EFFECTIVENESS OF WEB-BASED PROGRAMS IN IMPROVING BREASTFEEDING SELF-EFFICACY

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

By

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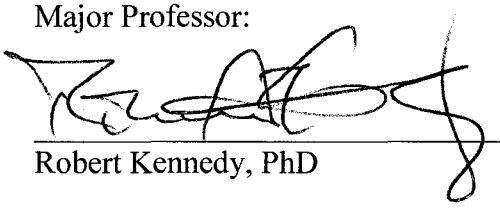

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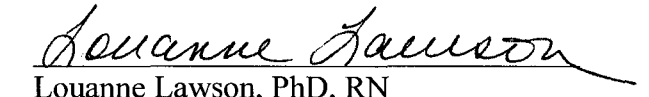

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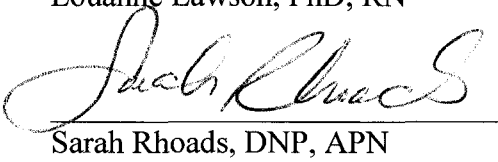

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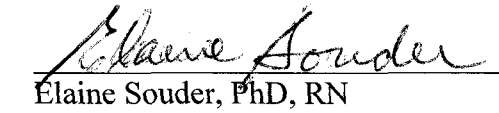

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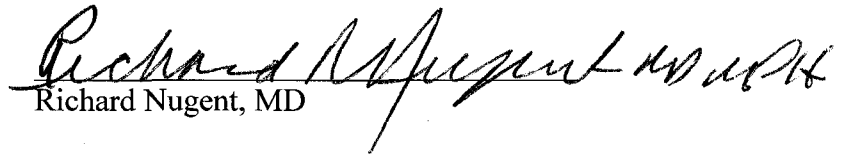

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Abstract

Introduction

Public health professionals are committed to promoting and supporting optimal breastfeeding practices by providing support, information, and resources on breastfeeding. However, public health nurses and nutritionists continue to report time constraints and knowledge deficits as significant barriers to providing adequate and appropriate education and support for breastfeeding. Many health agencies, facing similar challenges, are turning to the use of Web-based systems for promoting healthy lifestyles. This study will examine the effectiveness of Web-based programs for improving breastfeeding self-efficacy, a major determinant of breastfeeding outcomes.

Methods

Pregnant women on WIC who met eligibility requirements and completed consent forms were randomly assigned to either a six-week Web-based intervention group or a usual care control group. The theory of breastfeeding self-efficacy was used as a framework to determine if there was a significant difference in breastfeeding self-efficacy posttest scores between the intervention group and the control group.

Results

One hundred and forty five pregnant women on WIC were screened by health department nutritionists for eligibility and willingness to participate in the study. Twenty-three participants completed consent and pretest forms, were randomly assigned to groups, and participated in the study. After adjusting for pre-intervention scores, there was a significant difference between the intervention and control groups on the BSES-SF posttest scores ($F[1,20] = 8.045$, $p=.01$, $\eta_p^2=.29$). The control group's BSES-SF posttest

estimated marginal mean score ($M = 41.54$, SE=1.49) was significantly lower than the experimental group's ($M = 47.68$, SE=1.56). The partial eta squared value (η_p^2=.29) indicated that breastfeeding Web-based interventions had a large effect on improving breastfeeding self-efficacy scores.

Discussion

The findings in this study indicate that combining the use of a structured intervention consisting of existing breastfeeding Websites in combination with breastfeeding peer counselors may have the potential to overcome the time and distance obstacles that many pregnant women face when trying to access clinic-based breastfeeding education and support programs. The use of peer counselor-guided Web-based interventions may empower women to learn about breastfeeding on their own schedule, in their own environment, and with an opportunity to share the learning experience with significant others in a private setting.

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To my husband, Dick: my love and appreciation for his never-ending support, kindness and encouragement during my dissertation journey; especially those times when the end did not seem possible.

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Table of Contents

		Page
I	**Chapter One: Introduction**	
	Introduction	1
	Statement of the Problem	2
	Theoretical Rationale	5
	Purpose and Aims	6
	Significance	7
	Definitions of Terms and Abbreviations	8
	Summary	9
II	**Chapter Two: The Review of Literature**	
	Introduction	10
	Theoretical Framework	10
	Theory of Breastfeeding Self-Efficacy	12
	Systematic Review of Breastfeeding Research	20
	Preliminary Research	33
	Summary	37
III.	**Chapter Three: Methods**	
	Introduction	38
	Research Design	38
	Sampling Plan & Setting	48
	Instrumentation	43
	Procedures	45
	Summary	51
IV.	**References**	52
V.	**Appendices**	
	A - Breastfeeding Website Evaluation Form	59
	B - Results of Website Evaluation Project	61
	C - Study Schematics	62
	D - ADH-4000 Release of Health Information Form	63
	E - Nutritionists Script	64
	F - PI Recruitment Script	66
	G - Consent Form	68
	H - HIPAA Authorization Form	70
	I - Permission for Breastfeeding Self-Efficacy Scale – Short Form	72
	J - Institutional Review Board Approval	73

Table of Contents

VI. Dissertation Abstract

VII. Manuscript Abstract #1
Provider-based vs. *e*-based Breastfeeding Interventions:
A Systematic Review of the Evidence of Effectiveness

VIII. Manuscript Abstract #2
A Randomized Controlled Trial Examining the Effectiveness of
Web-based Interventions for Improving Breastfeeding Self-efficacy

CHAPTER 1: INTRODUCTION

Breastfeeding is a significant health decision with life-long physiological and psychosocial benefits for mother and child. Breastfeeding nurtures the relationship between mother and child and is associated with a lower risk of post neonatal death (American Academy for Pediatricians, 2006). It provides a host of health benefits for the infant, including a decrease in the incidence of illnesses caused by infectious diseases, and offers protection against many acute and chronic conditions such as sudden infant death syndrome, otitis media, diabetes, obesity, lymphoma, and leukemia (CDC, 2000). In an 18-year longitudinal study of a birth cohort of more than one thousand children, increasing the duration of breastfeeding was associated with consistent and statistically significant increases in cognitive ability and educational achievement (Horwood & Fergusson, 1998). A recent 15-year cohort study of 7,223 Australian infant-mother pairs found that the odds of non-breastfed infants being maltreated by their mothers were 4.8 times (95% CI: 3.3-6.9) the odds for infants who were breastfed for four or more months (Strathearn, Mamun, Najman, & O'Callaghan, 2009). This difference may be due in part to the increased self-esteem successful breastfeeding mothers achieve.

Breastfeeding mothers lose weight faster, have a lower risk of ovarian and breast cancers, and experience fewer hip fractures and osteoporosis in the postmenopausal period (National Women's Health Information Center, 2007). Breastfeeding benefits the environment by eliminating the need for disposal of formula bottles and cans and by reducing energy demands necessary for the production and transportation of formula (American Dietetic Association, 2007). Economic benefits from breastfeeding include the potential to decrease annual health costs in the U.S. by $3.6 billion through improved

health outcomes for both the mother and the baby (United States Breastfeeding Committee, 2002; & Weimer, 2001).

Breastfeeding has been recognized as a health priority by the World Health Organization, the United States Department of health and Human Services, the American Public Health Association, the American Academy of Family Physicians, the American College of Obstetricians and Gynecologists, the American Dietetic Association, and numerous other organizations and institutions devoted to improving maternal and child health. Despite this, breastfeeding rates remain below recommended levels and it is clear that innovative and broad-based efforts are needed to break the barriers to breastfeeding.

Statement of the Problem

Arkansas Public Health Nurses play an important role in providing breastfeeding education and support to pregnant women participating in the Women, Infants, and Children (WIC) program. WIC pregnant women represent approximately 47% (n~20,000) of the total pregnant population in Arkansas, which places PHNs in a powerful position to promote breastfeeding (Arkansas Department of Health, 2007). However, staffing shortages, time constraints and knowledge deficits are primary barriers to being able to provide effective breastfeeding education and support in the clinic setting.

Since 9/11 a new sense of urgency, and a renewed importance of public health, has emphasized the need to shore up the public health infrastructure and to prepare for potential mass casualty events. The focus on bioterrorism and disaster preparedness has created a dramatic shift in the role of PHNs, from clinic service providers to public health preparedness experts. In addition to providing patient care, PHNs must now function as

trained investigators with high-level epidemiological skills necessary for monitoring and detecting chemical, nuclear and biological threats. Complicating this situation is the fact that during the past 20 years, the United States has experienced a 62.5% reduction in the public health nursing workforce (Association of State and Territorial Directors of Nursing, 2001). Factors that have contributed to this problem include non-competitive wages, dangerous work environments, and the continuing nursing shortage crises. The overall shortage of nurses in the United States is a serious and growing problem, and the Health Resources and Services Administration (n.d.) predicts that by the year 2010 the supply will no longer be able to meet the demand. Based on current projections, the United States will experience an unprecedented shortage of 1,016,900 nurses by year 2020, as shown in Table 1.

Table 1.

Projected U.S. FTE RN supply, demand, and shortages

	Projection Year				
	2000	2005	2010	2015	2020
Supply	1,890,700	1,942,500	1,941,200	1,886,100	1,808,000
Demand	2,001,500	2,161,300	2,347,000	2,569,800	2,824,900
Shortage	(110,800)	(218,800)	(405,800)	(683,700)	(1,016,900)

As the nursing shortage problem continues to grow, it will become even more difficult to recruit and retain public health nurses, placing the public's health in jeopardy. It is critical that public health leaders search for innovative solutions to streamline nursing services, while enhancing public health outcomes. To address this problem, many

health agencies have effectively turned to the use of Web-based systems to promote healthy behaviors.

The use of paraprofessionals, such as breastfeeding peer counselors, to guide pregnant women to existing Web-based breastfeeding programs may be a viable alternative to expensive and time-consuming clinic-based, nurse-directed education and support. Breastfeeding peer counseling is a community-based resource that provides mother-to-mother support and assistance to help new mothers establish and maintain breastfeeding (Rossman, 2007). In a randomized trial assessing the efficacy of peer counseling in a group of low-income Latina women, Anderson, Damio, Young, Chapman, & Peres-Escamilla (2005) found that mothers in the peer counseling group were 15 times more likely ($p \leq .05$) to have exclusively breastfed throughout the study than mothers in the control group. Chapman, Damio, Young, & Perez-Escamilla (2004) found that initiation and duration rates in the peer counselor groups were higher than in the control group ($p \leq .05$). Arlotti, Cottrell, Lee, and Curtin (2005) also found that peer counselors were effective ($p \leq .05$) in increasing exclusivity of breastfeeding in a group of African American women who were WIC recipients. Similar results have been found in non-experimental studies of women attending rural WIC clinics (Schafer & Voget, 1998).

The results of these studies indicated that well-structured, intensive breastfeeding support provided by breastfeeding counselors was effective in improving exclusive breastfeeding rates. However, no research had been conducted that examined the effectiveness of using peer counselor-guided Web-based programs to enhance breastfeeding self-efficacy.

Theoretical Rationale

Dennis (1999) developed the theory of breastfeeding self-efficacy to provide a theoretical framework for studying maternal confidence. Several studies have shown that maternal confidence is a significant factor in the initiation and maintenance of breastfeeding (Blyth, et al., 2002; Ertem, Votto & Leventhal, 2002; Papinczak & Turner, 2000; Dennis, & Faux, 1999; and Buxton et al. 1991). Dennis found that breastfeeding self-efficacy, an attribute of maternal confidence, predicted: 1) whether a mother would choose to breastfeed or not, 2) how much effort she would expend, 3) whether or not she would have self-defeating thought patterns, and 4) how she would respond to breastfeeding difficulties.

Dennis (1999) used Bandura's (1977) theory of self-efficacy as a framework for the theory of breastfeeding self-efficacy. Dennis believed that the application of elements of the self-efficacy theory during the prenatal period would provide healthcare professionals with a framework to measure breastfeeding confidence in new mothers. Dennis and Faux (1999) developed and psychometrically tested the Breastfeeding Self-Efficacy Scale (BSES) to help identify new mothers at risk for failure to initiate and/or sustain breastfeeding. Further studies conducted in Canada (Dennis, 2003), Australia (Blyth et al., 2002; Creedy, Dennis, Moyle, Pratt, & DeVries, (2002), China (Dai & Dennis, 2003) and Puerto Rico (Torres, Torres, & Rodriguez, 2003) replicated this original research and demonstrated that BSES scores consistently predicted breastfeeding duration.

Dennis (2003) modified this instrument after a reduction analysis indicated item redundancy. This led to the development of the Breastfeeding Self-Efficacy Scale–Short Form (BSES-SF), which was used in this study to measure breastfeeding self-efficacy under the condition of Web-based interventions.

Purpose and Aims

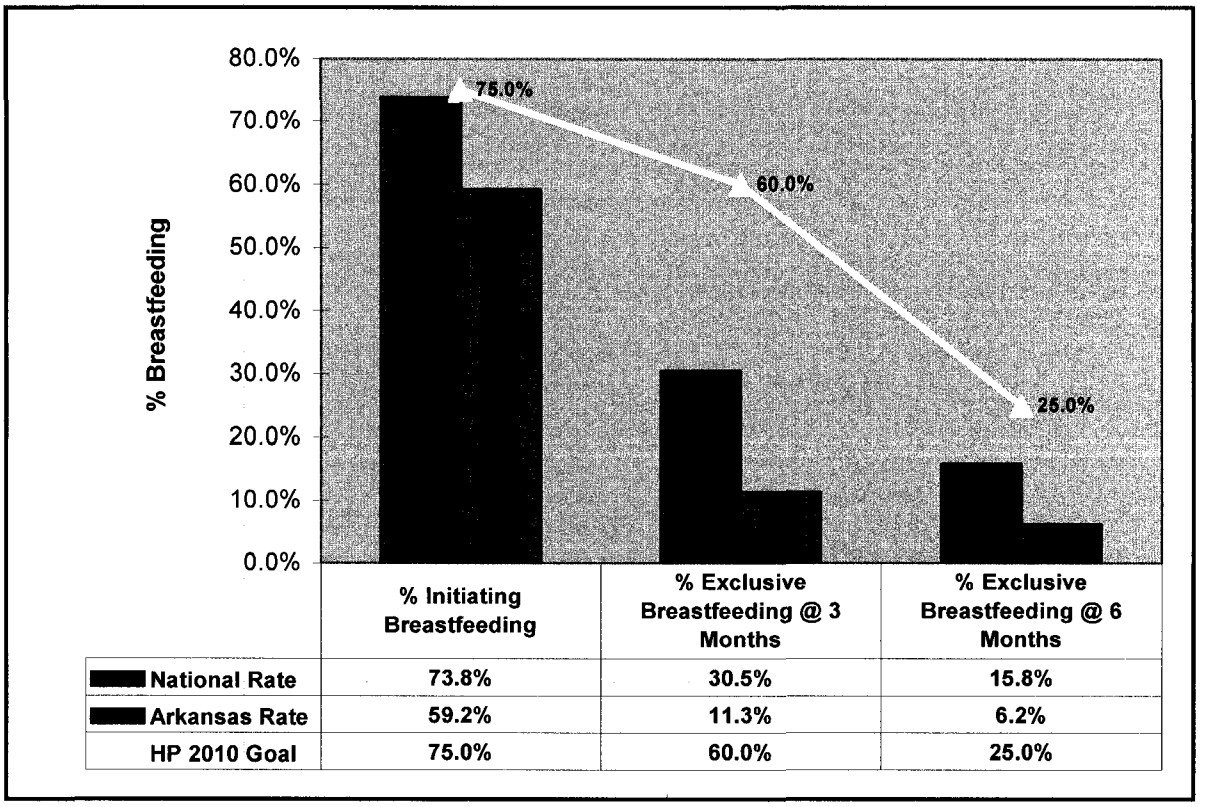
The purpose of this pretest/posttest randomized controlled trial was to determine if a short-term (six-week) breastfeeding Web-based intervention was effective in enhancing breastfeeding self-efficacy, which research has shown is positively related to breastfeeding initiation and duration.

The specific aims of this study were to: (1) study the effectiveness of peer counselor guided Web-based Interventions (PC-WBIs) in improving breastfeeding self-efficacy using the theory of breastfeeding self-efficacy framework; (2) determine statistical significance between pre- and post-intervention BSES-SF scores in randomly assigned intervention and control participants, and (3) contribute evidence-based knowledge to the scientific community.

Significance

Despite recommendations from the American Academy of Pediatricians, and overwhelming evidence that supports initiation and continuance of breastfeeding, only 11.3% (CI ±0.8) of infants in the United States, and only 6.2% (CI ±4.3) in the state of Arkansas, are exclusively breastfed to six months (CDC, 2006; American Academy for Pediatricians, 2006). As shown in Figure 1, Arkansas rates are substantially lower than the national rates and the objectives set by Healthy People 2010 (CDC, n.d.).

Figure 1. Breastfeeding Rates (CDC, 2006)



	% Initiating Breastfeeding	% Exclusive Breastfeeding @ 3 Months	% Exclusive Breastfeeding @ 6 Months
National Rate	73.8%	30.5%	15.8%
Arkansas Rate	59.2%	11.3%	6.2%
HP 2010 Goal	75.0%	60.0%	25.0%

The percentage of breastfeeding women on WIC has historically been lower than non-WIC women. While WIC breastfeeding rates have steadily risen from 3.6 percent in 1992 to 6.7 percent in 2006, these rates remain far below Healthy People 2010 goals (U.S. Department of Agriculture, 2007). WIC reports that major challenges in increasing the prevalence of breastfeeding include the lack of time WIC staff have to encourage and counsel pregnant women on breastfeeding and that WIC recipients include poor and under-educated women who are generally less likely to breastfeed their children (de Oliviera, 2003). These problems are also prevalent in Arkansas where only 39% of WIC moms, as compared to 61% of non-WIC moms, breastfed more than eight weeks (Pregnancy Risk Assessment Monitoring System, 2000).

Definitions of Terms and Abbreviations

- *Arkansas Department of Health (ADH)* – refers to the state department of health.
- *Breastfeeding Peer Counselors (BFPCs)* –paraprofessionals working for ADH who have had successful breastfeeding experiences and who can provide education and support for breastfeeding.
- *Breastfeeding Self-efficacy* -an attribute of maternal confidence that refers to a mother's perceived ability to breastfeed her newborn.
- *Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF)* - a psychometrically tested instrument designed to measure maternal confidence and predict breastfeeding outcomes.
- *Clinic-based* –provider-based education and support delivered in a health clinic setting. In this study, clinic-based refers to services provided by the ADH.
- *Exclusive Breastfeeding (EBF)* – only breast milk is given; no other liquids.
- *Non-Web-based* -traditional methods of delivering education and support such as face-to-face counseling and the distribution of written materials
- *Peer counselor guided Web-based interventions (PC-WBI)* – an intervention consisting of BFPC support in combination with Web-based programs.
- *Web-based* - anywhere, anytime education and/or support delivered over the Internet by a combination of methods.
- *WBI* – an acronym for Web-based interventions.
- *WIC* – an acronym for Women, Infants, and Children, a USDA program designed to improve the nutrition and health status of low-income women, infants, and preschool children.

Summary

This chapter introduced the research topic and discussed the research problem. A statement of the problem was presented, an overview of the theoretical rationale was provided, the purpose and aims were stated, definitions of terms and abbreviations commonly used in this research study were presented and the significance of this research project was given. The next chapter will summarize an extensive search of existing literature and provide a critical and integrative review of knowledge concerning non-Web-based and Web-based breastfeeding promotion and the philosophical approach to the development of the theory of breastfeeding self-efficacy.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

This chapter will review the literature related to the theoretical framework of breastfeeding self-efficacy and present a synthesis of evidence-based studies focusing on improving breastfeeding outcomes in a non-Web-based or Web-based environment. The framework for the theory of breastfeeding self-efficacy is presented; a description of the methodology for searching, retrieving, and synthesizing evidence-based research literature is described; and findings from preliminary research are reviewed.

Theoretical Framework

Although research on breastfeeding-related confidence is relatively new, a review of the literature indicated that maternal confidence was identified as one of the most prominently used construct in research exploring predictors of breastfeeding success (Grassley & Nelms, 2008; Mantha, Davies, Moyer, & Crowe, 2008; Blyth et al., 2002; Ertem, Votto & Leventhal, 2002; Papinczak & Turner, 2000; Dennis, 1999; O'Campo, Faden, Gielen, & Wang, 1992; & Buxton et al., 1991). To develop a clear, useful definition of maternal confidence, Rodgers & Knafl's (20003) "evolutionary" method of concept analysis was used to identify the abstract characteristics of "confidence" and to form a model case describing related attributes, antecedents, and consequences. This concept analysis led to the discovery of Bandura's (1986) theory of self-efficacy. Self-efficacy provides a mechanism to explain individual behavior and may be defined as a person's perceived capability to perform a behavior. By combining the terms self-efficacy, breastfeeding, and maternal confidence in a search of multi-disciplinary literature, the theory of breastfeeding self-efficacy emerged as a relatively new

framework for explaining and predicting breastfeeding behavior (Dennis & Faux, 1999). Self-efficacy expectancies for breastfeeding include a woman's confidence in her ability to perform specific tasks and behaviors related to successful breastfeeding (Dennis). Testing the theory of breastfeeding self-efficacy, under the condition of Web-based programs, provided empirical data regarding the practical use of this breastfeeding intervention to enhance the efforts currently expended by health care providers in clinic, hospital, and public health settings. Using breastfeeding self-efficacy as the outcome of interest in this study was consistent with the goals of using "Upstream" health improvement interventions that focus attention on the nonmedical determinants of health (Williams, Costa, Odunlami, & Mohammed, 2008).

Historical Perspective

The theoretical underpinnings of the middle-range theory of breastfeeding self-efficacy can be found in Bandura's theory of self-efficacy, which states, "People's level of motivation, affective states, and actions are based more on what they believe than on what is objectively true" (Bandura, 1997, p.2). Self-efficacy beliefs provide the foundation for human motivation, well-being, and personal accomplishment. Self-efficacy emerged as a significant attribute of the Social Cognitive Theory when Bandura realized that a key element affecting behavior was missing from the prevalent learning theories of that time – that of self beliefs (Bandura, 1977). The Social Cognitive Theory stemmed from the Social Learning Theory of 1941, which emphasized the importance of interaction with the environment on behavior and was a paradigmatic shift from the Behaviorism's instinct-based behavior philosophy (Pajares, 2002).

The philosophical foundation for this research project can be traced back to Auguste Compte's explanation of positivism (Schlick, 1979). Compte believed that the central assumption of positivism is the fact that from science we get prediction and from prediction comes action (Schlick). The theory of breastfeeding self-efficacy, which proposes that BSES scores are predictors of breastfeeding outcomes, is consistent with this belief. Positivism introduced the important relationship between theory, practice, and human understanding of the world (Schlick). This experimental research study followed this philosophical approach by seeking to gain an understanding of the relationship between breastfeeding self-efficacy theoretical concepts and the practice of Web-based programs for improving breastfeeding.

Theory of Breastfeeding Self-Efficacy

Bandura (1986) believed that when choosing, performing, or maintaining a behavior, four sources of information are considered influential in forming individual responses: 1) mastery experience, 2) vicarious experience, 3) social persuasion, and 4) physiological states. These sources of information, which Dennis (1999) used to form the antecedents within the breastfeeding self-efficacy theory, can be positively influenced by a Web-based breastfeeding program through the provision of appropriate and accurate information, peer and professional support, and audio-visuals that are tailored to pregnant women. Dennis believed that by using the self-efficacy theory as a framework for maternal confidence, women would "initiate, persist in, and continue breastfeeding" (p.200)

The relationships between the antecedents, consequences, and behavioral outcomes of Dennis' (1999) breastfeeding self-efficacy theory were clearly defined and

have been used to develop a conceptual model for this research. The antecedents and consequences of the theory of breastfeeding self-efficacy, using concepts from Bandura's self-efficacy theory, were defined by Dennis and are reported in the following paragraphs.

Antecedents

Performance Accomplishments. In breastfeeding self-efficacy, this antecedent refers to previous successful breastfeeding experiences. Self-efficacy is raised when breastfeeding is perceived as successful and lowered when unsuccessful (Dennis, 1999).

Vicarious Experience. A type of observational learning where other individuals' successful breastfeeding performances are delivered live, recorded, or in written materials and provide a common source of information about the skills and abilities involved in breastfeeding (Dennis, 1999). The effectiveness of observational learning is contingent on the attributes of the role model. Research has shown that peer counselors who have had successful breastfeeding experiences are effective positive role models (Kistin, Abramson, & Dublin, 1994; Long, Funk-Archuleta, Geiger, Mozar, & Heins, 1995; Schafer & Voget, 1998).

Verbal Persuasion. Praise from lactation consultants, healthcare professionals, peer counselors, family members, or personal friends can bolster a woman's self-efficacy. The effectiveness of verbal persuasion is contingent upon the credibility of the individual providing the appraisal (Dennis, 1999)

Physiological and Affective States. Positive interpretations of emotional arousal and other physiologic cues experienced while performing a behavior can positively or negatively influence self-efficacy. Dennis (1999) proposed that breastfeeding self-

efficacy is dependent on the interpretation of these cues (for example, excitement, satisfaction, pain, fatigue, anxiety, or stress).

Consequences

Choice of Behavior. Individuals with high self-efficacy will choose to breastfeed, as new mothers are more apt to try something new if they feel they are competent to perform the task (Dennis, 1999).

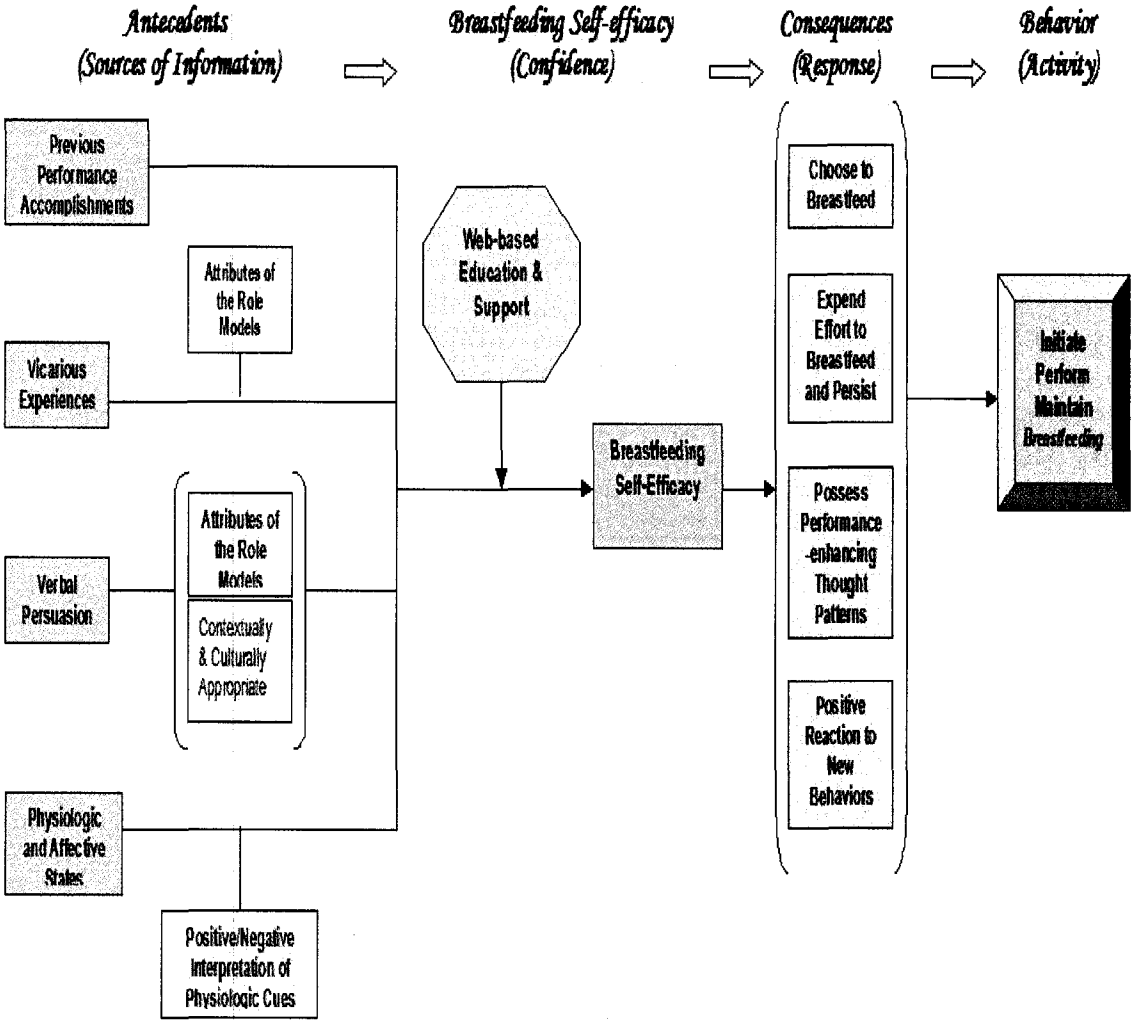
Effort Expenditure and Persistence. Bandura proposed that individuals with high self-efficacy tend to engage themselves fully in an activity by persisting and increasing their efforts when they begin to fail (Dennis, 1999; Bandura, 1986).

Performance Enhancing Thought Patterns. Bandura also believed that individuals with high self-efficacy were able to envision success, as these individuals are less likely to emotionally respond to difficulties and more likely to use a cognitive process to accomplish their goals (Dennis, 1999).

Positive Emotional Reactions. Positive decisions are influenced by an individual's emotional reaction to new behaviors. A person with high self-efficacy views a task as challenging; whereas an individual with low self-efficacy is overwhelmed by the prospect of having to perform the task (Dennis, 1999).

These concepts and their relationships, under the condition of Web-based education and support, are shown in Figure 2:

Figure 2. Conceptual model of the theory of breastfeeding under the condition of Web-based education and support



Source. From "Theoretical Underpinnings of Breastfeeding Confidence: A Self-Efficacy Framework," by C-L Dennis, 1999, Journal of Human Lactation, 15(3), p.197.

Theory Evaluation

This dissertation research was a predictive theory-testing study, which Fawcett (1999) states should meet four criteria: significance, internal consistency, parsimony, and testability. The criterion of social significance was met, as this research addresses a problem of particular interest to society. Theoretical significance was established by filling a gap that existed in this theory regarding Web-based interventions that may enhance self-efficacy. Internal consistency was met, as Dennis (1999) constitutively and operationally defined the concepts that comprise the breastfeeding self-efficacy theory with semantic clarity and consistency.

The theory is not overly complex and can easily be integrated into the practice setting, meeting the requirement of parsimony. The theory of breastfeeding self-efficacy also meets the criterion of testability, as its concepts can be observed empirically; the propositions can be measured; and its derived hypotheses can be falsified. A review of the literature identified several propositional statements that have provided the basis for understanding and testing the theory of breastfeeding self-efficacy. These statements have been classified using a schemata proposed by Fawcett and are shown in Table 2.

Table 2.

Theory of Breastfeeding Self-efficacy Propositions

Proposition	Classification
A mother's level of motivation, affective states, and actions are based on what they believe or don't believe they can do (Dennis, 1999).	Existence Contingent
Peer counselors have the skills to provide positive role modeling and guidance that can enhance breastfeeding self-efficacy (Lawrence, 2002).	Relational Direction Symmetrical
Breastfeeding is associated with consistent and statistically significant increases in cognitive ability and educational achievement (Horwood & Fergusson, 1998).	Relational Direction Asymmetrical
Maternal confidence is the most significant variable influencing breastfeeding adherence and duration (O'Campo et al., 1992).	Relational Direction Asymmetrical
Self-efficacy is a potentially modifiable variable. (Dennis, 2006).	Existence
Breastfeeding Self-efficacy Scale Scores are significantly related to breastfeeding outcomes at 1 week and 4 months (Blyth, et al.).	Relational Direction Asymmetrical
Social network of the mother is an important influence on initiation and duration of breastfeeding (Bonuck, Trumbley, Freeman, & McKee, 2005).	Relational Contingent
Role models for breastfeeding are important, but less available when breastfeeding is not the cultural norm (Dennis, Hodnett, Gallop, & Chalmers, 2002).	Existence
Lower breastfeeding rates are associated with infant mortality (American Academy of Pediatricians, 2006)	Relational Direction Asymmetrical
Breastfeeding self-efficacy is an attribute of maternal confidence. (Dennis, 1999)	Definitional
Women who participate in a prenatal self-efficacy enhancing intervention will have higher breast-feeding self-efficacy at 4 weeks postpartum than women in a control group (Nichols et al., 2007)	Relational Direction Asymmetrical

Theory Testing

To develop an instrument to test the theory of breastfeeding self-efficacy, Dennis (1999) conducted an extensive review of the literature and completed a concept analysis of self-efficacy, using methods recommended by Walker & Avant (1988). The domains that emerged from the Dennis concept analysis are:

1. Technique – actions and tasks that must be performed by the new mother for successful breastfeeding to occur.
2. Intrapersonal thoughts – breastfeeding perceptions of a new mother, including her attitudes and beliefs concerning a successful breastfeeding experience.
3. Support – the assistance that a new mother perceives as available for successful breastfeeding; emotional, informational, instrumental and appraisal assistance.

These domains provided the foundation for the initial development of the Breastfeeding Self-efficacy Scale (BSES), designed to test the theory of breastfeeding self-efficacy (Dennis & Faux, 1999). Dennis (1999) created propositional statements, as examples of breastfeeding expectations, for the antecedents, consequences, and behavior outcomes of Bandura's self-efficacy theory. These examples, as shown in Table 3, demonstrate the relationship between breastfeeding concepts and self-efficacy concepts and have guided the development of the BSES. Structural consistency of the theory was established through the development and subsequent psychometric testing of the BSES instrument.

Table 3.

Examples of Breastfeeding Expectations Using the Self-Efficacy Theory (Dennis, 1999a)

Elements of Self-Efficacy Theory	Examples of Breastfeeding Expectations
	Antecedents
Performance Accomplishments	Mothers with previous successful breastfeeding experience attempts will have higher breastfeeding self-efficacy than mothers who have not.
Vicarious Experience	Mothers who have observed successful breastfeeding will have higher breastfeeding self-efficacy than mothers who have not.
Verbal Persuasion	Mothers who receive positive evaluations and encouragement by a credible significant other will have higher breastfeeding self-efficacy.
Physiological States	Mothers who are relaxed and calm will have higher breastfeeding self-efficacy than mothers who are overwhelmed, anxious, or in pain.
	Consequences
Choice of Behavior	Mothers with high breastfeeding self-efficacy will choose to initiate breastfeeding, set breastfeeding goals, and be committed to these goals.
Effort Expenditure & Persistence	Mothers with high breastfeeding self-efficacy will exert effort and persevere with breastfeeding even when confronted with difficulties.
Thought Patterns	Mothers with high breastfeeding self-efficacy will envision success, think analytically and manage self-defeating thoughts.
Emotional Reactions	Mothers with a high breastfeeding self-efficacy will interpret breastfeeding difficulties as a positive challenge.
	Behavior Expectations
Efficacy Expectations	Mother is confident that she will be able to properly latch her baby on her breast.
Outcome Expectations	Mother believes that properly latching her baby will prevent cracked nipples.

A Systematic Review of Breastfeeding Research

A meta-synthesis approach was used to determine what is known about evidence-based breastfeeding research (Cooper, 1998). The aim of this review and synthesis was to produce a new and integrative interpretation of research focusing on the effectiveness of interventions in improving breastfeeding outcomes. This meta-synthesis built on previous findings from the U.S. Preventive Services Task Force (USPSTF) meta-analysis, which evaluated the effectiveness of educational and supportive interventions in improving the initiation and duration of breastfeeding (Guise, Palda, Westhoff, Chan, Helfand, & Lieu, 2003). The USPSTF meta-analysis included an exhaustive search of articles for the period 1996-2001, which yielded 22 randomized controlled trials, only one of which was judged to be of good quality.

Despite the reported lack of quality studies, the findings in this analysis, and subsequent recommendations, are important to the development of future interventions, both Web-based and non-Web-based. Specifically, recommendations for future interventions consisted of combining breastfeeding education with behaviorally oriented support, as these are shown to be the most effective in improving breastfeeding duration (Guise, et al.). Other significant findings by the USPSTF indicated that counseling from a provider during routine visits or the distributions of written materials were not effective in improving breastfeeding outcomes.

Search Strategy

Search terms were identified through the development of a PICO-formatted (population, intervention, comparator, and outcome) research question. Inclusion and exclusion terms are listed in Table 4.

Table 4.

Literature Search Strategy Criteria

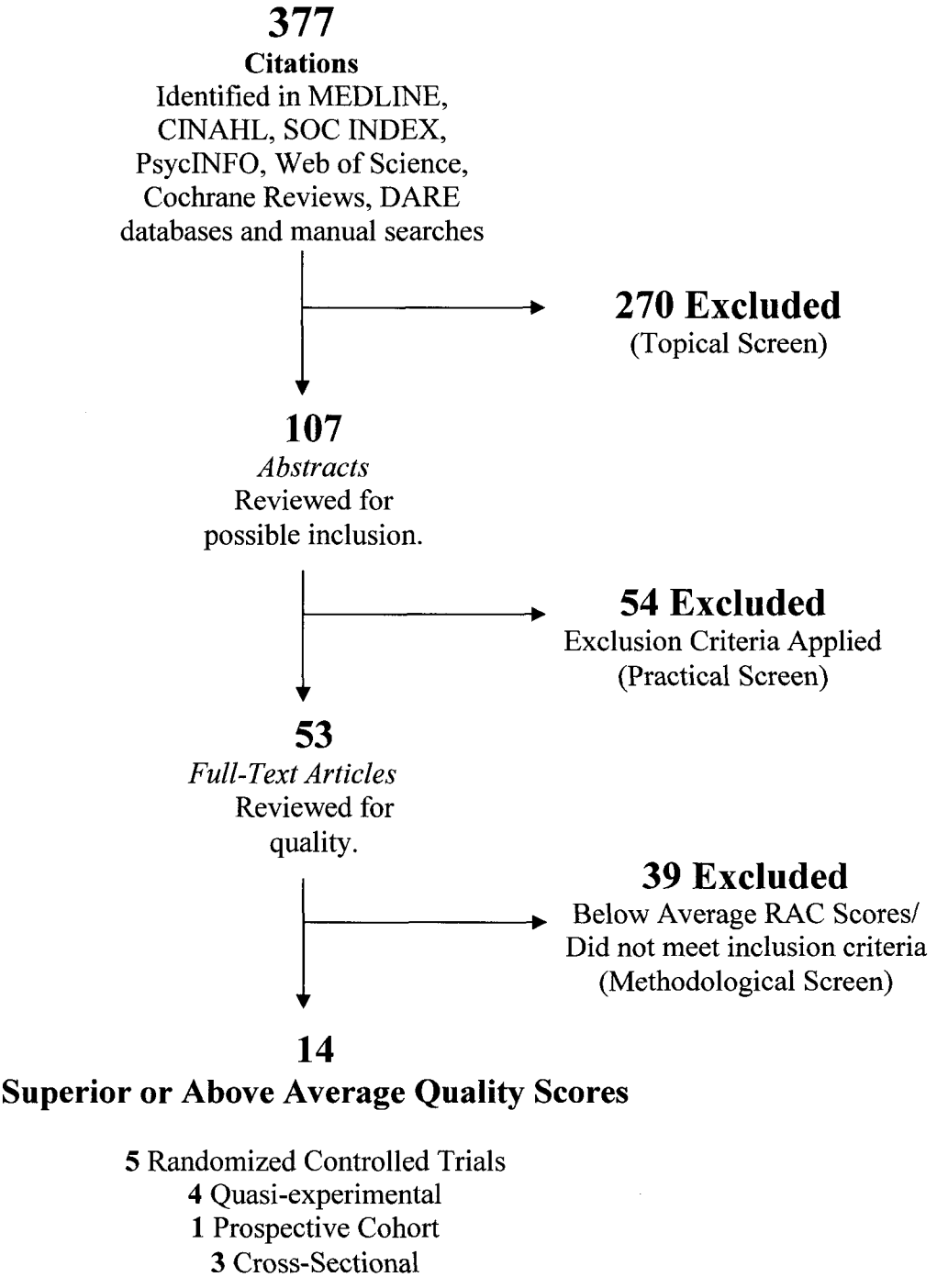
Criteria	Inclusion	Exclusion
Population	Women and/or Pregnant Women	Males, Non-humans
Intervention	Programs designed to support, educate, and promote breastfeeding attitudes, behaviors, and knowledge.	Medical interventions Health promotion interventions not related to breastfeeding
Comparison	Usual or standard care	None
Outcomes	Breastfeeding self-efficacy, behavior, knowledge, and/or attitude	Outcomes not related to breastfeeding
Design	Experimental, quasi-experimental, and non-experimental evaluating the effectiveness of breastfeeding interventions.	Qualitative Research Designs Reviews Meta-Analyses
Sampling	Probability or non-Probability samples	None
Setting	Communities or institutions in developed countries	Settings in developing countries
Date of Publication	Studies published from 1/1/2003 through 12/31/2008	Prior to year 2003
Publication Type	Journal Articles, Research Reports, Government Reports, University Reports, Reviews, Electronic Journals	White Papers, Letters, & Editorials,

Eligible studies were identified by searching MEDLINE, CINAHL, SOC INDEX, PsycINFO, Web of Science, Cochrane Trials, Cochrane Reviews, and DARE for the years 2001 through 2008. A search for gray literature was also conducted using the following resources: New York Academy of Medicine Gray Literature Report Database, CRISP Database, Health Technology Assessment Database, and Health Research Projects in Progress Database. No gray literature met the inclusion/exclusion criteria for this meta-synthesis. In addition, manual searches were conducted for articles not available in these databases using the University of Arkansas for Medical Sciences library. When an abstract was selected for review, the full-text publication reference list was also reviewed for relevant articles. Literature regarding the theoretical framework was found by using the term breastfeeding self-efficacy and self-efficacy with no delimitations. The underlying philosophy for this research project was discovered through a retrospective review of related periodicals and books.

Search Results

The searches initially identified >100,000 publications using the key and MeSH terms for the variables of interest: breastfeeding self-efficacy, maternal confidence, breastfeeding support and/or education. After combining terms, and focusing only on evidence-based research studies involving breastfeeding interventions, 377 citations were retrieved. After eliminating redundant studies and articles that clearly contained an intervention not related to breastfeeding promotion, 107 abstracts were reviewed for possible inclusion in this review. Fifty-four studies were additionally eliminated based on eligibility criteria. Fifty-three intervention studies met inclusion/exclusion criteria and were reviewed for quality. See Figure 3 for the study eligibility flow chart.

Figure 3. Study Eligibility Flow Chart



Quality Assessment of the Studies

The Research Appraisal Checklist (RAC) developed by Duffy (2001) was used to assess the quality of each study. Content validity for the RAC was established by members of the American Nurses' Association Council of Nurse Researchers. Eleven doctoral students used the instrument to appraise the same article and revisions were made based on their comments. Construct validity was determined by testing the hypothesis that "PhD students' rating of the research report using the RAC would be closer to an expert's ratings than would beginning master's students' ratings of the same report" (Duffy, 2001, p. 325). Interrater reliability of the RAC was estimated by independent reviews of a research report by Duffy and a doctoral student. The coefficient for the total instrument was $r = 0.94$. Cronbach's alpha for the estimate of internal consistency of the RAC was reported as 0.91 and all item-to-total correlations were reported as statistically significant at the 0.05 level (Duffy). Duffy's RAC facilitates the scoring of research studies using three categories: "superior" (205-306 points), "average" (102-204 points), and "below average" (0-102 points).

RAC scores on the eligible sample ranged from a low of 75 to a high of 271. Studies scoring below 102 points ("Average") were not included in this meta-synthesis of evidence-based breastfeeding research. Fourteen articles (5 Randomized Controlled Trials [RCTs], 4 Quasi-experimental, 1 Cohort, and 4 Cross-sectional) scored in the "average" or "superior" category. Study characteristics and collective findings of intervention studies that examined breastfeeding behaviors, knowledge, and attitudes were abstracted from the analytic sample of studies and entered into a Microsoft Access database for collective interpretation. These data are shown in Table 5.

Table 5.

Collective Findings Table for Breastfeeding

First Author (Date)	Purpose/Question	Study Design Sample Size N(I)[a] N(C)[b]	Intervention (Web/Non-Web)	Findings
Noel-Weiss (2006)	Test hypothesis education workshop increases BSE & BF duration.	RCT N=92 47(I) 45(C)	Education (Non-Web)	Workshop increased BSE and BF duration.
Labarere (2005)	Determine if visit to PC provider increases BF outcomes.	RCT N=231 116(I) 115(C)	Support & Education (Non-Web)	Longer BF duration in intervention group.
Dennis (2002)	Evaluate the effect of peer support on BF duration.	RCT N=256 132(I) 124(C)	Support (Non-Web)	Peer support increased BF duration.
Anderson (2005)	Evaluate the effect of peer counseling on BF outcomes.	RCT N=162 63(I) 72(C)	Education (Non-Web)	Intervention group had higher initiation and duration rates.
Bonuck (2006)	Determine if lactation consultant intervention increases BF rates.	RCT N=299 145(I) 154(C)	Support (Non-Web)	Intervention group had higher BF duration and intensity.
Wilhelm (2006)	Determine if motivational interviewing promotes BSE & BF.	Quasi-Exp N=73 37(I) 36(C)	Support (Non-Web)	Longer BF duration in intervention group.
Fallon (2005)	Evaluation of Telephone-based support for BF	Quasi-Exp N=2176 1236(I) 940(C)	Support (Non-Web)	Telephone-based support improved BF duration.
Blyth (2002)	Assess the effect of maternal confidence on BF duration	Prospective N=300	Maternal Confidence (Non-Web)	Maternal confidence is a significant predictor of BF.

First Author (Date)	Purpose/Question	Study Design Sample Size N(I)[a] N(C)[b] RAC[c] Score	Intervention/ Study Variables (Web/Non-Web)	Findings
LeWallen (2005)	Evaluate the relationship between BF support and early cessation	Cross-Sectional N=379	Support (Non-Web)	Lack of BF support postpartum is associated with decreased duration.
Dennis (2006)	Identify predictors of BSE in postpartum period	Cross-Sectional N=522	Support (Non-Web)	Results provided evidence that BSE can be modified to help improve BF rates.
Dunn (2005)	Determine the relationship between vulnerability factors & BF duration.	Cross-Sectional N= 526	Support Maternal Confidence (Non-Web)	Maternal confidence is the strongest predictor of BF outcomes.
Chezem (2002)	Determine the relationship between knowledge and BF confidence	Quasi-experimental N=83	Maternal Confidence Education (Non-Web)	Maternal confidence is positively correlated with BF duration.
Herman (2002)	Examine the feasibility of a social support Web site by low-income women	Cross-Sectional N=283	Support (Web)	PC Patients more satisfied and more confident about breastfeeding
Cheng (2003)	Gather perceptions of two breastfeeding web-based educational programs	Quasi-experimental N=20	Education (Web)	Participants were highly satisfied with the Web-based breastfeeding programs.

[a]N(I) refers to the sample number in the intervention group.

[b]N(C) refers to the sample number in the control group.

Synthesis of Non-Web-Based Breastfeeding Research

A search of the literature focusing on research designed to promote and encourage breastfeeding, found that three key variables were critical factors for successful breastfeeding. These included maternal confidence, breastfeeding support and breastfeeding education (Dunn, Davies, McCleary, Edwards, & Gaboury, 2006; Lewallen, Dick, Flowers, Powell, Zickefoose, 2006; Guise et al, 2003; Dennis, et al., 2002).

Maternal Confidence. Maternal confidence was either the variable of interest, or considered a moderator, in 62% of the studies reviewed emphasizing the importance of this modifiable factor. In all but one study (Chezem, Fiesen, & Boettcher, 2002), maternal confidence was found to improve breastfeeding outcomes. Chezem, et al. found that there was no significant relationship between breastfeeding duration and maternal confidence; however the statistics were not provided. The authors do report that this is in contrast to previous findings and that the lack of statistical significance may be related, in part, to the choice of instruments and the timing of the confidence assessment. This study was a small-sample, quasi-experimental study that should be interpreted cautiously.

Maternal confidence, or breastfeeding self-efficacy, is defined as a mother's perceived capability of successfully breastfeeding (Dennis, 1999). Research has shown that the most significant factor associated with failure to initiate and sustain breastfeeding is lack of maternal confidence (Chezem, et al., 2002; Blyth, et al., 2002; Creedy, et al., 2002; Buxton, et al., 1991; O'Campo, et al. 2002; Papinzak & Turner, 2000). In a prospective study of 627 pregnant women, Dunn, et al. (2006) found that women with low confidence were three times as likely to wean at six weeks. (*OR* = 3.10, *95% CI*:

1.36-7.07, $\chi^2 = 6.42$; p=0.01) than women with higher confidence. Nichols, et al. (2007) found that women who were assigned to a breastfeeding self-efficacy intervention showed significantly greater increases in breastfeed self efficacy than did the women in the control group (F[1,87]=5.35, p=.03).

Breastfeeding Support. Over 60% of the articles reviewed reported professional, peer, or social breastfeeding support as a positive factor in improving breastfeeding duration. Anderson et al. found that well-structured, intensive breastfeeding support provided by hospital and community-based peer counselors was effective in improving exclusive breastfeeding rates among low-income, inner-city women (Cohen's d = 1.4). Dennis, et al. (2002) found that significantly more mothers in the peer support group than in the control group continued to breastfeed at 3 months postpartum (81.1% vs. 66.9%, p=.01). These findings were consistent across studies with different levels and types of support (Wilhelm, Stepans, Hertzog, Rodehorst, & Gardner, 2006; Bonuck, et al., 2005; and Labarere, Gelbert-Baudino, Ayral, Duc, Berchotteau, & Bouchon, 2005). Lewallen, et al. (2006) examined the types of help women received with breastfeeding both in the hospital and at home and found that ninety-two percent (N=35) of the women studied reported having help with breastfeeding in the hospital. However, this situation changed once the women returned home where only 54.8% (N=208) reported receiving help.

Social, peer, and professional support are significant factors in breastfeeding initiation and duration. Social support helps reduce maternal stress by providing a mechanism for individuals to access information, receive emotional support, and get help as they cope with stressors caused by the newness of motherhood (Bonuck, et al., 2006). Peer counselors have had previous success breastfeeding, which establishes their

credibility with new mothers. They have the skills to provide positive role modeling and guidance that can enhance breastfeeding self-efficacy. Dennis, et al., (2002) found that significantly more mothers in a peer support group, than in the control group, continued to breastfeed at 3 months postpartum (81.1% vs. 66.9%, p=0.01). Professional support for breastfeeding primarily occurs in clinic and hospital settings where the knowledge, skills, and breastfeeding attitudes of nurses are directly related to the success or failure of a new mother's breastfeeding initiation and/or duration (Bonuck, et al.). These findings have been consistent across studies with different levels and types of support (Bonuck et al.; Labarere, et al., 2005; & Wilhelm, et al., 2006).

Breastfeeding Education. Breastfeeding education was the variable of interest in only two studies. This is a significant reduction from the meta-analysis conducted by Guise et al. (2003) where 55% of the studies involved education. This may be due in part to the lack of a clear distinction between breastfeeding support and education. Education generally includes providing instruction, which can be viewed as supportive.

Breastfeeding education is defined as individual instruction sessions or group classes that contain structured content on breastfeeding and/or provide training on practical skills such as positioning and latching techniques in a non-Web-based or Web-based setting. Professional education includes any programs that improve the knowledge, skills, attitudes, or behaviors of health care providers on the importance of breast-feeding, the physiology and management of lactation, or counseling related to breastfeeding (CDC, 2006a). In a randomized controlled trial (N=110) of primiparous women, a prenatal breastfeeding workshop was found to be effective in improving breastfeeding

self-efficacy (p=0.004), which led to improved breastfeeding duration rates (Noel-Weiss, Bassett & Cragg, 2006).

Synthesis of Web-based Breastfeeding Research

Despite scientific knowledge, which supports the effectiveness of these three key variables in initiating and sustaining breastfeeding, research also continues to indicate that a lack of time and breastfeeding knowledge impedes nursing's ability to effectively educate and counsel pregnant women regarding breastfeeding issues (Gagnon, 2005; Blyth et al., 2002). Currently, search engines on the Internet list millions of links to Websites offering information on breastfeeding (Eysenbach & Kohler, 2002). Many of these sites support current breastfeeding recommendations from the Academy of American Pediatricians and could serve as an educational tool for both nurses and clients. However, the credibility and quality of these sites is unknown. Therefore, it is the responsibility of health care professionals to evaluate and guide pregnant women to sites where the information has been found to be appropriate and adequate for promoting breastfeeding.

Web-based education and support "includes information, peer support, expert advice, and activities to help the client make decisions and plan behavior" (Herman, Mock, Blackwell, & Hulsey, 2005). In a recent meta-analysis comparing the effectiveness of Web-based versus non-Web-based interventions (N=11,754), Wantland et al. (2004) found that effect sizes for each of the reviewed study variables for knowledge change and/or behavioral change ranged from small (0.01 to 0.19); to moderate (0.20 to 0.47); to moderately large (0.54 to 0.75). The authors concluded that

there is "substantial evidence that use of Web-based interventions improve behavioral change outcomes" (Wantland et al., p.12)

In a recent study of nineteen African American women, Herman, et al. (2005), found that a Web-based pregnancy support program was successful in connecting, supporting, and educating this hard-to-reach group. Their findings indicated that this population could easily learn how to use the technology and that the most popular pages on the Web site were the discussion board and the "Ask the Nurse" page. They concluded that this method was cost-effective, empowered consumers and provided quality professional and social support.

In a research study on the use of therapeutic groups online, Finfgeld (2000) found that a few of the benefits of Web-based support include asynchronous 24/7 availability, time and travel savings, shielding of characteristics of users that might be stigmatizing, more comfort in talking about sensitive topics, anonymity, and the ability to take time to prepare a response. Disadvantages were reported as lack of face-to-face interaction and the fact that not all users have the technology to use the intervention. However, Finfgeld did comment that there is little research investigating the use of Web-based social and professional support; therefore it is difficult to determine if the advantages would outweigh the disadvantages.

There have only been two studies that examined the effects of a Web-based breastfeeding intervention. Huang, et al. (2007) developed a Web program for the purpose of educating prenatal women about breastfeeding. Their findings indicated that there was a significant effect in exclusive breastfeeding outcomes for the experimental group (Odds Ratio = 1.75, $Z = 1.97$, p=.05). The second study focused on comparing two

types of Web-based education (text versus graphics) rather than evaluating the effect of the intervention on breastfeeding outcomes (Cheng, Thompson, Smith, Pugh, and Stanley, 2003). Despite this, their research is pivotal, as findings indicated that 95% of the randomly assigned participants rated their comfort level with the computer as "very comfortable" even though some participants had no experience using a computer. Based on their findings, Cheng, et al. concluded that the "Web-based format provided a great deal of flexibility and allowed the users to find information of particular importance to his or her learning needs." In addition, men were included in this Web-based breastfeeding education program, having the potential to improve breastfeeding support in the home setting, which has been identified as a key moderator of breastfeeding duration (Lewallen, et al, 2006).

Dennis et al. (2002), Fallon, Hegney, O'Brien, Brodribb, Crepinsek, and Doolan (2005), Blyth et al. (2002), and Anderson et al. (2005) found that telephone support improved breastfeeding outcomes despite negative feedback concerning the inconvenient timing of the intervention calls. A Web-based intervention would be available anytime, in any location, and can be accessed when it is convenient for the user.

As more and more Americans use the Internet and the World Wide Web to gather health information, many health agencies are turning from written materials on health information to the use of Web-based health promotion programs (Wantland, et al, 2004). During the past 5 years, the number of American Internet users searching for information related to health topics has more than doubled to 113 million adults (Fox, 2006). The Pew Internet and American Life Project Survey found that every day during the month of

August 2006, approximately 10 million American adults searched for information on at least one health topic (Madden, 2007).

As people continue to move towards accessing online health information, nursing time can be more efficiently utilized, as less face-to-face time will be required for education and support. With the impending nursing shortage threatening the fabric of healthcare, discovering methods to save nursing time must become a national priority. Instead of being the method of delivery for education and support, nurses must find alternative methods and then learn to manage the method. If evidence-based research demonstrates that Web-based breastfeeding promotion interventions are successful, this innovative method of health support and education may be extended to other public health programs to either enhance existing nursing efforts, or to replace traditional education and support with systems that are less time intensive and more effective in achieving successful outcomes.

Preliminary Research

Feasibility Study

In 2006, this investigator conducted a qualitative pilot study ($n=3$) using a phenomenological approach (Morse & Field, 1995) to gather in-depth perceptions of public health nurses regarding the feasibility of a Web-based breastfeeding promotion intervention (Pate, 2006). Data were analyzed using thematic analysis, which facilitated the development of four overarching themes: *peer, informational and professional support are essential*, *frequency and timing of interventions are inadequate*; *lack of time, knowledge and confidence are barriers for nurses and moms;* and *nurses are willing to try anything different*. Breastfeeding support and maternal confidence were identified in

previous research as significant factors in facilitating breastfeeding and are discussed above. Frequency, intensity, and innovativeness of the interventions are new themes that emerged from the data. The following excerpts from interviews with public health nurses are exemplars of these themes:

Peer, informational, and professional support are essential. "Breastfeeding Peer Counselors help build confidence and that is the one thing these moms do not have."

Frequency and timing of interventions are inadequate. "The problem is it can be a long time from the patient's clinic visit until they deliver their baby and that's probably why we aren't doing well getting them to breastfeed."

Lack of time, knowledge and confidence are barriers for nurses and moms. "Nurses aren't always comfortable promoting breastfeeding because they don't really know that much about it, they don't have the training, and they just don't have the confidence."

Nurses are willing to try anything different. "If they [pregnant and new moms] knew they could just logon and chat with a counselor, wouldn't that be unbelievably great?"

Overall findings indicated that nurses perceived the use of technology for providing timely and routine breastfeeding information and support as superior to existing efforts by public health nurses, which consist of counseling and material distribution during a patient's initial prenatal visit. These findings provide support for the development and testing of Web-based interventions for improving breastfeeding outcomes.

Focus Groups

Four focus group sessions were conducted to facilitate the development and evaluation of the Web site interventions. This qualitative method is effective in collectively gathering the attitudes and perceptions of individual members with similar backgrounds (Morse and Field, 1995). Participants included Arkansas Department of Health breastfeeding peer counselors (BFPCs), the Statewide BFPC Coordinator, and the Statewide BFPC Supervisor. The purpose of the initial session was to present the research concept, to discuss the role of the BFPC in the delivery of the intervention (Website information) and to determine the methodology for evaluating breastfeeding Websites.

Based on information gathered during this session, and a comprehensive review of the literature, a breastfeeding Website evaluation form (see Appendix A) was designed using criteria from the Health On the Net Code of Conduct (Health On The Net Foundation, 2007), the American Association of Pediatricians (2006), the Arkansas Department of Health's (2006) breastfeeding policies and procedures, and the American Public Health Association's recommendations (Health Summit Workgroup, 2006). The second and subsequent sessions were held to address concerns regarding HIPAA and confidentiality, to define peer counselor coverage areas, and to provide training on the process used to evaluate existing breastfeeding Web sites.

The methodology used to retrieve and evaluate Web sites built on findings from studies evaluating breastfeeding Web sites (Shaikh & Scott, 2005; Dornan & Oermann, 2006). Both studies used the American Academy of Pediatrician's breastfeeding guidelines to determine the appropriateness and adequacy of breastfeeding information. For quality, Shaikh and Scott used the Health on the Net Code of Conduct (HONCode)

and Dornan and Oermann used the Health Information Technology Institute (HITI) criteria. Both searched the top three search engines. Shaikh and Scott recommended examining no more than twenty Web sites, as approximately 70% of users only query 2 pages of results. Dornan and Oermann only retrieved the top five Web sites citing a study done by Eysenback and Kohler (2002) indicating that consumers only explore the first few results returned by a search engine.

To identify Web sites for possible inclusion in this study, the top three search engines (Google, Yahoo, and MSN) were used to locate links to breastfeeding sites using the terms breastfeeding and breast feeding (Nielsen//NetRatings, 2007). This resulted in the retrieval of 120 Web sites. After eliminating duplicates and sites that were documents, not Web pages, 40 Web sites were evaluated by this researcher; and five BFPCs evaluated eight Web sites each. Evaluation scores were compared and if differences were 10 or more percentage points, the Statewide BFPC Coordinator and the Statewide BFPC supervisor evaluated the sites to resolve the differences. There were only four sites that had differences of more than 10 percentage points. Readability statistics were determined by pasting segments of the Web pages into Microsoft Word and then running the Flesch-Kincaid Grade Level function, which is consistent with methods used by Shaikh and Scott (2005) and Dornan and Oermann (2006). Readability levels ranged from 5^{th} grade to 12^{th} grade.

There were two aspects of Web sites that were evaluated: content and quality. The appropriateness and adequacy of the content material were evaluated using recommendations from the American Academy of Pediatricians and the Arkansas Department of Health breastfeeding policy guidelines. The quality of the Web site was

evaluated using the HONCode, if registered, and the HITI criteria if they were not a member. The results from this evaluative study are summarized in Appendix B. Sixteen sites, based on content scores, were selected for the intervention. The highest overall scores ranged from 63.1% to 97.5%. Content scores ranged from 63.9% to 96.7% and quality scores ranged from 71.1% to 100.0%. An intervention plan was developed using content similar to the education and counseling sequences used in local health units. The deliveries of content-specific sites will ensure that subjects receive information that builds knowledge in a structured manner.

Findings from the feasibility study and the focus group sessions have provided foundational information for this research study regarding the appropriateness and feasibility of using PC-WBI programs as a method for improving breastfeeding outcomes. The proposed study, using the PC-WBI developed collaboratively during the focus groups sessions, has been approved by the Arkansas Department of Health, Science Committee, whose members have responsibility for approving research involving public health clients.

Summary

This chapter provided a comprehensive review of the literature related to the theoretical framework of breastfeeding self-efficacy and breastfeeding promotion studies in a non-Web-based or Web-based environment. A description of the methodology for searching and retrieving relevant literature was described and findings from preliminary research were presented. The next chapter will discuss the methods and procedures of the proposed study.

CHAPTER III: METHODS

Introduction

This chapter presents the methods that were used to conduct this research study including the research design, sampling plan, instrumentation and procedures.

Research Design

A pretest-posttest randomized controlled trial (RCT) design was used to determine if there was a significant difference in mean BSES-SF scores at posttest time for the two groups, after controlling for the initial pretest scores. Arkansas Department of Health WIC participants were recruited by WIC nutritionists during their regularly scheduled visit. Consenting participants were randomly assigned to the intervention group or the control group. During the study both groups received usual care, which consisted of non-Web-based interventions, such as face-to-face counseling and education and the distribution of written materials. Participants in the intervention group received six-weeks of peer counselor guided Web-based education and support. Breastfeeding self-efficacy measurements for both groups were taken at week 0 (baseline) and week 7 (1 week post intervention). Study schematics are attached as Appendix C.

Potential Threats to Internal and External Validity

The following threats to the validity of the research design were identified a priori:

1. Attrition: subjects may drop out of the study before it is completed. This bias was minimized with an intent-to-treat analysis (Coffman, Aubry, Franks, & Yelin, 2007).

2. History: other breastfeeding promotional events may have a greater influence on the decision to breastfeed than is known. The distribution of participants was scattered throughout the state making it unlikely that history impacted the overall results.
3. Maturation: economic downtrends/loss of jobs may positively or negatively affect the decision to initiate breastfeeding. It would have been impossible to control for this threat without collecting additional personal data that was not available to this principal investigator..
4. Subject selection: sampling may be under/over represented within the groups. The study sample was a small, non-probability, convenience sample and the high refusal rate (38%) may have introduced selection bias into the study.
5. Hawthorne effect: the women selected for the intervention group may perform differently because they know they are being studied. The attention given by the BFPCs is part of the intervention and would be incorporated as usual care, if the intervention is effective.
6. Generalization: generalizing the results to populations other than the sample may not be possible due to nonprobability sampling. Due to the small convenience sample and the homogeneity of the sample (WIC women), generalization was not possible.

Sampling Plan

Sample Selection and Recruitment

Sample Characteristics. The target population for this research was WIC pregnant women (*N = 936,213*), which represents 45% of all infants born in the United States (United States Department of Agriculture, 2007). Pregnant women on WIC in the state of Arkansas (*N= 2,191)* during the month of recruitment comprised the accessible population (Arkansas Department of Health, 1007). Participants were screened for eligibility and willingness to participate by Arkansas Department of Health Nutritionists during routine WIC visits. Referrals were then sent to the principal investigator for recruitment.

Recruitment. Written Consent to release contact information was obtained using the ADH-4000: Authorization to Release Health Information (Appendix D) during a routine visit with ADH Nutritionists who used a script to screen clients for eligibility and willingness to participate (Appendix E). Contact information was then forwarded to this researcher who personally contacted potential participants via telephone and used an approved script to recruit the participants (see Appendix F). After confirming eligibility, obtaining written consent (see Appendix G) and HIPAA Authorization (Appendices H) participants were enrolled into the study and randomly assigned to either the intervention group or the control group using a computer-generated two-block random number generator in a 1:1 ratio.

Inclusion Criteria. Participants who met the following inclusion criteria were eligible for participation in this research study:.

1. Primiparous pregnant women on WIC with an expected due date greater than two months post-enrollment.
2. Between the ages of 20 and 30
3. Have access to email and the Internet
4. Provide written consent to participate to completion.

Exclusion Criteria. Subjects were considered ineligible if the following characteristics were present:

1. Identified as a substance abusers on their ADH WIC-5 record.
2. Received WIC in counties served by breastfeeding peer counselors.
3. Breastfeeding was contraindicated for any of the following reasons (CDC, 2007).
    a. Takes street drugs or does not control alcohol use.
    b. Has an infant with galactosemia.
    c. Has human immunodeficiency virus (HIV) infection.
    d. Has active, untreated tuberculosis.
    e. Takes certain medications that are contraindicated for breastfeeding.
    f. Is currently undergoing treatment for breast cancer.

Sample Size Estimation. There has been limited research conducted reporting the effect size of Web-based interventions relative to non-Web-based interventions. To determine the parameters for power and estimate sample size, data from the Wantland et al. study were used. In this meta-analysis, Wantland, et al. (2004) evaluated and analyzed

seventeen studies comparing Web-based interventions to non-Web-based intervention for improving health behavior and knowledge change outcomes. In this analysis, sixteen of the seventeen studies found improved knowledge and/or improved behavioral outcomes for participants using the Web-based interventions. Eleven studies found moderate to moderately large effect sizes providing data needed to estimate sample size using anticipated effect size as a determinant.

Power Analysis. An a priori power analysis was conducted for sample size estimation using G*Power 3 software (Faul, Erdfelder, Lang, & Buchner, 2007). The result of this analysis indicated that the smallest sample needed to detect a moderately large effect size with alpha error probability at 0.05 and power at 0.80 was 52. Details of the a priori power analysis used to compute this sample size are shown in Table 6.

Table 6.

*A priori Power Analysis using G*Power*

F tests - ANOVA: Fixed effects, special, main effects and interactions
Analysis: A priori: Compute Required Sample Size

Input:	Effect Size	=	.4
	α err prob	=	0.05
	Power (1-β err prob)	=	0.80
	Numerator *df*	=	1
	Number of groups	=	3
Output:	Noncentrality parameter γ	=	8.32
	Critical F	=	4.04
	Denominator *df*	=	49
	Total Sample Size	=	**52**
	Actual Power	=	0.81

Setting

The study setting was the state of Arkansas; however the intervention was delivered via the Internet to locations convenient to the participants. Study participants receiving the intervention were randomly assigned to breastfeeding peer counselors with each peer counselor having responsibility for guiding approximately three to four participants to pre-determined and pre-approved Web sites. Every attempt was made to equitably distribute responsibility for intervention participants to the peer counselors. Participants were encouraged to ask questions and provide feedback about their Web site experience. If requested by the participant, a face-to-face meeting between the WIC client and the peer counselor was arranged at a health department clinic closest to where the client resided, which is usual practice. If subjects posed questions or concerns outside of the peer counselor's scope of practice, they were referred to the Competent Professional Authority at the local health unit in their county of residence for assistance, which is also usual practice.

Instrumentation

The BSES-SF was used to collect breastfeeding self-efficacy data at pretest and posttest times. This instrument is a 14-item, self-report assessment tool modified from the original BSES due to the fact that internal consistency statistics suggested item redundancy. All responses are Likert-type scale items and are preceded with the phrase "I can always..." The scale ranges from 1=not at all confident to 5=always confident. All items are presented positively, which is consistent with Bandura's philosophy of self-efficacy. Total scores are summative and range from 14 to 70 with higher scores indicating higher levels of self-efficacy. In addition, this instrument has been used

antenatally for assessing breastfeeding self-efficacy by changing the stem to "I will always be able to..." (C-L Dennis, personal communication, October 4, 2007). Written permission to use the BSES-SF for data collection was obtained by Dr. Dennis (see Appendix I).

Psychometric Properties

Content Validity. Content validity of the BSES-SF was based on the literature, interviews with breastfeeding moms, and expert judgment (Dennis, 2003). A panel of three measurement experts and four content experts established content validity using methods previously established by Lynn (1986). The experts were asked to place each of the 40 items into one of the three domains and then to rate their level of confidence in placing the item. In addition, they were asked to predict the largest variability in item response, and to rate each item on a 3-point scale for its appropriateness in measuring breastfeeding self-efficacy. The resulting content validity index of 86% indicated a high degree of expert agreement with items placed in the correct domain 94% of the time (Dennis & Faux, 1999).

Construct Validity. Principal components factor analysis, comparison of contrasted groups, and correlations with measures of similar constructs were used to establish construct validity. All factor loadings exceeded 0.65, exceeding the 0.32 recommendation for item retention (Tabachnick & Fiddell, 2001). In addition, significant differences in breastfeeding self-efficacy were found between groups of primipara vs. multipara women with previous breastfeeding experience (Dennis, 2003).

Predictive Validity. Predictive validity was demonstrated in a study of breastfeeding women (N=164), through significant differences in BSES-SF scores and

infant feeding patterns at 4 and 8 weeks postpartum (Dennis, 2003). The higher the BSES-SF score was at 1-week postpartum, the more likely the mother was breastfeeding at 4 weeks postpartum. Blyth et al. (2002) found similar results with positive correlations between BSES-SF scores and infant feeding methods in a prospective study of 300 pregnant women.

Internal Consistency. The BSES-SF was tested and found reliable with a Cronbach alpha coefficient of 0.94 (Dennis, 2003).

Procedures

Intervention and Control Conditions

Participants in the intervention group received a weekly email for six weeks from their assigned peer counselor or the principal investigator (PI) directing them to Web sites that had been evaluated for content and quality. In addition to receiving the intervention, participants in the intervention group received usual care consisting of nursing and nutrition visits at the health department local health unit and written materials per ADH policy and procedure guidelines.

The control group only received usual care. Lindquist, Wyman, Krintine, Talley, and Findorff (2007) recommend creating a control condition that is similar to intervention conditions for time spent with participants, number of contacts, timing of intervention, and length of follow-up. While the rationale for this recommendation is appropriate to studies involving interventions where the interaction between researcher and subject is not the focus of the research, it does not hold true when the purpose is to determine if the interaction, when a component of the intervention, is more effective than usual care. The purpose of the proposed study is to examine the outcomes in a group receiving active

attention through peer counselor-delivered WBIs versus attention provided during usual care.

Peer counselors were responsible for guiding participants in the intervention group to pre-established Web site links via weekly emails for duration of 6 weeks with the following sequence and content:

Week-1 Benefits of breastfeeding for both baby and mom.

Week-2 Myths and facts of breastfeeding, positioning and latching

Week-3 Peripartum information

Week-4 Tips for getting started and successful breastfeeding

Week-5 What to expect during and after the 1st week postpartum

Week-6 Tips for mom; vitamins & fluoride

Follow-up emails were sent to members of the intervention group to gather information about their perceptions regarding the value of the information they received when reviewing the Web-sites. Participants were encouraged to direct their breastfeeding questions to their assigned peer counselor who was available to respond to all questions via email or telephone within 48 hours.

Data Collection

This principal investigator was personally responsible for collecting all study data. Eligibility information was collected during the screening process and verified by the PI during recruitment. Process Consent, HIPAA Authorization, and the BSES-SF pretest forms were given to potential participants by ADH nutritionists. This allowed the participants an opportunity to review the documents prior to contact by the principal investigator. A BSES-SF posttest was mailed to all participants on the seventh week.

Data Analysis

The variables of interest in this research project consisted of 1) one categorical independent variable with two levels, Intervention Group/Control Group; 2) one continuous dependent variable, BSES-SF posttest scores; and 3) one continuous covariate, BSES-SF pretest scores.

Null Hypothesis. The null hypothesis being tested in this study was as follows: There will be no difference in mean posttest BSES-SF scores between a group of WIC pregnant women receiving a peer counselor-delivered WBIs with usual care and a group of women receiving only usual care, after controlling for the pretest scores.

Intent to Treat Analysis. Data on all patients who were randomly assigned was analyzed in the groups to which they were allocated on an intention to treat basis (Frey & Sumeet, n.d.). For all subjects, the last observed response (pretest) carried forward and a sensitivity analysis was conducted to examine the effect of using this method on the conclusions. This analysis is based on the assumption that excluding subjects who withdrew could bias the results as compliant participants generally have better outcomes than noncompliant subjects (LaValley, 2003).

Statistical Techniques. A one-way between-groups analysis of covariance (ANCOVA) was conducted to compare the effectiveness of Web-based interventions designed to improve breastfeeding self-efficacy. The independent variable was the group assignment (Intervention/Control) and the dependent variable consisted of posttest scores on the BSES-SF–Short form (BSES-SF). Participants' scores on the pre-intervention administration of the BSES-SF test were used as the covariate in this analysis.

Statistical Assumptions. Preliminary checks were conducted to ensure that there was no violation of the assumptions for ANCOVA: normality, linearity, homogeneity of variances, homogeneity of regression slopes, and reliable measurement of the covariate. The following were the tests used to determine if the assumptions for ANCOVA were met:

1. Normality – for both the pretest and posttest scores, Kolmogorov-Smirnov results were examined.
2. Linearity - The R^2 value was examined to determine if there was a linear relationship between Posttest scores and Pretest scores.
3. Homogeneity of Variances – Levene's Test of Equality of Error Variances was used to test for equal error variances.
4. Homogeneity of Regression Slopes – The significance level of the interaction term Group*Pretest was examined to determine if there was any interaction between pretest and the intervention manipulation.
5. Reliable Measurement of the Covariate – Cronbach's alpha for Pretest Scores was used to test this assumption.

Human Subject Protection

Institutional Review Board Approval. Appropriate Institutional Review Board (IRB) approval was received (see Appendix J) and human subject considerations were followed pursuant to University of Arkansas for Medical Sciences and Arkansas Department of Health's guidelines. Even though the risks to the participant or her fetus were minimal, pregnant women are considered a vulnerable population requiring special

attention from the IRB. Based on Policy 17.8, the University of Arkansas for Medical Sciences IRB determined that the consent of the father was not required. The IRB also required that adequate consideration be given to the manner in which potential subjects will be selected. This condition was met with through voluntary participation and the opportunity to "opt out" of the study at any time. This option was standard language in each email so participants were continually reminded of their rights. This researcher monitored the consent process with weekly follow-up emails to the participants. In addition, each email reminded the participants to see their medical provider for issues relating to their pregnancy. All emails had a warning regarding the credibility of information on the Internet that had not been evaluated for accuracy and adequacy. Signed informed consent and HIPAA authorization forms were obtained from all participants before conducting the research.

Confidentiality. To protect participants' privacy, names were not attached to test results. A unique identifier was assigned to participants and the analysis/results used this identifier for purposes of data matching and publishing results. Documents and computer files were placed in a locked file cabinet in the principal investigator's home office. Computer data was password protected and all participants' research records will continue to be kept confidential.

Potential Benefits to the Participants. This research had the potential to increase participants' knowledge about breastfeeding. It also had the potential to benefit society as a whole through increased knowledge, technological advances, and better health. This information will help the Arkansas Department of Health understand the usefulness of

this educational program as a method of saving public health nursing time and reducing clinic visit time for pregnant WIC women.

Potential Risks to the Participants. The IRB determined this study to be "minimal risk." Participants were informed on the consent form, and verbally, that loss of confidentiality was a potential risk. However, they were assured that every reasonable effort would be made to protect their confidential information.

Data Safety and Monitoring. The PI coded identifying information with a unique identifier. This identifier was used for entering data into databases and for reporting purposes. Information on computer hard drives was secured by password protection and backed up after data was entered to a universal serial bus (USB) drive that is accessed with the PI's fingerprint. The PI has kept all study data in one locked cabinet at the PI's home office. Only the PI and members of the research team have access to the data. The PI maintained an individual research file on all participants, which included a communication log, a consent process record, demographic and descriptive data forms, BSES-SF pretests and posttests, consent forms, HIPAA forms, and DHHS 4000 Release of Contact Information WIC forms. Identifying demographic information was collected by the ADH Nutritionists and a release of information was signed in their presence. This information was then faxed to the PI. Initially, data were recorded on a paper data collection form and then entered into a Microsoft Access database that was password protected. These records will be destroyed one year after the completion of the research project. The PI verified the accuracy of all data collected, recorded, and entered into the database. Each file was reviewed by the PI for missing data. No missing demographic or pretest/posttest data was found. The PI monitored the data continuously. If necessary the

data may be shared with the Office for Human Research Protections, other regulatory agencies of the United States (including the Food and Drug Administration - FDA), the UAMS IRB, the ADH, or any other UAMS oversight offices to review the original medical records to verify clinical trial procedures and/or data. Confidential information will not be released for any other reason unless disclosure is required by law. If research findings are used for scientific papers or presentations, names will not be revealed.

Dissemination Plan

The consent form provided information to the participants regarding the PI's intent to disseminate research findings. They were verbally, and in writing, assured that their identity would be protected. Sources for dissemination include University of Arkansas for Medical Sciences Dissertation Defense, Arkansas Department of Health Grand Rounds, the Food and Drug Administration WIC Program, nursing, public health, and lactation journals. Two publishable manuscripts containing findings from this study were developed. One manuscript will presented the findings from the RCT and the other manuscript was a systematic review of the evidence of effectiveness of exclusive breastfeeding interventions.

Summary

This chapter discussed the proposed methods and procedures for this research study. A randomized controlled trial of 62 pregnant women on WIC was planned, comparing BSES-SF in peer counselor-guided Web-based intervention participants to a control group to determine the effectiveness of a Web-based program in improving breastfeeding self-efficacy.

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Appendix A. Breastfeeding Web Site Evaluation

Evaluator Name: Date Evaluated:

Web Site Name:

Web Site Address (URL): HONcode Accredited? ☐

Breastfeeding Education & Support Content Criteria	Agree	Disagree	Can't Tell
The following breastfeeding recommendations from the American Academy of Pediatrics (2005) are adequately and accurately presented on this Web Site:			
1. Human milk is the recommended feeding for all infants. When direct breastfeeding is not possible, expressed human milk should be provided.	☐	☐	☐
2. Peripartum policies and practices encourage breastfeeding initiation and maintenance, for example, education of both parents before and after delivery.	☐	☐	☐
3. Healthy infants should be placed and remain in direct skin-to-skin contact with their mothers immediately after delivery until the first feeding is accomplished.	☐	☐	☐
4. Supplements (water, glucose water, formula, and other fluids) should not be given to breastfeeding newborn infants unless ordered by a physician.	☐	☐	☐
5. Pacifier use is best avoided during the initiation of breastfeeding and used only after breastfeeding is well established.	☐	☐	☐
6. During the early weeks, mothers should be encouraged to nurse whenever the infant shows signs of hunger.	☐	☐	☐
7. Trained professionals should evaluate breastfeeding (position, latch, and milk transfer) at least twice daily during hospital stay.	☐	☐	☐
8. Breastfeeding newborn infants should be seen by a pediatrician or other experienced health care professional at 3 to 5 days of age.	☐	☐	☐
9. Breastfeeding infants should have a second ambulatory visit at 2 to 3 weeks of age to monitor weight gain and provide support to the mother.	☐	☐	☐
10. Exclusive breastfeeding supports optimal growth and development for about the first 6 months and breastfeeding should be continued for the first year of life.	☐	☐	☐
11. All breastfed infants should receive 1.0 mg of vitamin K_1 oxide intramuscularly after the first feeding is completed and within the first 6 hours of life.	☐	☐	☐
12. All breastfed infants should receive 200 IU of oral vitamin D drops daily beginning during the first 2 months of life until daily consumption is 500 mL.	☐	☐	☐
13. Supplementary fluoride should not be provided during the first 6 months of life. From 6 months to three years, the decision should be based on concentration in the water supply.	☐	☐	☐
14. Mother and infant should sleep in proximity to each other to facilitate breastfeeding.	☐	☐	☐
15. If hospitalization of the mother or baby becomes necessary, breastfeeding should be maintained, preferably directly, or pumping the breasts and feeding expressed milk.	☐	☐	☐
The following breastfeeding education and support criteria from the Arkansas Department of Health Policies and Procedures (2006) are adequately and accurately presented on this Web Site:			
1. Benefits for baby	☐	☐	☐
2. Benefits for mom	☐	☐	☐
3. Common concerns	☐	☐	☐
4. Common myths and facts about breastfeeding	☐	☐	☐
5. Healthy tips for breastfeeding moms	☐	☐	☐
6. What to do in the hospital	☐	☐	☐
7. What to expect during the 1st week	☐	☐	☐
8. What to expect after the 1st week	☐	☐	☐
9. Positioning and latching	☐	☐	☐

Health Information Quality Criteria	Agree	Disagree	Can't Tell
Credibility			
o Source: Author/Organization	☐	☐	☐
o Currency: Date of original document and Web posting	☐	☐	☐
o Relevance: Information relates to purpose	☐	☐	☐
o Site Evaluation: Review process disclosed	☐	☐	☐
Content			
o Accuracy: Information supported by scientific evidence	☐	☐	☐
o Disclaimer: Identifies limitations, scope, sources, etc.	☐	☐	☐
o Completeness: Discussion comprehensive and balanced	☐	☐	☐
Disclosure			
o Purpose: Mission and purpose clearly stated	☐	☐	☐
o Profiling/Collection of Data: Informed use of information	☐	☐	☐
Links			
o Selection: Appropriateness of links	☐	☐	☐
o Architecture: Facilitates ease of navigation	☐	☐	☐
o Content: Accurate, current, credible and relevant,	☐	☐	☐
o Back Linkages: Purpose, relevancy, authority, and credibility	☐	☐	☐
Design			
o Access: Available at the lowest-level of technology	☐	☐	☐
o Logical Organization (navigability): Focused on purpose and target audience	☐	☐	☐
o Internal Search Capability: Scope and function described	☐	☐	☐
Interactivity			
o Feedback Mechanism: For questions, comments, criticisms, and corrections	☐	☐	☐
o Means for Exchange of Information for Users: Moderator information	☐	☐	☐
Caveats			
o Clarification: Site purpose is to provide information, not market products	☐	☐	☐

What did you like best about this Web Site?

What did you like least about this Web Site?

This Web Site is most appropriate for educating new pregnant women in the following gestational periods (check all that apply): ☐1st Trimester ☐2nd Trimester ☐3rd Trimester

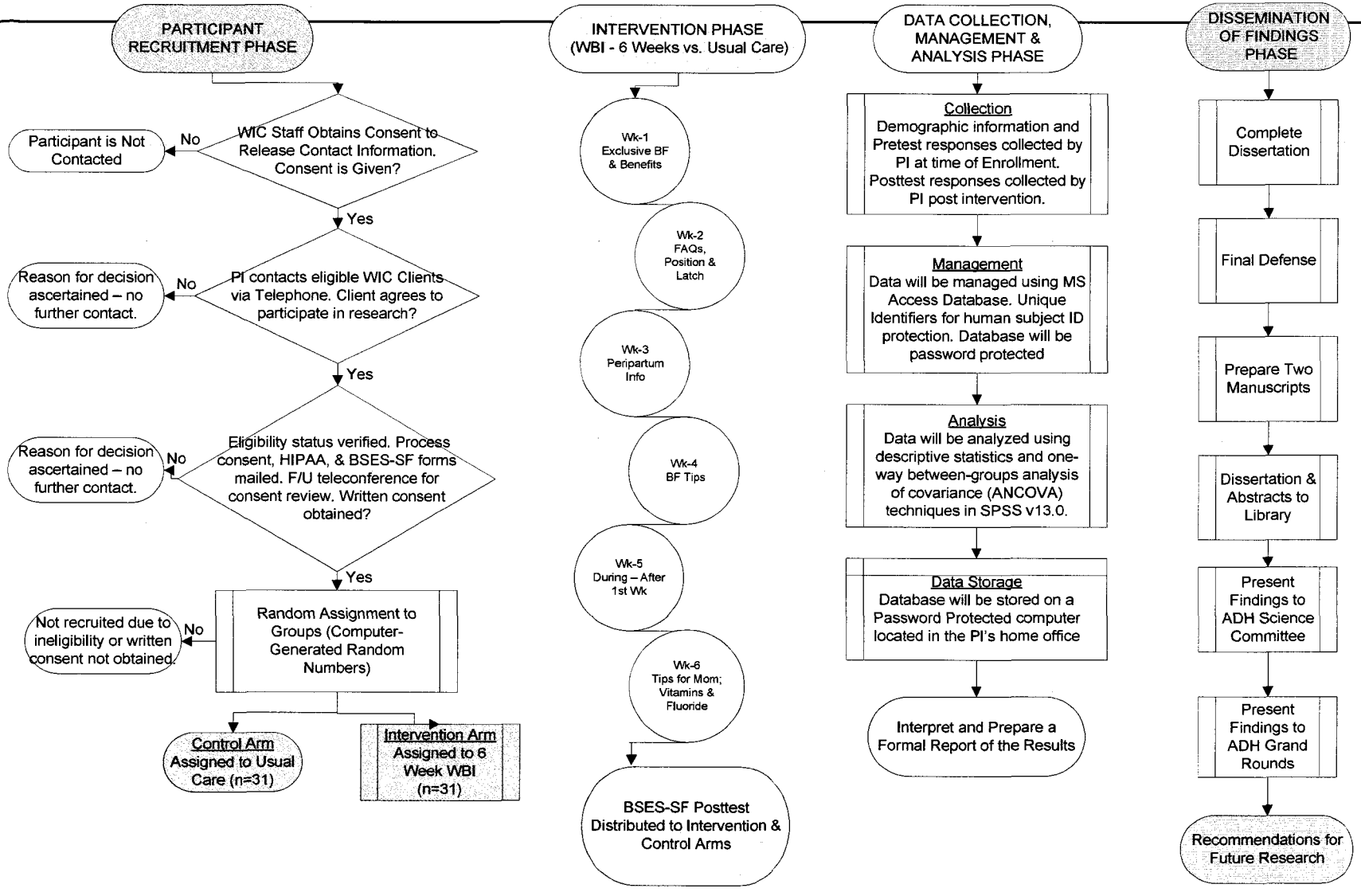
Thank you very much!

After completing this Web Site evaluation,
please email this form to Barbara.Pate@arkansas.gov or fax to 1-870-508-6870

Week	ID	URL	AAP	ADH	Content Score	HITI	Overall Score	Content Rank	HITI Rank	Overall Rank
		Top Sixteen Websites Based on Overall Average Rating						**Rank Order***		
1	2	http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=2&tax_su	60.0%	77.8%	68.9%	76.4%	70.8%	4	6	5
1	12	http://www.lalecheleague.org/	73.3%	92.6%	83.0%	87.8%	84.2%	14	10	14
1	39	http://www.webmd.com/parenting/tc/Breast-Feeding-Topic-Overview	60.0%	100.0%	80.0%	94.7%	83.7%	11	13	13
2	20	http://www.breastfeeding.com	93.3%	100.0%	96.7%	100.0%	97.5%	16	16	16
2	11	http://www.kellymom.com/	64.4%	74.1%	69.3%	80.7%	72.1%	5	7	6
3	29	http://kidshealth.org/parent/growth/feeding/breast_bottle_feeding.html	76.7%	100.0%	88.4%	94.8%	90.0%	15	14	15
3	37	http://www.nichd.nih.gov/health/topics/Breastfeeding.cfm	100.0%	38.9%	69.5%	73.7%	70.5%	6	4	4
3	17	http://womenshealth.gov/Breastfeeding/index.cfm?page=home	68.9%	92.6%	80.8%	87.7%	82.5%	12	9	11
4	10	http://www.keepkidshealthy.com/breastfeeding/index.html	66.7%	88.9%	77.8%	71.2%	76.2%	9	3	7
4	7	http://www.breastfeedingonline.com/	80.0%	72.2%	76.1%	81.6%	77.5%	8	8	8
4	27	http://www.verybestbaby.com/MyBaby/BreastFeeding.aspx	50.0%	94.4%	72.2%	97.4%	78.5%	7	15	9
5	14	http://www.nlm.nih.gov/medlineplus/breastfeeding.html	73.3%	83.3%	78.3%	89.5%	81.1%	10	11	10
5	15	http://www.who.int/topics/breastfeeding/en/	56.7%	72.2%	64.5%	71.1%	66.1%	2	2	2
5	19	http://www.breastfeeding.asn.au/bfinfo/index.html	62.2%	100.0%	81.1%	89.5%	83.2%	13	12	12
6	18	http://www.aap.org/healthtopics/breastfeeding.cfm	66.7%	61.1%	63.9%	60.5%	63.1%	1	1	1
6	26	http://www.pregnancy.org/breastfeeding.php	50.0%	83.3%	66.7%	76.3%	69.1%	3	5	3

* The top 16 Websites were selected from evaluation scores on 40 breastfeeding Websites retrieved from the top 3 search engines. The 16 Websites were then ranked from highest (16) mean evaluations scores to lowest (1) mean of evaluation scores.

Study Schematics



ARKANSAS DEPARTMENT OF HEALTH & HUMAN SERVICES
AUTHORIZATION TO DISCLOSE HEALTH INFORMATION

Client Name: _____ **Client ID #:** _____
Mailing Address: _____ **Date of Birth:** _____
_____ **Case Head:** _____

I, _____ hereby authorize
(Client or Personal Representative)

Arkansas Department of Health to disclose specific health information
(Name of Provider/Plan)

from the records of the above named client to: Barbara Pate
4570 Norfork River Road
Jordan, AR 72519
870-656-3434 (Cell) 501-686-8350 (Fax)
(Recipient Name/Address/Phone/Fax)

for the specific purpose(s): Participation in a breastfeeding research project being conducted by the WIC Division and the University of Arkansas for Medical Sciences.

Specific information to be disclosed: Name; Address; Telephone Number (Cell and/or home); Email Address; Date of Birth, and Estimated Date of Delivery

"All Medical Records" includes any and all written information you may have concerning my health care and any illness or injury I may have suffered, including, but not limited to, medical history, consultations, prescriptions, treatment, medical evaluations, x-rays, results of tests, and copies of hospital or medical records pertaining to me.

I understand that this authorization will expire on the following date, event or condition: 08/01/2009

I understand that if I fail to specify an expiration date or condition, this authorization is valid for the period of time needed to fulfill its purpose for up to one year, except for disclosures for financial transactions, wherein the authorization is valid indefinitely. I also understand that I may revoke this authorization at any time and that I will be asked to sign the *Revocation Section* on the back of this form. I further understand that any action taken on this authorization prior to the rescinded date is legal and binding.

I understand that my information may not be protected from re-disclosure by the requester of the information; however, if this information is protected by the Federal Substance Abuse Confidentiality Regulations, the recipient may not re-disclose such information without my further written authorization unless otherwise provided for by state or federal law.

I understand that if my record contains information relating to HIV infection, AIDS or AIDS-related conditions, sexually transmitted diseases, alcohol abuse, drug abuse, psychological or psychiatric conditions, genetic testing, family planning, or womens, infant, & children (WIC) this disclosure will include that information.

I also understand that I may refuse to sign this authorization and that my refusal to sign will not affect my ability to obtain treatment, payment for services, or my eligibility for benefits; however, if a service is requested by a non-treatment provider (e.g., insurance company) for the sole purpose of creating health information (e.g., physical exam), service may be denied if authorization is not given. If treatment is research-related, treatment may be denied if authorization is not given.

I further understand that I may request a copy of this signed authorization. A copy of this authorization shall be as binding as the original.

_____	_____	_____
(Signature of Client)	*(Date)*	*(Witness-If Required)*
_____	_____	_____
(Signature of Personal Representative)	*(Date)*	*(Personal Representative Relationship/Authority)*

NOTE: This Authorization was revoked on _____ _____
(Date) *(Signature of Staff)*

EFFECTIVENESS OF WEB-BASED PROGRAMS IN IMPROVING BREASTFEEDING SELF-EFFICACY

Script for Obtaining Permission to Release Personal Contact Information

Pre-screening: Please determine if any of the following exclusion criteria apply to this WIC client.

- ☐ This client requires a translator to communicate using the English language.
- ☐ This client is not between the ages of 20 and 30 years on today's date.
- ☐ This client is not a primiparous pregnant woman on WIC.
- ☐ This client has one or more of the following contraindications for breastfeeding:
  1. *Takes street drugs or does not control alcohol use.*
  2. *Has human immunodeficiency virus (HIV) infection.*
  3. *Has active, untreated tuberculosis.*
  4. *Takes certain medications that are contraindicated for breastfeeding.*
  5. *Is currently undergoing treatment for breast cancer.*

If the answer is ***YES*** to any of the above, do not continue with this script. This client is not eligible to participate in this research study. If the answer is ***NO*** to all of the above, continue the script

1. ***Nutritionist:*** The Arkansas Department of Health WIC division is participating in a research study being conducted by the University of Arkansas for Medical Sciences (UAMS) to evaluate breastfeeding education programs. The principal investigator for this study is Barbara Pate, a nursing doctoral student at UAMS. This study will examine the effectiveness of using Web-based programs to educate new moms about breastfeeding. To accomplish this, we are asking pregnant women on WIC if they are interested in helping with this project. To be eligible, you will need to have access to the Internet and email. Do you have the capability of accessing the Internet ***and*** checking your email regularly?

   Respondent:
   Yes ☐ ***GO TO #2***
   No ☐ (If NO, thank the person and continue your regular session.)

2. ***Nutritionist:*** Women who agree to participate in this study will be asked to complete two questionnaires: one at the beginning of the study and one at the end. Each questionnaire consists of less than 20 questions and should not take longer than 15 minutes to complete. The study will last for approximately six weeks. Consent forms for participation in this research will be sent to you before the study begins. In order to participate, you will need to read and sign the consent forms and return them to Mrs. Pate. The first questionnaire will be emailed to you after your consent forms have been returned and the second questionnaire will be emailed to you approximately 8 weeks laterYou will not need to come to the health department to participate in this research; it can be done from home using mail and email. Would you be interested in participating in this research project for pregnant women?

   Respondent:
   Yes ☐ ***GO TO #3***
   No ☐ (If NO, thank the person and continue your regular session.)

3. ***Nutritionist:*** To participate in this study it will be necessary for WIC to release your personal contact information to Barbara Pate. This information will be held in strict confidence and is bound by confidentiality and HIPAA requirements, as set forth by the Arkansas Department of Health and the University of Arkansas for Medical Sciences Institutional Review Board. If you agree to allow your contact information to be released, Mrs. Pate will call you to provide details about how the study information will be collected and used. She will also explain your rights as a study participant, including the right to drop out of this study at any time. Do I have your permission to release your personal contact information to Mrs. Pate?

   Respondent:

   Yes ☐ ***GO TO #4***

   No ☐ (If NO, thank the person and continue your regular session.)

4. ***Nutritionist:*** Great! I will let Mrs. Pate know that you are willing to participate and I will send her your personal contact information. She should be contacting you within a week to go over the consent forms and to provide details of the study. Prior to releasing your personal contact information, WIC requires that you sign Form _____. Is this OK with you?

   Respondent:

   Yes ☐ ***GO TO #5***

   No ☐ (If NO, thank the person and continue your regular session.)

5. ***Nutritionist:*** That's wonderful! – Thank you very much. If you have access to an Internet service, and would like a special free email account established for the purpose of participating in this project, Barbara Pate will set up a ***Gmail*** account for you using Google Mail. Would you like to use your own email or have a Gmail account set up?

   Respondent:

   ☐ **Email** _____@_____

   ☐ **Gmail**

6. ***Nutritionist:*** Do you have any questions for me at this time? Mrs. Pate will be contacting you within the next few days with details of the study. If you need to talk to her before then, contact numbers are on the flyer. Thank you so much for agreeing to participate!

Email/Mail/Fax the client's contact information and this completed form to:

Barbara L. Pate MPH, BSN, RN
University of Arkansas for Medical Sciences
College of Nursing Slot #529
4301 West Markham
Little Rock, AR 72205
FAX: 501-686-8350
patebarbaral@uams.edu

EFFECTIVENESS OF WEB-BASED PROGRAMS IN IMPROVING BREASTFEEDING SELF-EFFICACY

Script for Telephone Recruitment of Study Participants

1ST Attempt	Week Day _____	Date - Time ___/___/____- ___:___ AM PM
2nd Attempt	Week Day _____	Date - Time ___/___/____- ___:___ AM PM
3rd Attempt	Week Day _____	Date - Time ___/___/____- ___:___ AM PM
4th Attempt	Week Day _____	Date - Time ___/___/____- ___:___ AM PM
5th Attempt	Week Day _____	Date - Time ___/___/____- ___:___ AM PM

Date of Recruitment: ___/___/___

Respondent: Hello ?

1) PI: Hello, I am calling to speak to _____
WIC Participant's First and Last Name

Respondent: This is he or she. *(If not available, ask when it would be a good time to call back. Then **GO TO** the Call Back Section of this form.)*

2) My name is Barbara Pate. I am a nursing research student at the University of Arkansas for Medical Sciences calling on behalf of the Arkansas Department of Health. The WIC Division is sponsoring a research study to evaluate their breastfeeding education program and I will be the principal investigator for this study. We are asking eligible WIC pregnant women to participate in this study. Do you have a minute to talk? (If not, ask when it would be a good time to call back. Then ***GO TO*** the Call Back section.)

3) One of the requirements for participating in this research is Internet access. Would you have the capability of accessing the Internet ***and*** checking your email weekly?

Respondent:

Yes ☐ ***GO TO #4***
No ☐ (If NO, thank the person for speaking with you and ask her if she would like your name and number.)

4) Women who participate in this study will be asked to complete two questionnaires that will help us evaluate our breastfeeding education program. Completing each questionnaire should not take longer than 15 minutes. Consent forms will be sent to you before the study begins. You will need to read and sign the consent forms, review the Participant Information form, and make any needed corrections. The first questionnaire will be emailed to you after your consent forms have been returned and the second questionnaire will be emailed to you approximately 6 weeks later. All other communication and instructions will be sent using email. You will not need to come to the health department to participate in this research; it can be done from home using mail and email. Would you be interested in participating in this important research project for pregnant women?

Script for Telephone Recruitment of Study Participants

Respondent:

Yes ☐ ***GO TO #6***
No ☐ (If NO, thank the person for speaking with you and ask her if she would like your name and number.)

5) That's wonderful! – Thank you very much. I will need to verify your home address. Is this correct? (Read the address provided by ADH. If it is not correct, ask the Respondent for the correct address and enter here.)

_____
_____

6) I will also need your email address, do have this handy? (If NO, ask them if they would like you to call back or wait while they get it.)

_____@_____

7) Thank you. Tomorrow, I will mail you a packet of information including the consent forms that you will need to complete and mail back to me in the stamped envelope provided. If you have a few minutes, I would like to go over the consent forms with you so you will know what to expect. If you have any questions, you can ask them while I'm reviewing the forms or you can call or email me when you receive the forms. Is this OK?

Respondent:

Yes ☐ Review the Process Consent and HIPAA forms
No ☐ (If NO, ask when it would be a good time to call back and review these forms with her then ***GO TO*** the Call Back Section.)

8) The information you receive will include copies for your records with my name, telephone numbers, and email address. Also, if for any reason you decide you no longer want to be a part of this study, simply call or email me and let me know you would like to "Opt Out" of the project. Do you have any questions at this time?

Respondent:

Yes ☐ Answer their questions and thank them for their time and for agreeing to participate.
No ☐ Thank them for their time and for agreeing to participate.

CALL BACK INSTRUCTIONS

Title: EFFECTIVENESS OF WEB-BASED PROGRAMS IN IMPROVING BREASTFEEDING SELF-EFFICACY
Principal Investigator: Pate, Barbara L.
Contact Number: 870-656-3434
Sponsors: UAMS, College of Nursing, Dissertation Requirement
Arkansas Department of Health

CONSENT FORM

Introduction
You are being invited to take part in a nursing research study. Barbara Pate, the principal investigator for this study, will give you this form and explain the study. Please ask as many questions as needed so you understand the study and what you are being invited to do. If you understand the risks and benefits of being in the study and agree to participate, please sign the form on the last page. None of your rights will be waived if you sign the form.

Why is this research being conducted?
The purpose of this study is to determine the effectiveness of using Web-based programs to provide breastfeeding education.

What will you be asked to do?
If you decide to be in the study, you will be assigned to one of two groups. Group 1 will receive weekly emails for six weeks with links to Web-based breastfeeding programs, in addition to usual care provided by the Arkansas Department of Health (ADH). Reading the weekly emails and reviewing the Websites will not take longer than 30 minutes. Group 2 will receive usual care by ADH. Both groups will be asked to complete two surveys. One will be emailed to you at the beginning of the study and one at the end of the study. There will be about 20 questions on each survey. It should not take longer than 15-20 minutes to complete each survey.

Who will be in the study?
Each group will have up to 31 participants. Women who are between the ages of 20 and 30, pregnant and on Arkansas WIC are being invited to participate in this study.

What are the risks of being in this study?
Loss of confidentiality is a risk. Refer to the "What about confidentiality?" section for more information regarding this risk. There are no other known risks or discomforts associated with this study.

What are the benefits of being in this study?
There may be no direct benefit to you. The information you provide will help the Arkansas Department of Health understand the effectiveness of breastfeeding education programs, which has the potential to help all pregnant women learn more about breastfeeding.

What alternatives do you have?
If you do not wish to participate in the study, you do not have to.

Are there any costs or payments?
There are no costs to you for participating. No payment will be made to you for your participation.

What about confidentiality?
Any personal information collected during this study will be kept confidential. The University of Arkansas for Medical Sciences requires that the Institutional Review Board and the Office for Human Research Protections be able to review the records to make sure that the study is being conducted correctly. The results of this study will be given to the United States Department of Agriculture WIC program and the ADH WIC program. The results shared with ADH and USDA will not contain any of your personal or confidential information. The results only include totals, not individual information. No one else will have access to information gathered about you, which will be coded with a number so that the information cannot be identified with you. The list linking code numbers to your name will be kept in a locked, secure place. The information containing your name will be destroyed one year from the date of the study completion. The results of this study may be printed in a journal or formal report, but you will not be identified.

Is participation voluntary?
Your participation in this study is voluntary. You may withdraw from this study at any time. Refusal to participate will involve no penalty or loss of benefits to you. .

What if you want to drop out of the study?
If you do decide you no longer want to be a part of this study, all you have to do is email Barbara Pate at patebarbaral@uams.edu or contact her at any of the numbers listed below to let her know you no longer want to be in this study.

Can the researchers stop the study?
The researchers can stop the study or your participation in it at any time. Examples of why this study could be stopped include the following situations: if the risks to you are determined to be more than minimal this study may be stopped; if USDA, ADH, or WIC withdraws their support for this project this study may be stopped; or if the principal investigator is no longer capable of overseeing this research project, this study may be stopped.

New information
You will be notified verbally, or in writing by Barbara Pate, if any new information becomes available during this study that might affect your willingness to continue participation in the study.

What if you have questions about the study?
If you have any questions during this study, you should contact Barbara Pate, at 870-656-3434(Cell Phone) or 870-499-7642 (Home Phone) or email patebarbaral@uams.edu. You may call the Institutional Review Board at 501-686-5667 regarding a research-related injury, with questions about your rights as a research participant or to discuss any problems or concerns about the research. Also, you may call this number if you are unable to reach the Investigator or you wish to speak to someone not directly related to this study.

Statement of Consent
I have read the above statement and have been able to ask questions and express concerns, which have been satisfactorily responded to by the investigator. I understand the purpose and voluntary nature of the study as well as the potential benefits and risks that are involved. I have been given a copy of this consent form.

_____	X_____	_____
Participant's Printed Name	Participant Signature	Date/Time
_____	X_____	_____
Witness's Printed Name	Witness's Signature	Date/Time
_____	X_____	_____
Person Obtaining Consent Printed Name	Person Obtaining Consent Signature	Date/Time

Statement of the Investigator:
Any questions expressed by the participant have been answered.

_____	_____
Signature of the Principal Investigator	Date/Time

Appendix H. HIPAA Authorization

UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES

HIPAA RESEARCH AUTHORIZATION

STUDY TITLE:
EFFECTIVENESS OF WEB-BASED PROGRAMS IN IMPROVING BREASTFEEDING SELF-EFFICACY

PRINCIPAL INVESTIGATOR:
Name: PATE, BARBARA L.
Address: 4570 Norfork River Road, Jordan, AR 72519
Phone: 870-656-3434; 870-499-7642

CO-INVESTIGATORS:
Dr. Robert Kennedy, UAMS
Dr. Richard Nugent, ADH
Dr. Elaine Souder, UAMS
Dr. Louanne Lawson, UAMS
Dr. Sarah Rhoads, UAMS

Address: UAMS, ED III, 5226, 4301 Markham Street, Little Rock, AR.

Phone: 501-603-1162; (Fax) 501-686-8350

STUDY SPONSOR:
Name UAMS. College of Nursing. Dissertation Research; Arkansas Department of Health

The word "you" means both the person who takes part in the research, and the person who gives permission to be in the research. This form and the research consent form need to be kept together.

We are asking you to take part in the research described in the consent form. To do this research, we need to collect health information that identifies you. We may collect the following information from your medical record: Name, Address, Telephone Number, Email Address, and Expected Date of Delivery. This information will be used for contacting you and for determining the beginning of your 3rd trimester.

We will only collect information that is needed for the research. Participating in this research study will create the following new health information: usefulness of a peer counselor guided breastfeeding program. For you to be included in this research, we need your permission to collect, create and share this information.

We will, or may, share your health information with people at the University of Arkansas for Medical Sciences (UAMS) who help with the research or things related to the research process, such as the study staff, the UAMS Institutional Review Board and the research compliance office at the University of Arkansas for Medical Sciences. *We may share your information with the following researchers outside of the University of Arkansas for Medical Sciences: Arkansas Department of Health WIC Division.* We may also share your information with companies that pay for all or part of the research or who work with us on the research, such as the Sponsor listed above, or their legally authorized representative, or anyone who might

purchase those companies at a later date. Additionally, we may need to share your health information with people outside of UAMS who make sure we do the research properly, such as the Office for Human

Research Protections or the Food and Drug Administration. We believe that those involved with research understand the importance of preserving the confidentiality of your health information. However, some of the people outside of UAMS may share your health information with someone else. If they do, the same laws that UAMS must obey may not apply to others to protect your health information. Examples of health information that may be shared are gestational stage of pregnancy, estimated date of delivery, and decision to breastfeed.

This authorization to collect, use and share your health information expires at the end of the research.

If you sign this form, you are giving us permission to create, collect, use and share your health information as described in this form. You do not have to sign this form. However, if you decide not to sign this form, you cannot be in the research study. You need to sign this form and the research consent form if you want to be in the research study. We cannot do the research if we cannot collect, use and share your health information.

If you sign this form but decide later that you no longer want us to collect or share your health information, you must send a letter to the person and the address listed by "Principal Investigator" on the first page of this form. The letter needs to be signed by you, should list the "Study Title" listed on this form, and should state that you have changed your mind and that you are revoking your "HIPAA Research Authorization". You will need to leave the research study if we cannot collect and share any more health information. However, in order to maintain the reliability of the research, we may still use and share your information that was collected before the Principal Investigator received your letter withdrawing the permissions granted under this authorization.

During the course of the study, you may be denied access temporarily to certain medical information about you that is study related. However, the Principal Investigator and staff will not automatically deny a request, but will consider whether it is appropriate under the circumstances to allow access. If access is denied during the study, once the study is completed, you will be able to request access to the information again.

If you decide not to sign this form or change your mind later, this will not affect your current or future medical care at the University of Arkansas for Medical Sciences.

SIGNATURE, DATE, AND IDENTITY OF PERSON SIGNING

The health information about _____ can be collected and used by the researchers and staff for the research study described in this form and the research consent form.

Signature:_____

Date:_____

Print name:_____

Relationship to participant:_____

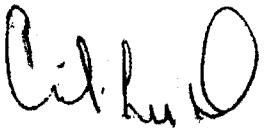
The researcher will give you a signed copy of this form.

April 16, 2009

To Whom It May Concern:

I gave Barbara Pate PhD, MPH, BSN, RN permission to use my Breastfeeding Self-Efficacy Scale in her doctoral dissertation. She may publish results from her dissertation using my scale.

Sincerely



Cindy-Lee Dennis, RN, PhD
Associate Professor and Canada Research Chair in Perinatal Community Health
University of Toronto

Appendix J. Institutional Review Board Approval

Institutional Review Board

Office of Research and Sponsored Programs

4301 West Markham, #636
Little Rock, AR 72205-7199

501-686-5667
501-686-8359 (fax)

www.uams.edu/orsp

UAMS
UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES

FWA00001119

Date: 08/02/2008

Original Review Date
6/24/2008

Barbara Pate
4570 Norfork River Road, Mailslot 32
Jordan, AR 72519

Protocol Title: Effectiveness of Web-based Programs in Improving Breastfeeding Self-efficacy

Original Review Date: 6/24/2008
Principal Investigator: Barbara Pate
Protocol Sponsor: None Provided

Record: 105538
PRN:

FINAL APPROVAL (Minor Revisions Met)

The Institutional Review Board Chair approved your minor revisions by expedited review on the date of this letter.

Approval period: 7/15/2008 through 7/15/2009.

Approved Documents:

Table of Content, Version: 1, Dated: 06/05/2008
Study Schematics, Version: 1, Dated: 06/05/2008
PI Biosketch, Pate, Version: 1, Dated: 06/05/2008
ADH Letter of Support, Version: 1, Dated: 06/05/2008
Cover Sheet, Version: 1, Dated: 06/05/2008
Protocol, Version: 1, Dated: 06/05/2008
Appendix A - Website Evaluation, Version: 1, Dated: 06/05/2008
Appendix D - WIC Authorization, Version: 1, Dated: 06/05/2008
Appendix I - Email from Dr. Valentine, Version: 1, Dated: 06/05/2008
CV, Pate, Version: 1, Dated: 06/05/2008

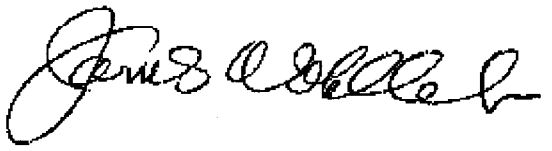
Original Submission, Version: 1, Dated: 06/05/2008
DSMP, Version: 1, Dated: 06/05/2008
Modification form in response to Major Revisions, Version: 1, Dated: 06/27/2008
Appendix G-Written Consent Form_v2, Version: 2, Dated: 06/27/2008
Appendix E-Nutritionist Script_v2, Version: 2, Dated: 06/27/2008
Appendix F - PI Recruitment Script, Version: 2, Dated: 06/27/2008
Appendix C - BSES-SF Instrument_v2, Version: 2, Dated: 06/27/2008
Appendix B - Intervention Sequence_v2, Version: 2, Dated: 06/27/2008
Appendix H - HIPAA Authorization_v2, Version: 2, Dated: 06/27/2008
Notification: Documents Revised for Major Revisions, Version: 1, Dated: 06/27/2008
PI Response to IRB Major Revisions, Version: 1, Dated: 07/06/2008
Notification: PI Response , Version: 1, Dated: 07/07/2008
Appendix G - Written Consent_v3, Version: 3, Dated: 07/11/2008
Modification re Response to Contingencies, Version: 1, Dated: 07/11/2008
PI Response to IRB Minor Revision 071108, Version: 1, Dated: 07/11/2008
Modification re PI Response to Minor Revision 071108, Version: 1, Dated: 07/11/2008

Next Review Due: 7/15/2009.

The risk to adults who enter this study was determined to be Minimal.

Please report to the IRB all changes, adverse reactions/deaths or closure of the study as soon as possible.

Signed: James Wohlleb, IRB Committee Chair **on:** 08/02/2008 **at:** 16:39:24



Provider-Based vs. *e*-Based Breastfeeding Interventions: A Systematic Review of the Evidence of Effectiveness

A manuscript submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

By

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2009
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Manuscript Abstract #1

Provider-Based vs. *e*-Based Breastfeeding Interventions: A Systematic Review of the Evidence of Effectiveness

Abstract

Background

There is a growing body of research that indicates breastfeeding peer counselors are effective in improving breastfeeding outcomes. Unfortunately, this type of support is limited by geography and time constraints. To overcome this problem, some health agencies have successfully turned to internet technology-based (*e*-based) interventions as a method of delivering health education and support. However, the effectiveness of *e*-based versus provider-based breastfeeding interventions has not been examined. The purpose of this systematic review was to produce a synthesis and analysis of research-based literature that can serve as a source of evidence for making decisions regarding the use of these methods of intervention delivery for improving breastfeeding outcomes.

Methods

Eligible studies were identified by searching electronic databases, journals and bibliographies of identified trials and review articles. Selected studies were reviewed and evaluated for the suitability of design and quality of execution using the Centers for Disease Control's (CDC) procedure for systematic reviews, which was developed specifically for the purpose of making evidence-based recommendations for developing interventions. The outcome of interest was exclusive breastfeeding, which the CDC defines as an infant's consumption of human milk with no supplementation of any type except for vitamins, minerals, and medications.

Results

Seventeen articles were selected for inclusion in this evidence-based synthesis: eleven Randomized Controlled Trials, one Group Randomized Controlled Trial, and five Non-Randomized Trials with concurrent controls. Studies with interventions including ***e***-based technology were more likely to have positive exclusive breastfeeding outcomes: Odds Ratios (95% Confidence Intervals) and Cohen's *d*, for ***e***-based based studies and for provider-based studies were *OR* = 1.7 (1.3-2.2), *d* = 0.30 and *OR* = 1.3 (1.0-1.3), *d* = 0.12 respectively.

Conclusions

The results of this systematic review indicated that ***e***-based interventions have the potential to positively influence exclusive breastfeeding outcomes. Internet technologies, which include a variety of audio, visual, and interactive programs, are widely available and affordable. The use of ***e***-technologies may be an appealing alternative to time-consuming, expensive provider-based breastfeeding education and support. Future research should examine the effectiveness of using e-technologies to deliver interventions designed to improve breastfeeding outcomes.

A Randomized Controlled Trial Examining the Effectiveness of Web-based Interventions for Improving Breastfeeding Self-efficacy

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Manuscript Abstract #2

A Randomized Controlled Trial Examining the Effectiveness of Web-based Interventions for Improving Breastfeeding Self-Efficacy

Abstract

Background

Public Health professionals are committed to promoting and supporting optimal breastfeeding practices by providing support, information, and resources on breastfeeding. However, time constraints and knowledge deficits continue to be major barriers to being able to provide education and support for breastfeeding. To overcome these barriers, this study examined the effectiveness of using paraprofessionals to guide pregnant women to breastfeeding Websites to determine if this method of intervention delivery was a viable alternative to nurse-intensive, clinic-based education and support.

Methods

The study design was a pretest/posttest randomized controlled trial. The participants assigned to the intervention group received email messages with instructions and links to existing Websites that had been approved for content and quality by public health department breastfeeding experts. The control group received usual care. The primary outcome of interest was breastfeeding self-efficacy, which was measured using the Breastfeeding Self Efficacy Scale–Short Form.

Results

All participants (N=23) were primiparous pregnant women between the ages of 20 and 30 years (M = 24, SD=3) with income levels at or below 185% of poverty. Thirteen percent of participants were in their 1st trimester; 61% in their 2nd trimester; and 26% in their 3rd trimester. There were no statistically significant differences between groups on age, race, income level,

employment status or trimester. Results indicated that women who participated in the intervention had significantly higher mean breastfeeding self-efficacy scores than women in the control group, After adjusting for pre-intervention scores, there was a significant difference between the intervention and control groups on the BSES-SF posttest scores (F[1,20] = 8.045, p=.01, η_p^2=.29). The control group's BSES-SF posttest estimated marginal mean score (M = 41.54, SE=1.49) was significantly lower than the experimental group's (M = 47.68, SE=1.56). The partial eta squared value (η_p^2=.29) indicated that breastfeeding Web-based interventions had a large effect on improving breastfeeding self-efficacy scores.

Discussion

These findings suggest that this intervention may have the potential to improve breastfeeding self-efficacy, a major determinant of breastfeeding initiation and duration. However, future longitudinal studies with concurrent control groups are needed to make conclusive statements on the value of Web-based programs for improving breastfeeding outcomes.