument for measuring formula supplementation volumes?

Hypotheses

The directional hypotheses for this thesis were stated as follows:

1. A delayed weight group (weight at five days) will have significantly higher breastfeeding confidence compared to a standard weight group (weight at two or three days).
2. A delayed weight group (weight at five days) will have significantly longer intention to exclusively breastfeed their newborns compared to a standard weight group (weight at two or three days).
3. A delayed weight group (weight at five days) will administer significantly lower volumes of formula supplementation to their infants compared to a standard weight group (weight at two or three days).
4. Delayed weighing of newborns by community health nurses will operate as a feasible way of delivering postpartum homecare services in the Vancouver area.

5. The BSES-SF will be a valid and reliable instrument for measuring maternal breastfeeding confidence in the postpartum period.
6. The 24-hour feeding diary will be a reliable instrument for measuring formula supplementation volumes given to an infant.

Conceptual Definitions

Maternal breastfeeding confidence. A mother's perceived ability to breastfeed her new infant (Dennis, 2003).

Exclusive breastfeeding. Providing no other liquids or solids to an infant except breastmilk (Labbok & Krasovec, 1990)

Operational Definitions

Maternal breastfeeding confidence. A mother's perception of breastfeeding confidence as measured by the Breastfeeding Self-Efficacy Scale – Short Form (Dennis, 2003).

Exclusive Breastfeeding. Providing only breast milk and Vitamin D supplement to an infant as per Health Canada recommendations (Canadian Pediatric Society, Dieticians of Canada, Health Canada, 2005) as measured by maternal report on pre- and post-intervention 24 -hour feeding diaries.

Supplementation. The volume of other sources of nutrition, specifically formula, being given to the infant as measured by a 24 -hour feeding diary filled out by the mother pre- and post-intervention

Intended duration. A mother's anticipated time of providing only breast milk as a nutritional source for her infant as measured by maternal report on pre- and post-intervention questionnaires.

Standard weighing practices. Standard weighing practices involve a newborn weight being taken by a CHN at the initial postpartum home visit on day two or three postpartum and during subsequent days until a gain in weight has occurred.

Delayed weighing practices. Delayed weighing practices involve a newborn weight being taken by a CHN on day five postpartum, when a gain in weight is anticipated, and during subsequent days, if needed, until a gain has occurred.

Sample

The proposed sample size was 140. Given that this was a feasibility study to examine delayed newborn weighing procedures and the use of the 24-hour feeding diaries and the BSES-SF, no power analysis was undertaken. With the significance criteria set at ≤ 0.05 and achieving the recommended power of ≤ 0.80 to minimize the risk of a Type II error, the estimated sample size would be 251 participants (Polit & Hungler, 1999). Upon completion of sampling, 55 primiparous women intending to exclusively breastfeed their infants and residing in Vancouver, BC were recruited.

Inclusion criteria were:

- primiparous woman.
- ability to read and speak English.
- having a singleton infant born at greater than 38 weeks gestation and having a discharge weight of <7% loss from birth weight.
- receiving initial home care follow-up on day two or three postpartum.

- residing in a neighborhood receiving home care services from Evergreen, Three Bridges, South or Pacific Spirit Community Health Center.
- intending to exclusively breastfeed.

Exclusion criteria were:

- evidence of maternal risk factors, including postpartum hemorrhage, pregnancy induced hypertension, diabetes, depression, past breast augmentation or reduction, intake of maternal medications that may affect breast milk, or substance use.
- evidence of social concerns (i.e., being followed by the Ministry of Children and Family).
- evidence of the infant having newborn pathological jaundice evident within 24 hours of birth or physiologic jaundiced (assessed by a CHN at the initial home visit) requiring urgent medical follow-up and/or treatment.
- evidence of the infant having risk factors, such as facial or gastrointestinal anomalies or any diagnosed syndromes.

As a result of B.C. Women's Hospital implementing a length of stay initiative, with an average length of stay for uncomplicated deliveries decreasing from 48 hours postpartum to 24 hours (Children's and Women's Hospital, BC Women's Hospital and Health Center, Provincial Health Services Association, 2004), the investigator altered the recruitment guidelines to recruit women discharged home on day one postpartum (greater than twenty-four hours post delivery) or day two postpartum.

Ethical Considerations

Ethical review and approval of the study were obtained through the University of British Columbia Behavioral and Social Sciences Ethics Committee, as well as the Vancouver Coastal Health, B.C. Women's Hospital and St. Paul's Hospital ethical review boards prior to the recruitment of participants. Informed consent was obtained from all participants in the study. During the initial home visit made by the CHN, study protocols were discussed and the mother signed the consent form for participation in the study (Appendix A). All participants were given a colorful laminated reusable feeding diary and marker on the initial home visit as a gift for their participation.

In July 2005, VCH implemented a computerized charting system for use by all nurses working within VCH, including the liaison nurses at both St. Paul's and B.C. Women's Hospital. This change affected the capacity of the liaison nurses to recruit for the study due to the increased workload associated with learning and utilizing a new charting system. As a result of these changes, in November 2005 ethical approval was obtained to allow community health nurses to recruit eligible participants without receiving the study information in hospital. This increased flexibility allowed for mothers being seen by the participating health centers to be recruited regardless of the hospital in which they gave birth. Mothers from outlying regional hospitals such as Burnaby, Richmond and North Vancouver became eligible to participate upon meeting the study criteria.

Setting

St. Paul's Hospital liaison nurses began recruitment for this study in June, 2005, and B.C. Women's Hospital liaison nurses began recruitment in September 2005. Recruitment was completed July 29, 2006. Data collection initially occurred through two health units: the Evergreen Community Health Center (Evergreen CHC) and the Three Bridges Community Health Center (Three Bridges CHC). In December 2005, the South Community Health Office was included as a data collection site in order to increase participant numbers. A final recruitment site, Pacific Spirit Community Health Center, was added in February 2006.

Recruitment Procedures

Liaison nurses employed by BC Women's Hospital and Vancouver Coastal Health routinely work with mothers prior to discharge to collect pertinent maternal and newborn histories regarding the delivery and early postnatal period along with any social issues in need of follow-up. Upon discharge home, each family's liaison form is faxed, or sent electronically, to the local health center for CHN follow-up. If liaison nurse capacity allowed, eligible participants were approached by the liaison nurses and given a study information pamphlet for review (Appendix B). If they were interested in participating, the liaison nurse advised the mother to begin the 24-hour feeding diary included in the pamphlet (Appendix C). The liaison forms received at the health centers indicated which mothers had received the study information in hospital. All liaison forms were reviewed by the CHNs for eligibility criteria. If eligible mothers were not given the information pamphlet in hospital, they were provided with the study information during initial telephone contact by a CHN.

When booking the initial home visit with potential participants, a phone script was used by the CHN to inquire whether a mother was interested in participating in the study. Three different phone scripts (Appendix D) available for use depending on the mother's knowledge of the study. Interested mothers were randomly assigned to participate in either the standard weighing group or the delayed weighing group. Randomization was completed by block assignment. This method ensured equal distribution of participants among the two groups over the entire duration of data collection. The randomization group was indicated in the study package.

No subjects were recruited on days that would require the initial weight for the experimental group to be delayed until Saturday or Sunday. This limitation was put in place in recognition of the reduced number of CHNs working on weekends. Recruitment was, therefore, restricted to days where there was a full complement of staff to follow study procedures.

Liaison nurses were given a training session to review recruitment materials and eligibility information. Health center CHNs involved in the recruitment of subjects were given a training session by the investigator, which provided details pertaining to the study and the protocols. Each nurse was provided with a written script to follow when recruiting subjects into the study. In addition, each nurse and health center was provided with a hard copy of information pertaining to the study and the protocols. The investigator was available on a daily basis for phone consultation if problems occurred. In addition, frequent phone and email contact were made with both the liaison and community health nurses to address any concerns or questions that arose regarding the

study recruitment, procedures or protocols. Occasional meetings were held with staff to maintain face-to-face involvement during recruitment.

Study Protocol

The following section describes the protocol for the standard and experimental groups.

Standard care group. Mothers assigned to the standard care group received standard follow-up care provided by a CHN in an initial home visit. This included an infant weight. The initial visit was made on day two or three postpartum. A subsequent visit or visits were made until a weight gain had been established. If the family was receiving physician follow-up during this time, a CHN telephoned to obtain the weight acquired at the physician's office.

Experimental care group. Mothers assigned to the delayed weighing group also received all standard follow-up care provided by a CHN during the initial home visit but their infants were not weighed. This initial visit also took place on day two or three postpartum. Telephone support was provided on day three or four around further nursing assessment and breastfeeding support. A home visit was only made during this time if deemed necessary by the CHN for physical assessment or breastfeeding support. The initial post discharge weight was then obtained on day five postpartum, either by the CHN or physician.

If there was no demonstrated weight increase on day five, the CHN provided breastfeeding support and ongoing newborn follow-up until a successful method of feeding was established. A feeding plan which included supplementing the infant after breastfeeding with expressed breast milk or formula (Vancouver Coastal Health

Authority, 2003), or a referral to an external breastfeeding support agency for further follow-up was recommended to the mothers, if breastfeeding problems persisted. A CHN informed the investigator of any subjects whose infants did not have a gain in weight on day five, which enabled the investigator to include those subjects in the analysis.

If the CHN had any concerns during her contact with the family, which resulted in the need to obtain a weight prior to day five, she/he was encouraged obtain the weight and withdraw the participant from the study. Any variances from the expected outcomes outlined in the Healthy Beginnings Newborn Care Pathways (Vancouver Coastal Health, 2001) justified withdrawal from the study. Teaching was done with all mothers to enable them to assess for signs of successful breastfeeding and when to seek follow-up from a health care professional. No mothers were withdrawn from the study.

Instruments

The Breastfeeding Self-Efficacy Scale. The Breastfeeding Self-Efficacy Scale (BSES), a measure of breastfeeding confidence was developed by Dennis and Faux (1999). The original scale consisted of 40 items. The response scale is a five-point Likert-type scale, with one being "not at all confident" and five being "always confident". The items measured elements that influenced breastfeeding success such as technique, intrapersonal thoughts, and support. All items are scored to form a summary score. The instrument has demonstrated adequate reliability and predictive validity in several studies (Creedy et al., 2003; Dai & Dennis, 2003; Dennis & Faux, 1999; Torres, Torres, Rodrigues & Dennis, 2003). However, evidence of construct validity remains limited.

Dennis and Faux (1999) demonstrated strong predictive validity for the instrument in a sample of 130 women, primarily Caucasian and married, living in

Canada. Women with high BSES scores in hospital were more apt to be exclusively breastfeeding at six weeks postpartum. An internal consistency reliability of 0.96 was found. The original scale was reduced to 33 items.

Creedy et al. (2003) supported the reliability of the instrument (Cronbach's alpha antenatal = 0.97; Test-retest reliability: 1 week = 0.96, 16 weeks = 0.96) with 300 Caucasian women, who were mainly married. Predictive validity was strongly supported because self-efficacy scores antenatally and at one week postpartum were predictive of breastfeeding behaviour at sixteen weeks postpartum.

Dai and Dennis (2003) translated the BSES into Mandarin and tested the reliability and validity of the instrument with a Chinese population. In a sample of 186 Chinese women, Cronbach's alpha was 0.93. Predictive validity was supported as mothers with higher BSES scores in the immediate postpartum period were more likely to be breastfeeding at four and eight weeks postpartum.

Torres et al. (2003) recruited 100 Puerto Rican women and administered the Spanish version of the BSES prior to discharge home from hospital. Internal consistency reliability was 0.96. Similarly to the Australian sample, factor analysis suggested a need for item reduction. Predictive validity was supported as those mothers with high BSES scores were more likely to be exclusively breastfeeding versus supplementing with formula when the instrument was administered in hospital.

Breastfeeding Self-Efficacy Scale - Short Form. Shortly following the publication of the Australian and Puerto Rican studies, Dennis (2003) published her findings from a psychometric assessment of a shortened version of the BSES, the BSES-Short Form (BSES-SF). Dennis recruited a larger sample of 491 breastfeeding mothers and data was

collected at one, four and eight weeks postpartum using the original BSES form. Again the BSES was a reliable instrument for identifying women's breastfeeding self-efficacy (Cronbach's alpha = 0.97). Factor analysis provided support for the removal of 18 items, for a total of 14 remaining items. This shortened scale is referred to as the BSES-Short Form (BSES-SF). Repeated internal consistency analysis for the BSES-SF was completed and supported reliability (Cronbach's alpha = 0.94). Predictive validity was supported in the BSES-SF, with higher BSES-SF scores at baseline, being associated with a greater likelihood of maintained breastfeeding at follow-up. The BSES-SF also identified women at high risk of discontinuing breastfeeding prematurely due to low self-efficacy (Dennis).

Baseline and follow-up questionnaires. Questionnaires with demographic and personal variables were completed during the initial home visit on day two or three postpartum and at two weeks postpartum. Information on marital status and perceived support network were collected in the baseline questionnaire. In addition, the mother's age, income, ethnicity, and level of education, as well as the gestational age of the infant at birth and infant age at time of questionnaire completion were collected at two weeks postpartum. Marital status and perceived support network were determined again at two weeks postpartum to establish any change in status from the baseline measurement. Questions regarding the mothers' preferred way of feeding their babies and intended duration of breastfeeding were posed at baseline and two weeks postpartum.

Twenty-four hour feeding diary. A feeding diary was provided that requested breastfeeding times and duration, frequency of infant voids and stools and formula supplementation volumes over a 24-hour period.

Data Collection Procedures

Both the standard care group and the experimental care group completed their feeding diaries for 24-hours prior to the CHN's initial home visit. If the diary had not been filled out prior to the initial home visit, or they had not received a feeding diary, the CHN asked mothers to recall the amount of formula supplementation they had given the infant in the 24-hours prior.

Also during the initial CHN home visit, the mother was asked to complete the baseline questionnaire, including the BSES-SF (Appendix E). Both the feeding diary and the baseline questionnaire were collected by the CHN and returned to the researcher.

A form letter about study participation was shown to the mothers who gave approval for CHNs to fax the letters to the infants' physicians (Appendix F). To address any physician question or concerns regarding the study, the researcher's contact information was included in this letter. The letter was faxed by the CHN on the day of recruitment.

Each participant was given an envelope by the CHN that contained a follow-up BSES-SF and questionnaire (Appendix G), 24-hour feeding diary, and self-addressed stamped envelope. The mothers were instructed to complete the measures at two weeks postpartum and to mail all of the completed forms to the researcher. A reminder phone call was made at two weeks postpartum, and again at three weeks postpartum, to encourage mothers who had not completed and returned the questionnaires. Three mothers preferred to provide answers for the questionnaire on the telephone with the researcher.

Analysis

All data were coded, entered, and cleaned using the Statistical Analyses Package for Social Sciences software package Version 14 (2005). An ID only data set was created for entry of collected demographic information (maternal age, ethnicity, income, education level, and gestational age at delivery), intended breastfeeding duration, perceived support people, preferred feeding method, 24-hour feeding patterns and breastfeeding confidence scores. Participants who did not respond within six weeks postpartum were not included in the data set. Missing data due to non-response or refusal to respond were coded as missing.

Descriptive statistics and measures of central tendency were used to describe demographic and personal factors as well as the main study outcome variables, including the BSES-SF, formula supplementation volumes and intended breastfeeding duration time. Potential demographic differences between study groups were analyzed using chi-square tests. Correlation matrices were created for combined experimental and control group scores once no significant differences were identified between groups to identify potential demographic variables influencing the women's breastfeeding confidence. Pearson's r was calculated to evaluate potential significant relationships between maternal age and breastfeeding confidence. Kendall's Tau was calculated for potential correlations of income, level of education and breastfeeding confidence scores and Spearman's Rho was calculated for potential correlations of ethnicity with BSES-SF scores.

To conduct preliminary psychometric testing of the BSES-SF, exploratory factor analysis with a principal components extraction method was utilized. A one factor

solution using an unrotated matrix was used to be congruent with previous psychometric testing of the instrument by Dennis (2003). Eigenvalues > 1.00 met the recommended criterion for factor extraction and a cutoff value of .40 was used to determine item retention (Polit & Hungler, 1999). Reliability of the BSES-SF was analyzed utilizing an inter-item correlation matrix. Fifty percent of item to item correlations loading between 0.3 and 0.7 were considered satisfactory to ensure items were associated but not redundant (Carmine & Zeller, 1979). The Cronbach's alpha method was used to determine internal consistency and reliability of the instrument which would be demonstrated with an alpha level greater then 0.70 (Polit & Hungler). Test-retest reliability was also calculated with a reliability coefficient greater then 0.70 deemed satisfactory (Polit & Hungler).

Parametric tests were used to address the hypotheses. One way ANOVA was utilized for between-group analysis and paired t-tests for within-group analysis of differences across time. The sum of scores on the Breastfeeding Self-Efficacy Score – Short Form (BSEF-SF) was used in the data analysis, as recommended by the developer of the instrument (Dennis, 2003).

Because this was a feasibility study with a small sample size, the probability of finding significant differences between groups was small. For that reason, paired t-tests were used to examine possible trends in the means of within group scores for breastfeeding confidence, formula supplementation volumes and intended breastfeeding duration at baseline and two weeks postpartum in order to support the study hypotheses that weighing infants prior to breast milk establishment decreases breastfeeding confidence and intended breastfeeding duration and increases formula supplementation

volumes. The *p*-value that was used for all analyses as the accepted level for significance was ≤ 0.05 (Polit & Hungler, 1999). With significant *p*-values, the investigator could observe a reliable effect size so that a power analysis could be conducted to support a larger study.

Qualitative components of the surveys were reviewed for themes in the respondent's views of community health nurse support.

Summary

This chapter presented the research design, study goals, research questions, hypotheses, conceptual and operational definitions, sample requirements, ethical considerations, setting, recruitment procedures, study protocols, instruments utilized for analysis, data collection procedures, and modes of analysis. An experimental, pretest - posttest feasibility design was used to determine the effect of two types of newborn weighing practices employed by CHNs in Vancouver, B.C. on breastfeeding confidence levels, intended duration of breastfeeding, and formula supplementation volumes. In Chapter Four the results of the psychometric testing of the BSES-SF and the data analysis are presented.

Chapter IV

Results

The results of this experimental, pretest - posttest feasibility study were obtained through the analysis of questionnaires and feeding diaries completed by participants at two or three days postpartum and two weeks postpartum. The study examined the influence of two types of newborn weighing practices (standard [weight at two or three days old] and experimental [weight at five days old]) on women's breastfeeding confidence levels, intended duration of breastfeeding, and formula supplementation volumes.

A summary of the demographic and personal characteristics of the sample will be presented. In addition, the results of the preliminary psychometric testing of the BSES-SF will be discussed and the analyses that address the five research hypotheses, along with the relationships between participant demographics and breastfeeding confidence scores, will be presented in this chapter.

Description of the Sample

A convenience sample of 55 primiparous women, intending to exclusively breastfeed, were recruited for this study. Four non-responders to the follow-up questionnaire and two participants returning the follow-up questionnaire beyond the specified data collection period (a total of six participants) were excluded from the data analysis. The final sample size was 49 women. Demographic data on study non-responders was not available as the majority of this information was collected with the two week questionnaire. The standard care group (day two/three weight) consisted of 23

mothers while 26 mothers were randomized into the experimental group (day five weight).

Demographic Characteristics

The age range of participants was 19 to 41 years (M=30.7 years, SD=4.9). Ethnic background was diverse, with the largest proportion of the participants (46%) indicating their ethnicity as Caucasian. The second most prevalent ethnic group was Chinese (29%). Other ethnic groups included were Filipino (10%), Japanese (4%), Indo-Canadian (2%), Latino (2%), Sri Lankan (2%), Pakistani (2%), and Portuguese (2%). Educational preparation was high, with 84% of participants reporting post-secondary education. Failure to respond to the item addressing education occurred in 4% of the sample. For cross-tabulation analysis, ethnic background was coded as Caucasian and Non-Caucasian and education level was coded as high school or less and post-secondary. The maternal annual income reported ranged from under $15,000 to over $45,000. Failure to respond to the item addressing income occurred in 6% of the sample. Income was coded as under $30,000 and $30,000 and over for cross tabulation analysis. All participants reported they were married or living in a common law relationship (Table 1). Chi-square tests did not reveal significant differences between the demographic variables for the two study groups. The table following illustrates the combined sample demographics.

Table 1

Demographics Characteristics of the Sample (N=49)

Variables	Frequency (%)
Age	
< 30 years	20 (41%)
> 30 years	29 (59%)
Level of Education [a]	
High School Diploma or Less	6 (12%)
Post Secondary Diploma/Degree	41 (83%)
Ethnicity	
Caucasian	23 (47%)
Non Caucasian	26 (53%)
Maternal Income in Canadian Dollars [b]	
< $30, 000	18 (37%)
$30,000 +	28 (57%)
Marital Status	
Married	43 (88%)
Common-Law	6 (12%)

Note. [a]Missing data = 2
[b]Missing data = 3

Personal Characteristics

Preference to exclusively breastfeed at two or three days postpartum was reported by 84% of mothers in the study and that number remained unchanged at two weeks postpartum. Participants identified a variety of breastfeeding support people. Those most frequently identified were partners/spouses (94%), community health nurses (CHNs) (63%) and mothers/mother in-law (51%) at baseline and partners/spouses (94%), mothers/mother in-law (63%) and CHNs (55%) at follow-up. Other support people

identified were relatives, friends, doctors, support groups, breastfeeding services and the Newborn/B.C. Nurse Line (Table 2). Chi-square tests did not reveal significant differences between the personal characteristics of the two study groups. The table below illustrates the personal characteristics of the total sample.

Table 2

Personal Characteristics of the Sample (N=49)

Variables	Frequency (%) 2-3 Days	Frequency (%) 2 Weeks
Preferred Feeding Method		
Breastfeed Only	41 (84%)	41 (84%)
Breast and Formula Feed	8 (16%)	8 (16%)
Breastfeeding Support (2 or 3 days)		
Partner/Spouse	46 (94%)	46 (94%)
Community Health Nurse	31 (63%)	27 (55%)
Mother/Mother-in-law	25 (51%)	31 (63%)
Doctor	24 (49%)	24 (49%)
Friends	20 (41%)	22 (45%)
Other relatives	15 (31%)	12 (25%)
Breastfeeding Service	5 (10%)	1 (2%)
Newborn Hotline/BC Nurseline	5 (10%)	5 (10%)
Support Group	5 (10%)	2 (4%)

Psychometric Testing of the BSES-SF

Reliability. The total mean scale score for the baseline BSES-SF was 53.3 (SD=8.9), with an average item mean of 3.8 (ranging from 3.2-4.2). The follow-up questionnaire total mean scale score for the BSES-SF was 53.8 (SD=10.2), with an average item mean of 3.8 (ranging from 3.6-4.1). Greater then 50% of item-to-item correlations ranged between 0.3 and 0.7 at baseline and follow-up demonstrating scale items were correlated but not redundant. The item-total correlations ranged from 0.27-0.74 at baseline and 0.40-0.83 at follow-up. One item-total correlation, referring to breastfeeding with family members present, was below 0.30 at baseline when corrected for overlap. Internal consistency reliability, as measured by the Cronbach's alpha, was 0.89 on the baseline and 0.92 on the follow-up BSES-SF, both above the recommended alpha level of greater then 0.70 for determining reliability (Polit & Hungler, 1999). The test-retest reliability coefficient demonstrated stability of the measure over time (r=0.77) (Polit & Hungler).

The lowest item-total correlation on the baseline and follow-up questionnaire was with the item, "I can always comfortably breastfeed with my family members present" which had an item-total correlation of 0.27 at baseline and 0.40 at follow-up. With removal of this item the Cronbach's alpha coefficients would increase to 0.90 at baseline and 0.93 at follow-up (Table 3 and 4).

Table 3

BSES-SF Baseline Item Statistics

Item	M (SD)	Item-Total Correlation	Cronbach's Alpha
1. I can always determine my baby is getting enough milk	3.20 (.99)	0.553	0.88
2. I can always cope with breastfeeding like other challenging tasks	3.81 (.95)	0.455	0.89
3. I can always breastfeed without formula supplementation	3.91 (1.16)	0.688	0.87
4. I can always ensure my baby is properly latched for the whole feed	3.63 (.97)	0.640	0.88
5. I can always manage the breastfeeding situation to my satisfaction	3.65 (.90)	0.743	0.87
6. I can always manage to breastfeed even if my baby is crying	3.59 (1.01)	0.703	0.89
7. I can always keep wanting to breastfeed	4.16 (.82)	0.362	0.90
8. I can always comfortably breastfeed with my family members present	3.77 (1.26)	0.272	0.87
9. I can always be satisfied with my breastfeeding experience	3.87 (.94)	0.704	0.87
10. I can always deal with the fact that breastfeeding can be time consuming	4.16 (.89)	0.443	0.89
11. I can always finish on one breast before switching to the other	3.75 (.94)	0.641	0.88
12. I can always continue breastfeeding my baby for every feeding	4.10 (1.00)	0.693	0.88
13. I can always manage to keep up with my baby's breastfeeding demands	3.95 (1.09)	0.742	0.87
14. I can always tell when my baby is finished breastfeeding	3.73 (.93)	0.358	0.90

Table 4

BSES-SF Follow-Up Item Statistics

Item	M (SD)	Item-Total Correlation	Cronbach's Alpha
1. I can always determine my baby is getting enough milk	3.65 (.96)	0.715	0.92
2. I can always cope with breastfeeding like other challenging tasks	3.89 (.96)	0.657	0.92
3. I can always breastfeed without formula supplementation	3.89 (1.27)	0.587	0.92
4. I can always ensure my baby is properly latched for the whole feed	3.95 (.91)	0.491	0.92
5. I can always manage the breastfeeding situation to my satisfaction	3.55 (.93)	0.810	0.92
6. I can always manage to breastfeed even if my baby is crying	3.87 (1.12)	0.695	0.92
7. I can always keep wanting to breastfeed	4.08 (.93)	0.643	0.92
8. I can always comfortably breastfeed with my family members present	3.77 (1.10)	0.399	0.93
9. I can always be satisfied with my breastfeeding experience	3.69 (.1.02)	0.813	0.92
10. I can always deal with the fact that breastfeeding can be time consuming	4.93 (.98)	0.508	0.92
11. I can always finish on one breast before switching to the other	3.77 (1.06)	0.626	0.92
12. I can always continue breastfeeding my baby for every feeding	4.10 (.98)	0.817	0.92
13. I can always manage to keep up with my baby's breastfeeding demands	3.91 (1.05)	0.830	0.92
14. I can always tell when my baby is finished breastfeeding	3.65 (.96)	0.638	0.92

Validity. The exploratory factor analyses produced three satisfactory eigenvalues of 6.06, 1.29 and 1.21 (61.3% of the variance) at baseline and 7.30, 1.24 and 1.06 (68.8% of the variance) at follow-up. Although a three-factor solution in the unrotated matrix was yielded, 52.2% of the variance at baseline, and 43.3% at follow-up, was accounted for in one construct. The scree tests suggested a two-factor solution. The inconsistency between the factor loadings and the scree plot was most likely a result of insufficient sample size and that factor rotation was not utilized. No communality value exceeded one, which indicates there were no problems with the solution (Tabachnick & Fidell, 2001). However, the item referring to breastfeeding with family members present did have the lowest communality of all items. This item loaded below the recommended value of 0.4 for item retention (Polit & Hungler) at 0.24 at baseline and 0.36 at follow-up. However, as the literature reveals that family members are a strong support network for breastfeeding mothers, this item was deemed conceptually relevant to the instrument and therefore was retained for the analyses. The remaining factor loadings ranged from 0.44 to 0.77 (Table 5 and 6).

Table 5

BSES-SF Baseline Item Factor Loading

Item	Loading Factor 1	2	3	Communality
1. I can always determine my baby is getting enough milk	0.63	-0.15	0.15	0.438
2. I can always cope with breastfeeding like other challenging tasks	0.53	0.65	0.02	0.706
3. I can always breastfeed without formula supplementation	0.77	-0.21	-0.36	0.774
4. I can always ensure my baby is properly latched for the whole feed	0.72	0.06	-0.20	0.561
5. I can always manage the breastfeeding situation to my satisfaction	0.80	0.00	0.06	0.645
6. I can always manage to breastfeed even if my baby is crying	0.77	-0.31	-0.07	0.690
7. I can always keep wanting to breastfeed	0.42	0.25	0.58	0.573
8. I can always comfortably breastfeed with my family members present	0.33	0.06	0.37	0.244
9. I can always be satisfied with my breastfeeding experience	0.76	0.33	0.04	0.681
10. I can always deal with the fact that breastfeeding can be time consuming	0.52	0.46	-0.17	0.507
11. I can always finish on one breast before switching to the other breast	0.69	-0.10	0.43	0.669
12. I can always continue breastfeeding my baby for every feeding	0.77	-0.14	-0.33	0.719
13. I can always manage to keep up with my baby's breastfeeding demands	0.82	-0.14	-0.23	0.745
14. I can always tell when my baby is finished breastfeeding	0.43	-0.53	0.41	0.627

Figure 3. ***Scree Plot BSES-SF Baseline***

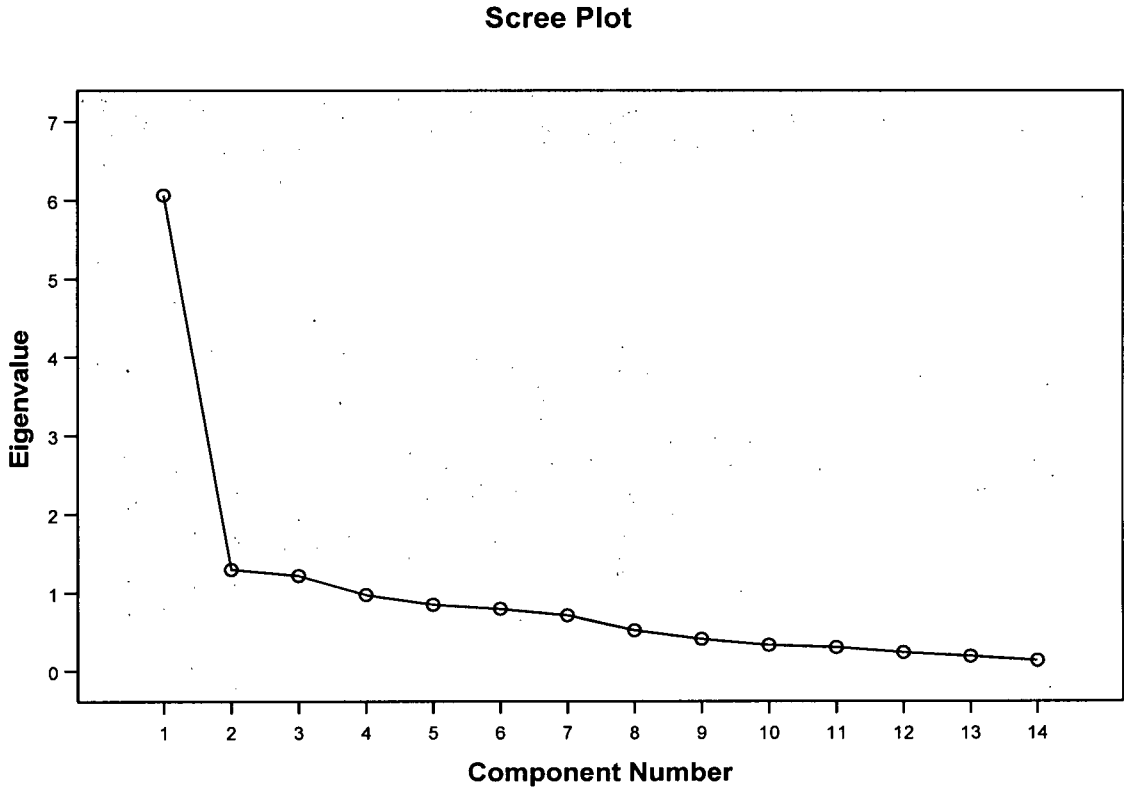
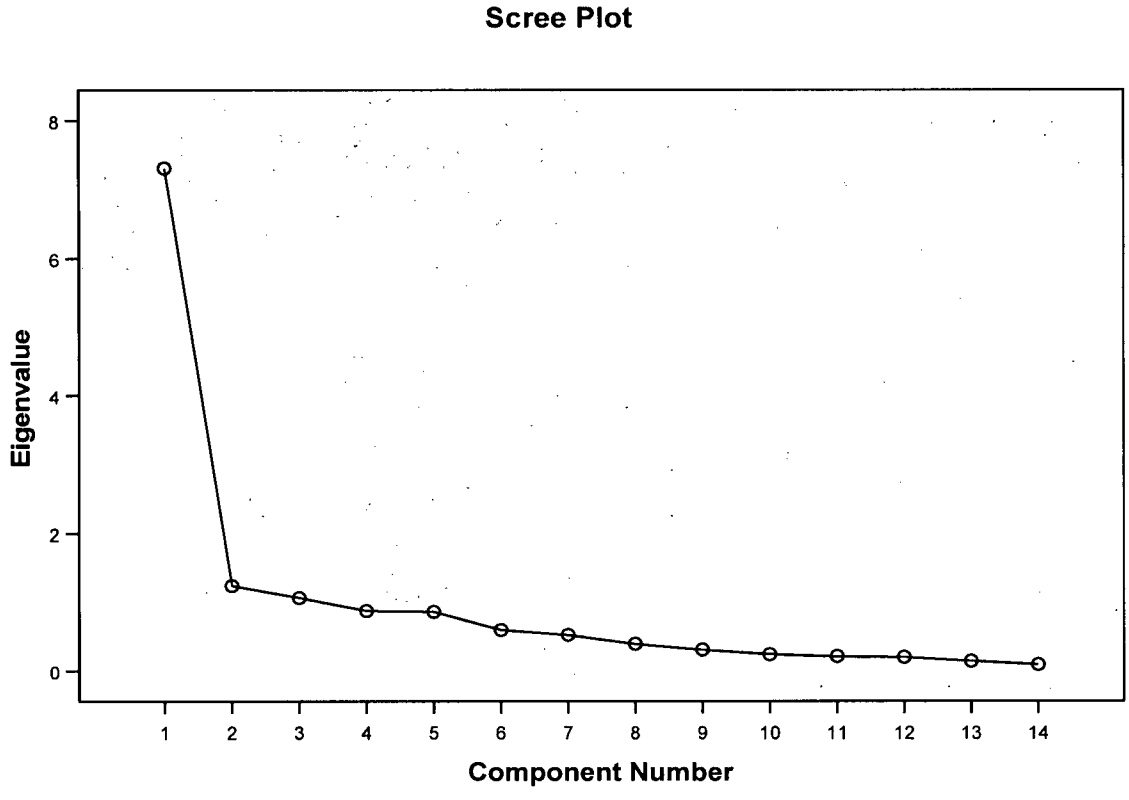


Table 6

BSES-SF Follow-Up Item Factor Loading

Item	Loading Factor 1	2	3	Communality
1. I can always determine my baby is getting enough milk	0.76	0.06	-0.01	0.59
2. I can always cope with breastfeeding like other challenging tasks	0.72	0.25	0.13	0.60
3. I can always breastfeed without formula supplementation	0.65	-0.60	0.02	0.78
4. I can always ensure my baby is properly latched for the whole feed	0.57	0.05	-0.60	0.68
5. I can always manage the breastfeeding situation to my satisfaction	0.86	0.20	-0.20	0.82
6. I can always manage to breastfeed even if my baby is crying	0.75	-0.19	0.06	0.60
7. I can always keep wanting to breastfeed	0.70	0.33	0.28	0.68
8. I can always comfortably breastfeed with my family members present	0.45	0.11	0.38	0.36
9. I can always be satisfied with my breastfeeding experience	0.86	0.25	-0.13	0.81
10. I can always deal with the fact that breastfeeding can be time consuming	0.57	0.48	0.33	0.66
11. I can always finish on one breast before switching to the other	0.68	-0.42	0.31	0.73
12. I can always continue breastfeeding my baby for every feeding	0.85	-0.24	-0.01	0.78
13. I can always manage to keep up with my baby's breastfeeding demands	0.86	-0.30	0.04	0.83
14. I can always tell when my baby is finished breastfeeding	0.70	0.12	-0.45	0.70

Figure 4. ***Scree Plot BSES-SF Follow-Up.***



Feasibility of the 24-Hour Feeding Diaries

While the 24-hour feeding diary proved to be a feasible instrument for collecting data on formula supplementation volumes, the baseline diaries were frequently not filled out until the CHN had enrolled the participant into the study. As a result, the researcher was relying on maternal recollection of supplementation amounts given in the previous 24-hours.

Breastfeeding Self-Confidence

The BSES-SF scores met the assumption of normality at baseline measurement (Shapiro-Wilks = 0.958, p= 0.079) and at the two week follow-up measurement (Shapiro-Wilks = 0.954, p=0.54), with the scores ranging from 24 to 69 at baseline and 21 to 69 on the follow-up questionnaire out of a possible range of 14-70. Between-group differences on breastfeeding confidence scores at both measurement times demonstrated no significant differences between weighing and not weighing the infant until day five postpartum (Table 7). Within group paired t-tests revealed, although not significant, that there was a small decrease observed in the day two/three weight group's BSES-SF scores and a small increase noted in the day five weight group's BSES-SF scores (Table 8).

Table 7

Analysis of Variance for Group Comparison BSES-SF Scores

Measurement Time	*df*	*F*	*MS*	*p*
		Between subjects		
2 or 3 days	1	0.07	5.3	0.80
2 weeks	1	0.61	63.5	0.44

Note. Sum of scores for the BSES-SF was used for analysis

Table 8

Within Group Comparison BSES-SF Scores over Time (Standard Care and Experimental Care Groups)

	BSES-SF Scores			
Variables	*M*	*SD*	*t*	*p*
Standard Care				
2 or 3 days	53.7	7.9	0.731	0 .43
2 weeks	52.6	8.9		
Experimental Care				
2 or 3 days	53.0	9.9	-1.7	0 .11
2 weeks	54.8	11.2		

Note. Sum of scores for the BSES-SF was used for analysis

Because no significant differences in BSES-SF scores were identified between groups, correlation matrices were done on combined experimental and standard care group BSES-SF scores and the demographic variables of age, income, ethnicity, education and marital status. At the baseline measurement, marital status was significantly correlated with breastfeeding confidence (τ= 0.045) but the follow-up measurement at two weeks found no significant demographic characteristics to be correlated with BSES-SF scores.

Intended Breastfeeding Duration

A one-way ANOVA to examine between-group analyses of the effect of infant weighing on intended breastfeeding duration revealed no significant differences between the standard and experimental groups were found at two or three days or two weeks postpartum (Table 9).

Table 9

Analysis of Variance for Group Comparison Intended Breastfeeding Duration

Measurement Time	***df***	***F***	***MS***	***p***
		Between subjects		
2 or 3 days[a]	1	0.07	1.04	0.79
2 weeks	1	0.19	3.30	0.67

Note. [a]Missing data = 2

Paired t-tests examining within group intended breastfeeding duration revealed the standard care group means remained unchanged over time while the experimental group means decreased slightly but this decrease was not significant. The mean intended breastfeeding duration time for the standard care group was 9.2 months (SD=2.9) at baseline and 9.2 months at follow-up (SD=4.3). The experimental groups mean intended breastfeeding duration times were 9.5 months (SD=4.4) at baseline and 8.5 months (SD=4.3) at follow-up (Table 10).

Table 10

Within Group Comparison Intended Breastfeeding Duration over Time (Standard Care and Experimental Care Groups)

	Intended Breastfeeding Duration			
Variables	***M***	***SD***	***t***	***p***
Standard Care				
2 or 3 days	9.2	2.9	0.00	1.0
2 weeks	9.2	4.3		
Experimental Care				
2 or 3 days	9.5	4.4	1.7	0.10
2 weeks	8.5	4.3		

Note. Intended breastfeeding duration reported in months.

Formula Supplementation Volumes

Seventy-six percent of mothers were exclusively breastfeeding their newborns at two or three days and 78% at two weeks postpartum. The one-way ANOVA revealed no significant differences between the two groups for formula supplementation at two or three days postpartum. For the two week measurement, the ANOVA revealed no significant differences in formula supplementation volumes between the experimental and standard care groups, however, a possible trend in the data that would support the researcher's hypothesis was revealed with the *p* value close to the level of significance (Table 11).

Table 11

Analysis of Variance for Group Comparison Formula Supplementation Volumes

Measurement Time	*df*	*F*	*MS*	*p*
		Between subjects		
2 or 3 days	1	0.05	244.20	0.82
2 weeks [a]	1	2.1	58416.00	0.15

Note. [a] Missing data = 2

Paired t-tests for within group analysis revealed formula supplementation volumes were higher at both measurement times in the day two/three weight group then in the day five weight group and the change in mean formula supplementation rate over time was significant in the standard care group. The mean amount of formula supplement increased from 30.4 ounces at baseline to 112.6 ounces at the follow-up measurement. The change in mean formula supplementation rate of the experimental group was not significant (Table 12).

Table 12

Within Group Comparison of Formula Supplementation Volumes over Time (Standard Care and Experimental Care Groups)

	Formula Supplementation Volumes			
Variables	***M***	***SD***	***t***	***p***
Standard Care				
2 or 3 days	30.4	79.7	-2.47	0.02*
2 weeks	112.6	199.4		
Experimental Care				
2 or 3 days	15.6	45.0	-1.13	0.27
2 weeks	42.1	125.5		

Note. Formula supplementation volumes reported in ounces.
*$p \leq .05$

Qualitative Analysis

Two questions were included in the baseline and follow-up questionnaire that addressed the participants' view of the breastfeeding support that was provided by the CHN. Thirty-seven participants (76%) provided answers. The results provided support for the role of the CHNs in providing breastfeeding support. The mothers indicated that CHNs provided teaching on correct position and latch, infant cues and general breastfeeding education. Mothers felt that the CHNs offered reassurance and ongoing support for answering their questions.

Feasibility of Study Procedures

Weighing infants on day five postpartum was a feasible element of delivering community health postpartum services in the Vancouver area. Delaying the first weight from the initial visit to the follow-up visit may have resulted in decreased workloads for CHNs as the delayed weight prevented the need to reweigh the infants during the time of normal newborn weight loss. No negative consequences were documented in the experimental group when newborns were not weighed between hospital discharge and day five postpartum.

Summary

Although, between group formula supplementation volumes revealed no significant differences at baseline or follow-up measurements, the within group analysis revealed a significant finding. The amount of formula given to the day two/three weight group increased significantly over the two weeks while the amount of formula given to infants in the day five weight group, although supplementation volumes also increased, revealed no significant difference. While only this significant finding involving the main study variables related to breastfeeding was found, the BSES-SF analyses revealed a trend in the data that may indicate support for the study hypotheses. Evidence of an increase in the day five weight groups' mean breastfeeding confidence scores between baseline and follow-up measurements and a slight decrease in the day two/three weight groups' confidence scores between baseline and follow-up measurements was noted. No significant differences were found between groups on the BSES-SF analyses. Finally, the between group intended breastfeeding duration scores demonstrated no significant differences at either measurement points. Within group intended duration revealed no

significant change over time in the day two/three weight group and revealed a decrease over time in the day five weight group.

The psychometric testing of the BSES-SF demonstrated the reliability and internal validity of the instrument for this study and the 24-hour feeding diaries were an effective tool for collecting formula supplementation amounts.

Through discussion with CHNs during the study recruitment, and following the study closure, the researcher found they were accepting of the delayed weight measurement guidelines and felt the study created a supportive environment for a more global breastfeeding assessment that was less reliant on weight scales.

Discussion of the study findings of this study as well as the limitations, implications for nursing practice, education, research and administration will be presented in the following chapter.

Chapter V

Discussion

Many variables may influence breastfeeding outcomes. Pre and post weighing intervention questionnaires and feeding diaries were used in this study to evaluate the effect of two different newborn weighing practices utilized by (CHNs) on breastfeeding confidence levels, intended breastfeeding duration and formula supplementation volumes. The standard care group (day two/three) had their newborn infants weighed on either day two or three postpartum while the experimental group (day five) had their infants weighed on the fifth day postpartum, following breastmilk establishment. This chapter presents a discussion of the key findings that were described in Chapter Four. Implications for nursing practice, education, administration and future research will also be discussed.

Breastfeeding Self-Confidence

Although there were no significant differences between the two study groups at either measurement times, there was a small decrease observed in the standard (day two/three) care group's breastfeeding confidence scores and a small increase noted in the experimental (day five) group's breastfeeding confidence scores. This trend indicates some support for the hypothesis that weighing infants prior to mothers' breast milk establishment may have a negative effect on breastfeeding confidence. Because research strongly links breastfeeding confidence with breastfeeding outcomes (Dennis, 2003), this trend is in contrast to the findings of McKie et al.'s (2006) study which concluded that as long as support and reassurance was available to breastfeeding mothers during their

infants' time of weight loss, there would be no negative consequences of weighing before breast milk establishment for breastfeeding outcomes.

As there are numerous variables that contribute to breastfeeding confidence, which were not all measured in this study, other variables could also account for this finding. Although marital status was initially correlated with breastfeeding confidence scores, at two weeks there was no correlation between the two variables. The lack of correlation may reflect performance accomplishment that is described in Dennis's (1999) breastfeeding self-efficacy theory. An individual's performance accomplishments over time will affect their self-efficacy and, ultimately, their goal outcomes (Dennis). As some of the mothers accomplished their breastfeeding goals over the two weeks between measurement times, their confidence may have increased and thus external variables, such as marital status, became less significant.

The lack of association between breastfeeding confidence and the demographic variables of education, ethnicity, income and marital status (at two weeks) was similar to the finding of the Dennis (2003) when she first tested the BSES-SF. Dennis suggested this lack of correlation demonstrates the BSES-SF is a unique instrument that is able to identify mothers who are at higher risk to either not initiate, or discontinue breastfeeding once initiated, based on a modifiable variable, namely self-confidence related to breast feeding, rather than fixed demographic features.

Intended Breastfeeding Duration

No significant differences in intended breastfeeding duration between the two groups were found at the baseline or the follow-up measurement. While the within group mean intended breastfeeding duration time of the standard care group showed no change

over time, the experimental group's intended breastfeeding duration demonstrated a slight decrease between the two measurements. Given the small sample size (N=49), it is difficult to determine if this change in the means over time is a random error (Polit & Hungler, 1999).

Formula Supplementation Volumes

Although there was no significant difference between groups found with formula supplementation volumes, the significant within group finding in the day two/three weight group and non-significant within group finding of the experimental group is noteworthy, in particular with such a small sample size. Although a Type II error remains possible; however, this finding does support the study hypothesis that mothers exposed to infant weighing prior to breast milk establishment would provide more formula supplementation to their infants than those mothers whose infants were not weighed until post breast milk establishment.

Study Limitations

This feasibility study had a number of limitations including the sample, methods and data analysis.

Sample. Due to increased workload issues at the study sites as a result of the introduction of a new computerized charting system during the initial phase of recruitment, a significantly lower number of women was recruited into the study than anticipated. The involvement of a research assistant to recruit mothers would have been effective in increasing participant numbers. The limitation of recruitment days to those with a full compliment of staff to follow through with the study procedures also added to the difficulty of recruiting further participants into the study. Questionnaires completed

by participating CHNs following recruitment closure supported these explanations of recruitment limitations. With the final sample size being 49 mothers recruited, far from the original goal of 140, the likelihood of a Type II error in this study is high due to the low power of the study (Polit & Hungler, 1999).

The inclusion criteria resulted in a somewhat homogenous sample. Although the sample was ethically diverse with 53% of the participants of non Caucasian ethnicity, the demographics characteristics reveal the majority of the participants reporting maternal age over 30, post secondary education, annual income above $30,000 and having support of a spouse or partner. In addition, maternal or newborn health and social issues served as exclusion criteria. Consequently, mothers were recruited who were more likely to continue breastfeeding (Dennis, 2002).

Methods. The CHNs were not blinded to the mothers' group assignment and may have unconsciously offered more or less breastfeeding support to a mother depending on her group assignment. While weight measurement is frequently used as an evaluation tool of breastfeeding success, CHNs may have spent more time teaching mothers in the experimental group about other signs of successful breastfeeding such as signs of milk transfer and adequate infant output.

The researcher was reliant on the CHNs to follow all recruitment procedures and protocols. As recruitment was frequently completed by different nurses, and spanned a 13 month time period, there was an increased chance that study procedures may not have been followed consistently.

With the demographic data collected at the baseline measurement only consisting of marital status and preferred feeding method, while the remaining demographic data

was collected at two weeks, the researcher was unable to analyze the potential differences between those mothers that completed the study and those whom did not. Three mothers preferred to provide answers for the questionnaire on the telephone with the researcher. This may have had the potential to introduce bias as the mothers may not have answered the questions as they would have if they were to complete the questionnaires individually. Bias may also have been introduced during the baseline measurement because the CHNs were present while the mothers completed the questionnaire.

The timing of response to the two week questionnaire was also a limitation in the study as the questionnaires were not always completed by the mothers at the two week time point. The timeline ranged from 7 days to 37 days, with a mean of 16 days. Although follow-up reminder phone calls were made to participants', having time to complete the questionnaire was often limited given the many responsibilities faced by the new mothers.

Data analysis. The study neither controlled for, nor measured, potential confounding variables that were salient in Dennis's framework for self-efficacy. Influencing variables such as postpartum depression, stress and general self worth have been previously measured in conjunction with the breastfeeding self efficacy by Dennis (2003) and have been positively correlated with breastfeeding outcomes.

The 24-hour feeding diary was an effective tool for collecting mean amounts of formula provided to the infants as a supplement to breastfeeding. Reliance on maternal recall of formula supplementation may have resulted in inadequate measurements reported by those mothers who did not receive the study information in hospital, and therefore did not fill in the 24 hour feeding diary until the CHN visit.

In regards to the instrument measuring breastfeeding confidence, the BSES-SF is a relatively new instrument and therefore has received limited psychometric analysis. In testing the validity of the instrument, the recommendation of a two or three factor solution for the BSES-SF differed from that previously recommended by the author (Dennis, 2003), who suggested a one-factor solution for the BSES-SF and a two-factor solution for the original BSES (Dennis & Faux, 1999). This difference is most likely a result of the small sample size which was far below the 10:1 recommendation for reliable factor analysis (Nunnally & Bernstein, 1994). In addition, to be congruent with previous psychometric testing of the instrument completed by Dennis (2003), no factor rotation was done to discriminate between factors.

The item, "I can always comfortably breastfeed with my family members present" had multiple low inter-item correlations in the reliability testing and a factor loading below 0.4 in the factor analysis conducted at both measurement times. This finding supports possible item deletion. Previous testing of the BSES-SF (Dennis, 2003) found this item, although loading above 0.4 was the lowest loading item (0.66) of the 14 items. Although the overall factor analysis findings of this study support item reduction, due to the small sample size, and un-rotated factor analysis, the values received could be a result of error. However, the similar findings in the previous testing of the BSES-SF would suggest further psychometric testing of the instrument with an adequate sample size of at least 140 subjects (Nunnally & Bernstein, 1994) should be done to analyze the potential need for item deletion.

Qualitative Data

Qualitative data collected on the two week questionnaire pertaining to participants' impressions of the CHN support was positive. Mothers stated that the CHNs were helpful in providing support around techniques for breastfeeding and providing reassurance and support for their questions and concerns. This information provides validation for CHNs' efforts to assist mothers in reaching their breastfeeding goals due to their ability to provide one-on-one early support to breastfeeding mothers.

Implications for Nursing Practice

Although this feasibility study was unable to reject the null hypotheses, the study findings provide information of relevance to nursing practice. Delayed weighing did not appear to have any harmful effects, which suggests other forms of newborn assessment should be utilized. It is important that nurses view newborn weight measurement as one of several assessment tools when providing care for newborns. Nurses require adequate assessment skills in order to evaluate effective breastfeeding in the absence of a newborn scale. Having this skill will also assist in telephone assessment when a home visit cannot be made or may not be necessary. Assessment of effective breastfeeding strategies and infant intake and output are key items to evaluate. Providing teaching to a breastfeeding mother so that she is able to assess the effectiveness of her breastfeeding will assist in building mothers' capacities in terms of their self-assessments for providing adequate nutrition to her newborn. In addition, providing ongoing support and reassurance that may build a mother's breastfeeding confidence is valuable in increasing breastfeeding duration as shown in the literature (Dennis, 2002).

At the community level, drop-in support group services that allow for peer support enables CHNs to focus their interventions strategically to increase breastfeeding duration (Davidson, 1996; Noel-Weiss & Hebert, 2004). Identifying mothers who may have low breastfeeding confidence via a questionnaire, such as the BSES-SF, and implementing effective confidence building strategies may be valuable for CHNs in assisting mothers to reach their breastfeeding goals. CHNs may also be able to identify mothers who are at high risk for breastfeeding cessation due to demographic variables such as age, education and income (Dennis, 2002) and provide more comprehensive breastfeeding support to increase breastfeeding initiation and duration.

Until further studies of newborn weighing practices are completed that incorporate larger sample sizes, perinatal nurses should be practicing within the current guidelines. The British Columbia Reproductive Care Program (2003) recommended that newborn weight measurement occur at birth, day three and day seven. If CHNs were to follow this practice, the number of home visits would be decreased as the majority of families are visiting their family physicians at approximately one week postpartum thus requiring the CHN weight assessment only on day three. As a result, CHNs would be able to focus their interventions on other means of increasing breastfeeding initiation and duration rates such as prenatal education or group drop-ins, which allow for peer support. CHNs may also implement other health promotion strategies or programs which address the needs of, not only the newborn age group but the broader infant, child and youth population.

Perinatal nurses should also be following the World Health Organizations (2003) recommendations for infant feeding and promoting exclusive breastfeeding for the first

six months of life. Unnecessary formula supplementation should be discouraged and parents advised of the medically indicated reasons for providing formula, as well as the risks associated with formula supplementation of their breastfed newborns. The significant study finding of increased formula supplementation over time in the standard care group reinforces the importance of teaching the norms and expectations of weight loss in the initial postpartum days to help prevent formula supplementation prior to breast milk establishment.

As the majority of mothers in this study stated that partners/spouses and mothers/mother-in-laws were considered breastfeeding supports, which is reflective of the literature (Dennis, 2002), the incorporation of these people regarding breastfeeding teaching should be encouraged in nursing practice.

Implications for Nursing Education

Perinatal nurses must be supported in their education around breastfeeding support and newborn assessment skills. Breastfeeding courses should be mandatory and included in the nursing orientation process. Emphasis should be placed on visual and physical assessment of breastfeeding technique and newborn assessment in order for nurses to feel comfortable in their skills in the absence of an infant weight scale.

All perinatal nurses should be knowledgeable about the British Columbia Reproductive Care (BCRCP) Guidelines (2003) on newborn weight loss and recommended weight measurement intervals and receive support for the implementation of these guidelines into daily practice. Regional education should be provided to all new employees that outline the guidelines. An expectation should be created by regional educators and clinicians that these guidelines are utilized and nurses should be provided

with ongoing support for their clinical concerns and judgments on the necessity of follow-up weighing. In addition, all perinatal nurses should be educated on the medical reasons for formula supplementation of breastfed infants as well as the policy statements of the WHO (2001) and Canadian Pediatric Association (2005) on exclusive breastfeeding for the first six months of life.

Basic nursing education should include a focus on newborn physical assessment, including signs of dehydration, and basic breastfeeding knowledge. Emphasis should be placed on a global assessment that does not rely on a weight scale. Students should be encouraged to provide teaching to new mothers on signs of successful breastfeeding and the norms and expectations around newborn weight loss.

Implications for Health Policy

Policies need to be developed and supported that encourage a work environments that promote breastfeeding success. There are several government policies already in place to support the recommendation of exclusive breastfeeding for six months yet many agencies have been slow to implement the changes needed to become baby friendly. The WHO/UNICEF Baby Friendly Initiative (Breastfeeding Committee of Canada, 2002, 2004), should be utilized by all maternity hospitals and community health centers providing newborn care to inform breastfeeding policies. These policies include training of all employees in the knowledge and skills to implement breastfeeding friendly policies, education of pregnant women and their families of the benefits of breastfeeding and supporting mothers to establish and sustain breastfeeding.

Adoption of existing health policies that address normal newborn weight loss (British Columbia Reproductive Care Program, 2003) and recommendations for weight

measurement at birth, day three and seven should be supported immediately until further studies are undertaken that support other measurement times. Following further research into the effects of early newborn weight measurement on breastfeeding outcomes, current policies should be reviewed and altered accordingly to improve breastfeeding initiation and duration rates province wide.

Data collection on breastfeeding outcomes, including readmission rates for neonatal dehydration, could be utilized to support the implementation of breastfeeding friendly policies as well as the education of staff nurses to enable them to provide effective breastfeeding support. A national database would be beneficial to enable researchers to analyze trends between differing areas of the country and study the effects of alternate CHN practices on breastfeeding outcomes.

Implications for Future Research

Because the literature on infant weighing protocols and their effect on breastfeeding outcomes is limited, further research needs to be conducted. A larger multivariate randomized control trial is recommended to allow sufficient power and controls to potentially identify further significant associations among study variables. A minimum of 251 participants would need to be recruited in order to generate a reliable effect size of 0.25 with a power of 0.80 (Polit & Hungler, 1999). Adequate resources are necessary to recruit a substantial study sample and increase the power of the study. It would be beneficial to recruit a more socio-economically diverse sample so that the findings could be generalized to more populations. An effort to expand the recruitment sites to other areas of the city would also be beneficial in enabling generalization of the results to other areas. In addition, a research study comparing representative samples

from Vancouver Coastal Health and other jurisdictions would be useful to evaluate any potential differences between both breastfeeding duration and newborn dehydration and jaundice readmission rates.

Further testing of the Breastfeeding Self- Efficacy Scale- Short Form is recommended as currently there is only one published study utilizing this instrument. Further psychometric testing, with an adequate sample size of a minimum of 140 participants (Nunnally & Bernstein, 1994), will provide further evidence of the need for item reduction.

Summary

This feasibility study examined the effect of two different community health nurse newborn weighing procedures on breastfeeding confidence, intended breastfeeding duration and formula supplementation volumes.

Mothers in the experimental group who had their infants weighed after breast milk establishment (day five postpartum), although not a significant difference, demonstrated an increase in their breastfeeding confidence scores at the two week measurement while the mothers in the standard care group who had their infants weighed prior to breast milk establishment (day two/three postpartum) demonstrated a decrease in their breastfeeding confidence.

With respect to formula supplementation volumes, a significant difference was found between the two groups. The within group supplementation volumes in the standard care group, where mothers were exposed to infant weighing prior to breast milk establishment, demonstrated significantly higher mean volumes of formula provided

between the two measurement times. This significant difference was not found within the experimental group whose infants were not weighed until after breast milk establishment.

Finally, no significant differences between, or within groups, was found in the intended breastfeeding duration time.

This study also examined the feasibility of using 24-hour feeding diaries to collect formula supplementation volumes and utilizing the BSES-SF instrument to measure breastfeeding confidence. The 24-hour feeding diary was effective at collecting infant supplementation volumes when including maternal recall as a method of collection for some diaries. The BSES-SF proved to be a reliable and internally valid instrument for this study. However, reliability testing suggested a need for the deletion of one item but with the small sample size and factor rotation not being utilized this finding is potentially a result of error.

There are many variables that influence breastfeeding outcomes and therefore it is difficult to incorporate all possible variables into a study. This study attempted to measure the effect of newborn weight measurement prior to maternal breast milk establishment on several breastfeeding outcomes. Unfortunately, the researcher was unable to recruit a large enough sample to generate significant *p*-values on the majority of the items measured. Although only one significant *p*-value was observed, the trends seen with the small sample size provide support for conducting a larger study to investigate the potential influence of current CHN weighing practices on women's breastfeeding confidence, intended breastfeeding duration and formula supplementation volumes. Until more research is undertaken, perinatal nurses should be cognizant of their current

practices and there potential impact on breastfeeding outcomes and the need to expand assessments beyond neonatal weight measurement.

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Participation:

To take part in this study you must:

- Be a first time mother
- Speak and read English
- Want to only give breast milk to your baby
- Have no health concerns
- Have a baby born over 37 weeks gestation who has no health concerns
- Agree to have the recommended community health nurse follow-up in your home which is provided for all new mothers in Vancouver
- Agree to fill out a 15 minute questionnaire and a 24 hour feeding diary initially, and in two weeks time, and return it by mail to the investigator

You would not be able to take part in this study if you:

- Have a history of post partum hemorrhage, pregnancy induced hypertension, diabetes, depression, breast augmentation or breast reduction
- You are taking medications which may affect your breast milk
- You are working with a social worker from the Ministry of Children and Family
- You have a baby who has high levels of jaundice and needs phototherapy (light therapy)
- You have a baby who has any health concerns such as facial or gastrointestinal anomalies or any diagnosed syndromes

Procedures:

This study will involve women who are living in the city of Vancouver and receiving pubic health services from Evergreen, Three Bridges or South Community Health Center.

The liaison nurse in the hospital gave you an information pamphlet about this study and a 24-hour feeding diary to complete. The community health nurse who is visiting you in your home today will ask you to sign this consent form and fill out a short questionnaire that will ask you about your confidence in breastfeeding your baby, how you are feeding your baby and some questions about yourself. She will collect the questionnaire and your feeding diary that has recorded your baby's feeding activities since yesterday.

You will be randomly assigned into one of two groups. **Both groups will receive the same amount of public health follow-up.** Your infant is routinely weighed by the community health nurse as part of the routine care. The study protocol requires that the control group be weighed 24 hours post hospital discharge and the intervention group at 5 days post birth. In two weeks time you will be given another 24-hour feeding diary and short questionnaire to complete. The questions are about your confidence in breastfeeding your baby, how you are feeding your baby and some information about yourself. The feeding diary will record your babies feeding activities. You may leave any question blank that you do not wish to answer. You will be provided with a stamped self-addressed envelope to return your completed questionnaire. Over the two weeks, this study will take about one hour of your time.

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Fax: 604.822.7466

SUBJECT CONSENT TO PARTICIPATE
PARTICIPANT COPY

Project Title: Waiting to be Weighed. A pilot project comparing two different infant weighing practices of community health nurses and their effect on breastfeeding outcomes.

If you agree to participate in this study please read and sign the consent below.

Verification of Consent

You have read and understand the consent form and all information provided about the study.

You have had sufficient time to consider the information provided about this study.

You have had an opportunity to ask questions and have received satisfactory responses to your questions.

You understand that all information collected will be kept confidential.

You understand that you may withdraw from this study at anytime with no effect on the health care that you are receiving.

You understand that you will receive no money from taking part in this study.

You have been told that you will receive a copy of this consent form for your records.

_____
Subject Signature

_____
Printed Name of the Subject Date

If needed, I may be contacted by telephone at #_____ or _____.

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SUBJECT CONSENT TO PARTICIPATE
Researcher Copy

Project Title: Waiting to be Weighed. A pilot project comparing two different infant weighing practices of community health nurses and their effect on breastfeeding outcomes.

If you agree to participate in this study please read and sign the consent below.

Verification of Consent

You have read and understand the consent form and all information provided about the study.

You have had sufficient time to consider the information provided about this study.

You have had an opportunity to ask questions and have received satisfactory responses to your questions.

You understand that all information collected will be kept confidential.

You understand that you may withdraw from this study at anytime with no effect on the health care that you are receiving.

You understand that you will receive no money from taking part in this study.

You have been told that you will receive a copy of this consent form for your records.

_____
Subject Signature

_____
Printed Name of the Subject Date

If needed, I may be contacted by telephone at #_____ or _____.

Appendix B
Study Information Pamphlet

How can we help mothers succeed at **Breastfeeding?**

A study in cooperation with the UBC School of Nursing and Vancouver Coastal Health.

Are you a first time mother who plans to breastfeed your baby ?

Are you planning on having home visits from a community health nurse after you leave the hospital ?

Would you like to help community health nurses learn how they can better support breastfeeding mothers ?

If so, then you may be able to take part in this study.

School of Nursing
University of British Columbia

One Grande, High Fat, Decaf
BREAST MILK
Please...

School of Nursing
University of British Columbia

Appendix C
24-Hour Feeding Diary

Date: _____

FEEDING DIARY

Time	Breastfeeding (how many minutes?)	Formula (how much?)	Wet Diaper ✓	Dirty Diaper ✓

Appendix D
CHN Telelphone Script

To recruit eligible participants on the initial CHN phone contact for the Weighting to be Weighed study
WHO RECEIVED THE STUDY INFORMATION IN THE HOSPITAL

I understand that yesterday in the hospital you were given some information from the liaison nurse about a research project being conducted by the UBC School of Nursing at this health unit. This study is exploring the effects of community health nurses weighing practices on breastfeeding outcomes. Do you remember receiving this information?

NO
(did not receive anything)

↓

Please see phone script page 3.

YES
(and they read the information pamphlet)

↓

1) "Do you have any questions about the study that I can answer for you?" (answer accordingly. If unsure advise that you will contact the researcher and get back to her with answer)
2) "Are you interested in taking part in this study?"

NO ↓

"O.K., that's no problem. Thank you for taking the time to read about the study"

YES ↓

"We are happy that you are willing to participate. We will put you into one of two study groups. Both groups will receive the same amount of community nurse follow-up and care. The only difference is that each group will have their baby weighed on different days. When I come to see you I will give you some more information about the study and we can talk about what the study involves. Do you have any more questions right now?"
(answer accordingly. If you are unsure of answer advise mother that you will contact the researcher and get back to her with the answer)

Proceed with home visit arrangement

YES
(they received the info <u>but did not read it</u>)

↓

"Are you interested in learning about this study?"

NO ↓

"O.K., that's no problem."

Proceed with home visit arrangements

YES ↓

"Because you are interested in participating in this study you will need to read the information that the liaison nurse gave you yesterday before I arrive for your visit. When I see you today you can let me know if you are still interested in taking part in the study. I will bring the study package with me to your house so that you will have it if you agree to participate. Whether you choose to take part in the study or not, it will not affect the care you will be receiving from me. As well, you are able to withdraw from the study at any time with no effect on the care you receive. Do you have any questions that I can answer right now?"

(answer accordingly. If you are unsure of answer advise mother that you will contact the researcher and get back to her with the answer)

Proceed with home visit arrangements

CHN TELEPHONE SCRIPT

To recruit eligible participants on the initial CHN phone contact for the Weighting to be Weighed study
WHO DID NOT RECEIVE ANY STUDY INFORMATION IN HOSPITAL

Since this is your first baby and you are breastfeeding you may be eligible to participate in a research study that is being conducted by the UBC School of Nursing and this heath unit. This study is exploring the effects of community health nurses weighing practices on breastfeeding outcomes. Participating in this study would not affect the service that I would be providing and you would receive the same amount of public health follow-up as a mother who is not in this study. Would you be interested in hearing more information about this study?

NO ↓

Proceed with home visit arrangements

YES ↓

(Turn over)

Appendix E
Baseline Questionnaire

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School of Nursing

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Breastfeeding Self-Efficacy Scale – Short Form
Baseline Questionnaire

For each of the following statements, please choose the answer that best describes how confident you are with breastfeeding your new baby. Please mark your answer by circling the number that is closest to how you feel. There is no right or wrong answer.

1 = not at all confident
2 = not very confident
3 = sometimes confident
4 = confident
5 = very confident

		Not at all Confident				Very Confident
1.	I can always determine that my baby is getting enough milk	1	2	3	4	5
2.	I can always successfully cope with breastfeeding like I have with other challenging tasks	1	2	3	4	5
3.	I can always breastfeed my baby without using formula as a supplement	1	2	3	4	5
4.	I can always ensure that my baby is properly latched on for the whole feeding	1	2	3	4	5
5.	I can always manage the breastfeeding situation to my satisfaction	1	2	3	4	5
6.	I can always manage to breastfeed even if my baby is crying	1	2	3	4	5
7.	I can always keep wanting to breastfeed	1	2	3	4	5
8.	I can always comfortably breastfeed with my family members present	1	2	3	4	5
9.	I can always be satisfied with my breastfeeding experience	1	2	3	4	5
10.	I can always deal with the fact that breastfeeding can be time consuming	1	2	3	4	5
11.	I can always finish feeding my baby on one breast before switching to the other breast	1	2	3	4	5
12.	I can always continue to breastfeed my baby for every feeding	1	2	3	4	5
13.	I can always manage to keep up with my baby's breastfeeding demands	1	2	3	4	5
14.	I can always tell when my baby is finished breastfeeding	1	2	3	4	5

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Appendix G
Two-Week Follow-Up Questionnaire

University of British Columbia
School of Nursing

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Tel: 604.822.7417
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Breastfeeding Self-Efficacy Scale – Short Form
Two-Week Follow-Up

For each of the following statements, please choose the answer that best describes how confident you are with breastfeeding your new baby. Please mark your answer by circling the number that is closest to how you feel. There is no right or wrong answer.

1 = not at all confident
2 = not very confident
3 = sometimes confident
4 = confident
5 = very confident

	Not at all Confident				Very Confident
1. I can always determine that my baby is getting enough milk	1	2	3	4	5
2. I can always successfully cope with breastfeeding like I have with other challenging tasks	1	2	3	4	5
3. I can always breastfeed my baby without using formula as a supplement	1	2	3	4	5
4. I can always ensure that my baby is properly latched on for the whole feeding	1	2	3	4	5
5. I can always manage the breastfeeding situation to my satisfaction	1	2	3	4	5
6. I can always manage to breastfeed even if my baby is crying	1	2	3	4	5
7. I can always keep wanting to breastfeed	1	2	3	4	5
8. I can always comfortably breastfeed with my family members present	1	2	3	4	5
9. I can always be satisfied with my breastfeeding experience	1	2	3	4	5
10. I can always deal with the fact that breastfeeding can be time consuming	1	2	3	4	5
11. I can always finish feeding my baby on one breast before switching to the other breast	1	2	3	4	5
12. I can always continue to breastfeed my baby for every feeding	1	2	3	4	5
13. I can always manage to keep up with my baby's breastfeeding demands	1	2	3	4	5
14. I can always tell when my baby is finished breastfeeding	1	2	3	4	5

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Two Week Postpartum Questionnaire

Now I would like to ask you a few questions about you and your baby

Please feel free to leave any question blank that you do not wish to answer. The community health nurse(s) that visited you will not see this questionnaire. Only the research investigators named below will have access to your answers.

1. How do you prefer to feed your baby? (circle one)

Breastfeed only Breastfeed and Formula Feed Formula Feed

2. How long do you hope to breastfeed your baby for? _____ weeks (or _____ months)

3. Who do you feel provides you with breastfeeding support? (circle all that apply)

Partner/Spouse	Your Mother/ Mother-in law	Other Relatives	Friends	Community Health Nurse	Doctor	Support Group	Breastfeeding Service	Newborn Hotline or BC Nurse Line

4. How many weeks pregnant were you when you gave birth? _____ weeks

5. How many days old is your baby today? _____ days

6. How old were you on your last birthday_____ years

7. What is your ethnic background? (circle)

Chinese Caucasian Latin American Indo Canadian Vietnamese Other _____

8. What was <u>your</u> yearly income prior to maternity leave? (circle)

Under 15, 000 15, 000 – 30,000 30, 000 – 45,000 Over 45, 000

9. What is your marital status?

Single Married Living with partner (common-law) Living separate from partner

Over...