

An Exploration of Changes in Healthcare Providers' Learning Outcomes
Related to Breastfeeding Support and Promotion

by

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ABSTRACT

Despite the widely recognized health benefits of breastfeeding and its endorsement by leading health organizations, as a preventative public health intervention, inadequate breastfeeding knowledge and lactation management skills among healthcare providers continues to be a major barrier for women who choose to initiate breastfeeding. Breastfeeding competencies are not standardized in healthcare education for any of the health professions. To address this gap, a few continuing education and professional development programs have been implemented, but paucity in research regarding the efficacy of these programs exists. The purpose of this study was to explore the changes in healthcare providers' learning outcomes related to breastfeeding support and promotion.

A non-experimental pre-posttest self-report survey design was used to assess the feasibility and preliminary efficacy of an online breastfeeding educational intervention for healthcare providers. The Theory of Planned Behavior (TPB) provided the framework for exploring the participants' psychological and behavioral outcomes. The research questions were: (1) What is the feasibility of an online breastfeeding course for healthcare providers? (2) What are healthcare providers' psychological and behavioral changes occurring after completion of an online course? (3) How do the post-intervention psychological and behavioral outcomes of the online format compare with those of the previous format (hybrid) of this breastfeeding course?

Although participants' favorably assessed the feasibility (i.e., acceptability) of the 45-hour course, several factors contributed to participants' satisfaction level: Previous online learning experience, connectedness with others, and the degree of structural

support. Significant positive changes occurring in participants were increases in their knowledge and beliefs about breastfeeding; attitudes toward formula feeding; perceived behavioral control; perceptions about being able to perform breastfeeding supportive behaviors; and intentions to perform actions that are consistent with evidence-based breastfeeding supportive behaviors. Significant changes in the beliefs about formula feeding were not in the expected direction raising conceptual and pedagogical issues. Participants had negative perceptions about being able to implement what they learned in their workplaces or to affect policy. Findings support the use of online breastfeeding education programs for healthcare providers; changes at both individual and institutional levels are necessary to change provider practices.

DEDICATION

To my family:

Thank you Mom and Dad (Marilyn and Gordon Phillips) for instilling a love of learning and making education a priority in my upbringing. You have always believed in me, given me unconditional love, and supported my endeavors; your support means more than I could ever convey with words. This was possible because you made me who I am.

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Chapter 1

INTRODUCTION

Statement of the Problem

Breastfeeding is a well-recognized public health strategy, improving the health of mothers, infants, and children (Ip et al., 2007). All leading health organizations recommend exclusive breastfeeding for the first 6 months of life, continuing with complementary foods for 1 year or more (Eidelman et al., 2012). Although the National Center for Health Statistics reported the *Healthy People 2010 Objectives* for breastfeeding initiation rate of 75% was met, duration and exclusivity objectives remain low (Centers for Disease Control and Prevention [CDC], 2013). Inadequate breastfeeding knowledge and lactation management skills among healthcare providers have been identified as a significant contributing factor in the cessation of breastfeeding among mothers who choose to initiate breastfeeding (Dodgson & Tarrant, 2007; Hannula, Kaunonen, & Tarkka, 2008; Sikorski, Renfrew, Pindoria, & Wade, 2003). The Surgeon General has responded to this in her '*Call to Action to Support Breastfeeding*', a comprehensive strategic plan to increase breastfeeding rates (U.S. Department of Health and Human Services [U.S. DHHS], 2011). Among the key elements identified in the *Call to Action* (2011) is the importance of providing evidence-based breastfeeding and lactation management education to healthcare providers who care for mothers and their infants. Despite this well documented need, and the support of the *Call to Action* (2011), breastfeeding education has not been routinely incorporated into the existing curricula for healthcare providers.

Most healthcare programs (e.g., nutrition, nursing, and medical schools) fail to provide adequate knowledge and skills in breastfeeding management (Lauwers & Swisher, 2011). Breastfeeding competencies are not standardized in healthcare education for any of the health professions. To address this gap, a few continuing education and professional development programs have been implemented, but paucity in research regarding the efficacy of these programs exists and is largely in the descriptive stage, limiting comparability and generalizability (Watkins & Dodgson, 2010). The purpose of this study is to explore the changes in healthcare provider's learning outcomes related to breastfeeding support and promotion.

Background

Educating Health Professionals

The CDC defines professional breastfeeding education as “any programs that improve the knowledge, skills, attitudes, or behaviors of healthcare providers on the importance of breastfeeding, the physiology and management of lactation, or counseling related to breastfeeding” (Shealy, Benton-Davis, & Grummer-Strawn, 2005, p. 41). Although educating health professionals is a required component for the success of all breastfeeding interventions (e.g., breastfeeding support), systematic reviews have consistently failed to produce evidence that education alone significantly improves breastfeeding initiation or duration (U.S. DHHS, 2011; Shealy, Benton-Davis, & Grummer-Strawn, 2005). According to the CDC's definition, any improvement in the 4 prescribed categories (knowledge, skills, attitudes, or behaviors of healthcare providers) described within these broad topic areas would be considered a successful outcome (Shealy, Benton-Davis, & Grummer-Strawn, 2005). However, the goal of educating

health professionals is to change practice, ultimately resulting in improved breastfeeding outcomes. Pertinent to this goal, a discussion relating to: (a) Existing standards of practice for healthcare providers, (b) educational resources available to healthcare professionals, and (c) opportunities to use education for hospital-level and community-level practice changes follows.

Standards of Practice. The quality of clinical care received by many breastfeeding mothers in maternity units, physician’s offices, and community healthcare settings across the country is substandard (CDC, 2013; U.S. DHHS, 2011). In recognition of this issue, *Action 10* of the Surgeon General’s *Call to Action* is to “include basic support for breastfeeding as a standard of care for midwives, obstetricians, family physicians, nurse practitioners, and pediatricians” (U.S. DHHS, 2011, p. 47). Although widespread implementation of this objective has not been achieved, a few organizations have published practice standards that may be accessed freely by providers (and organizations) to facilitate their integration into practice; two key examples of these standards follow. The Academy of Breastfeeding Medicine (ABM), an “international physician organization dedicated to the promotion, protection, and support of breastfeeding”, has published 25 clinical protocols for managing common medical conditions that may affect breastfeeding (ABM, 2012). The protocols undergo a rigorous 2-way review and are updated every 5 years. More recently, the *ABM Protocols* have become available through the National Guideline Clearinghouse, a public resource for evidence-based guidelines (Agency for Healthcare Research and Quality & U.S. DHHS, 2013). Protocols include how to manage mastitis, engorgement, jaundice, ankyloglossia, as well as, other common situations that may be encountered while breastfeeding. The

United States Breastfeeding Committee (USBC), a non-profit coalition of professional, educational, and governmental organizations that work collaboratively to promote, protect, and support breastfeeding, has developed core competencies in breastfeeding care and services (USBC, 2010). The competencies provide a framework for all health professionals to “integrate evidence-based knowledge, skills, and attitudes into their standard healthcare delivery practices” (USBC, 2010, p. 2). Competence in the core areas represents the minimal knowledge, skills, and attitudes health professionals from all disciplines should possess in order to provide effective services to families. Further, the USBC (2010) urges educators to use the competencies as a framework for developing curricula that meets these objectives. Despite a public health agenda favorably aligned with these goals, and the development of practice standards, breastfeeding education is not routinely integrated into the curricula of academic programs. As a result, healthcare providers (and organizations) are left to seek out educational opportunities to fill this gap.

Education to change practice. All healthcare professionals who work with mothers and their infants need a basic understanding of human lactation and the practice (or management) of breastfeeding (U.S. DHHS, 2011). A variety of evidence-based resources for professional education exist that vary in length and content. Although a basic knowledge of human lactation is required of all health professionals, the scope, depth, and intensity (i.e., duration) of the needed education should be tailored to the provider’s workplace (i.e., those working in maternity care need more comprehensive knowledge and skills related to the support and promotion of breastfeeding). Several exemplary programs are highlighted below. The American Academy of Pediatrics (AAP) has developed and pilot-tested their *Breastfeeding Residency* curriculum in 14 residency

programs across the country (Felman-Winter et al., 2010). Data from these programs are forthcoming, but results are promising. Wellstart International, a non-profit organization dedicated to the advancement of evidence-based breastfeeding education for health professionals, has a *Lactation Management Self-Study* tool and other resources for professional in-services (Wellstart International, 2013). The International Lactation Consultant Association (ILCA) and United States Lactation Consultant Association (USLCA) have numerous continuing education resources: (a) *Guide to Selecting a Lactation Course*, (b) *Directory for Lactation Management Courses*, (c) *ILCA Study Modules*, (d) and the USLCA's live and recorded webinars (ILCA, 2014; USLCA, 2014). The described educational resources represent an attempt to advance healthcare providers' knowledge of evidence-based breastfeeding practices and are an important first step to improving practice.

Education for hospital-level change. Education and training that promote and support changes in clinical practice at the institutional level have shown the most promise for affecting breastfeeding rates (Shealy, Benton-Davis, & Grummer-Strawn, 2005; U.S. DHHS, 2011). The *Baby-friendly Hospital Initiative (BFHI)* was developed by the United Nation's Children's Fund (UNICEF) and the World Health Organization (WHO) to provide standards for hospital-level implementation of evidence-based supportive breastfeeding practices (WHO, 1998). The BFHI is more than an educational intervention; it is a systematic program for eliciting clinical practice changes through institutional reform. The voluntary accreditation program, although not widely implemented in the United States (< 3% of hospitals), has been enacted in over 20,000 hospitals in 150 countries since its inception in 1991 (Baby-Friendly USA Inc., 2012).

Education of all maternity workers (20 hours), including physicians (3 hours) and adherence to 10 *Baby-Friendly* practice steps (e.g., rooming-in of mother and baby) is required (WHO & UNICEF, 2009). Although far from conclusive, researchers conducting a recent systematic review of education and evidence-based practice interventions concluded that the *BFHI* training might have the potential to influence breastfeeding duration (Spiby et al., 2009; Ward & Byrne, 2011). Unfortunately the evidence from the reviewed studies lacked comparability; the authors concluded that no consistent way to achieve increases in breastfeeding duration was present. It is not known which variables (or combination of variables) are responsible for the practice changes observed in the reviewed studies. Although an upward trend in the implementation of U.S.-based *BFHI* has continued, the overwhelming majority of hospitals/maternity units have not indicated intent to seek approval.

Education for community-level change. Many health professionals who work with mothers and babies are in community settings that are not part of the *BFHI*. Women seek breastfeeding advice and support in a variety of settings and circumstances. Although hospital standards exist for breastfeeding support, standards for community-based lactation services and support are lacking. Despite the lack of community standards, one programmatic exemplar is noteworthy; a discussion follows. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) (a program that provides nutrition education and counseling, including breastfeeding promotion, protection, and support to low-income pregnant, breastfeeding, and postpartum women, infants, and children up to 5 years of age) is a substantial contributor to the public health nutrition workforce and is required to follow federally prescribed regulations in order to

receive funding (Greenaway, 2011; Haughton & George, 2008). One particular mandate stipulates all staff that work with mothers and babies are to receive training on the promotion and support of breastfeeding (USDA Food and Nutrition Service, 2013). WIC leaders take this charge seriously; the *WIC National Strategic Plan* for promoting breastfeeding and the *Six Steps to Achieve Breastfeeding Goals for WIC Clinics* are available to all WIC clinics (Greenaway, 2011). The WIC Program's use of peer counselors (i.e., a woman who has successfully breastfed an infant is provided basic training on breastfeeding and lactation management to counsel her peers) has been highly successful (Chapman, Morel, Anderson, Damio, & Perez-Escamilla, 2010). The authors of a recent review of peer counseling studies ($N = 26$) concluded that peer counselors effectively improved rates of breastfeeding initiation, duration, and exclusivity (Chapman et al., 2010). The WIC Program is the largest public health program serving women, infants and children; however, this program serves a select low-income, at risk population. A need exists for comprehensive community-based lactation standards.

Although educational resources exist to serve professionals within some community programs (e.g., WIC) and hospital settings, a gap exists for providers outside of these two systems. Healthcare providers that may routinely encounter the breastfeeding dyad in family practices, pediatric offices and community clinics may not possess the knowledge, skills, and attitudes to effectively support women to meet their breastfeeding goals. To address this need, various educational programs and professional continuing educational opportunities have been developed.

Lactation Education Programs

In the U.S. formal lactation education programs, often called ‘certificate programs’, have existed for over 30 years. Created with the recognition that health provider’s knowledge and skills in lactation management were insufficient and continuing education was warranted, several formal programs of varying length, intensity, complexity, and quality have been created. The following programs have dominated the lactation field. In 1982, the University of California, Los Angeles Extension (continuing education department) commenced with the first *Lactation Educator Training Program* (Regents of the University of California, 2014). The course, still listed on their website today (but inactive since 2009) trained health professionals and paraprofessional to be *Lactation Educators* (LE). The course curriculum followed evidence-based guidelines (WHO, 1998) and consisted of 40 hours of education (5, 8-hour days, face-to-face format), including an experiential teaching assignment. Evergreen Perinatal Education (2014), founded in 1986, provides a *Lactation Educator* certificate upon completion (e.g., not competency assessed) of their 45-hour face-to-face lactation course (5, 8 hour days lecture and written paper/study guide) (Evergreen Perinatal Education, 2014). University of California San Diego’s Extension has a similar 40-hour class (5, 8-hour days) that was developed in the 1990’s; this course has been updated over the years to reflect current standards and offers a *Certificated Lactation Educator Counselor* designation upon successful completion (UC San Diego Extension, 2014). The Healthy Children’s Center for Breastfeeding’s 45-hour *Lactation Counselor Training Course* purports to provide “research based breastfeeding education” and administers their proprietary *Certified Lactation Educator (CLC®) Certification Exam*

(Healthy Children's Project Inc., 2012). Participants who pass their written exam receive the CLC® designation. Founded in 2011, Arizona State University's *Southwest Clinical Lactation Education Program* (SWCLEP) offers a 54-hour (continuing education) lactation management course for healthcare providers. The *Lactation Educator* (LE) course is offered in a hybrid format (3 days face-to-face and 2 days online). Competency-based online assessments, mandatory attendance, and completion of all homework assignments are required for successful completion of the course (i.e., receive *Lactation Educator* certificate). Although many claims are made by each of the described programs regarding the impact trained counselors can have on practice, no published data from these programs exist to evaluate their efficacy. Further, some programs simply required attendance as basis for 'successful completion' whereas others required a paper and pencil exam. One program claimed that participants must exhibit "competency in specific areas", but it is not clear how this is measured (Healthy Children's Project Inc., 2012). The diversity in program content, length, and evaluation methods (of participants), coupled with the lack of research evidence demonstrating the effectiveness of individual programs, limits researchers', educators', and consumers' ability to draw conclusions or make comparisons.

Prompted by the proliferation of core programs aimed at providing evidence-based breastfeeding knowledge and skills to healthcare professionals, and the increasing number of certificates being offered, leading professional organizations have become concerned about the number of certificate programs operating without oversight. Especially problematic, consumers (of educational offerings and provider services) have become confused over what the different certifications mean. In response to this issue,

the USLCA (2009) has issued guidance on *Who's Who in Lactation in the USA* (Appendix A) by outlining the national professional standards for International Board Certified Lactation Consultants (IBCLC's), CLC's, CLE/LE's, and WIC Peer Counselors. Guidance for curriculum standards exists (Greenaway, 2011; Mannel, Martens, & Walker, 2013; United States Breastfeeding Committee, 2010; USLCA, 2014; World Health Organization, 1998). To address these concerns, the Lactation Education Accreditation and Approval Committee (LEAARC) was formed; it is an international, non-governmental peer-review process for voluntary self-evaluation (Commission on Accreditation of Allied Health Education Programs, 2012). The LEAARC reviews and grants formal recognition to lactation education programs (approval status and recommendation for accreditation). There are 25 *LEAARC Approved* courses worldwide (LEAARC, 2015). Approved courses include undergraduate and graduate college classes; for profit and not-for-profit education-based businesses; and online, in-person, and self-study courses. Interestingly, only one U.S.-based public health entity is listed (County of Riverside Department of Public Health). Criteria for approval include: (a) All programs must have existed for more than one year and been offered more than one time; (b) offer a minimum of 45 hours and cover all areas of the International Board of Lactation Consultant Examiner's (2013) *Exam Blueprint*; (c) and primary faculty have been IBCLC certified for more than 5 years. Although the goal is to provide "a reliable indicator of educational quality to..." consumers, no outcome data for the recognized programs or their learning outcomes have been published (Commission on Accreditation of Allied Health Education Programs, 2012).

Delivery Formats

Most often educational offerings for lactation have been delivered in face-to-face formats, less often as distance learning. More recently, the use of the Internet has enabled healthcare providers to access continuing education information with ease and efficiency. Reaching providers who are most in need of continuing education is critical. Busy providers often find it difficult to leave the workplace to devote the necessary time to attend traditional in-person trainings and interactive workshops (O'Connor, Brown, & Lewin, 2011). Similarly, it is not always feasible to find knowledgeable and experienced instructors who can allot the necessary time to teach on a continuing basis. An asynchronous online format offers several distinct advantages for both the learner and the education provider: (a) Flexibility (timing and access), (b) lower overall course delivery costs, and (c) access to current information (Lewin & O'Connor, 2012; O'Connor et al., 2011). More importantly, no loss in efficacy appears to occur. Cook et al., 2008 conducted a meta-analysis ($N = 201$) of electronic learning programs for health professionals; they examined the effects of Internet-based instruction and compared outcomes with 2 control groups (no intervention and with non-Internet intervention). The authors concluded that learning outcomes (knowledge, skills, learner behaviors, and effects on patients) were significantly improved compared with the no intervention control group and were similar to traditional content delivery methods (Cook et al., 2008). Lack of uniform curriculum standards, setting, homogeneity, and methodological issues limited the researchers' ability to make further comparisons. The researchers recommended that futures studies should be undertaken to compare Internet-based interventions with other delivery formats and to expand the evidence-base on distance

learning outcomes (e.g., skills, behaviors, practice, and patient outcomes). Emerging delivery formats, made possible by the proliferation of Internet connections both in the workplace and at home, offer the potential to bring knowledgeable and experienced instructors together with professionals requiring additional breastfeeding knowledge and skills. Numerous advantages exist for both the professional learner and their employer, providing a (potentially) mutually beneficial outcome.

Summary

Breastfeeding is a public health priority, yet few educational institutions integrate breastfeeding and human lactation science into their health sciences curricula. As a result, many healthcare professionals do not possess the requisite breastfeeding knowledge, attitudes, and skills to support breastfeeding families. Practice standards for hospital-based maternity care workers exist, but community standards are lacking. Educational resources and programs for continuing education exist for healthcare professionals, but their efficacy has not been established. Theory guided research has the potential for building efficacious educational interventions by explaining motivation to perform particular behaviors. A discussion of the theory used for this investigation follows.

Chapter 2

BACKGROUND

Conceptual Framework

The conceptual framework for this study was the Theory of Planned Behavior (TPB). Developed more than two decades ago, the TPB has proved to be a powerful framework for explaining and predicting motivation to perform a wide range of human behavior (Archer, Elder, Hustedde, Milam, & Joyce, 2008). Today, the TPB is considered one of the most prominent and best-supported social-psychological theories for predicting behavior; it has been used to study behavioral issues ranging from voting behavior to infant feeding decisions (Sharma & Romas, 2008). In fact, the TPB has been one of the most common theoretical frameworks used in breastfeeding research (Nelson, 2006).

The TPB is an extension of the Theory of Reasoned Action (TRA) (Ajzen, 1985; Ajzen, 1991; Ajzen & Fishbein, 1980). Although the TRA is parsimonious, its explanatory and predictive power is limited by the assumption that all behavior is under volitional control (Ajzen, 1985). Ajzen (1985) expanded the theory to include perceived behavioral control to explain behavior that is not completely under volitional control; this new construct “assumes that behavior is located along a continuum from complete volitional control to no volitional control” (Wambach, 1998, p. 52). The addition of the perceived behavioral control construct has rendered the TPB useful in explaining and predicting complex health-related processes, including infant feeding decisions, maternal breastfeeding behaviors, and the intention of healthcare providers in promoting and

supporting breastfeeding (Dodgson, Henly, Duckett, & Tarrant, 2003; Duckett, 1998; Wambach, 1997; Wambach et al., 2011; Watkins & Dodgson, 2010).

This section will provide an overview of the TPB model, discuss its operationalization, describe its use in breastfeeding research (related to healthcare providers), review each of the constructs (both its theoretical implications and how it has been operationalized in breastfeeding research), and discuss the limitations of the model.

Overview of the TPB

The TPB model's central concept is the individual's motivation drives their intention to perform a given behavior (Ajzen, 1991). Intention is intuitively described as how hard the individual is willing to try and the degree of effort they are planning to exert in order to perform a behavior (Ajzen, 1988). Intention is assumed to reflect the motivational factors that influence a behavior (Ajzen, 2002). According to Ajzen (1988, 1991), the stronger the intention to engage in a behavior, the more likely it will be performed. Key determinants of intention (Figure 1) include: (a) Attitude toward the behavior (e.g., the positive or negative evaluation of performing the behavior), (b) subjective norm ("the person's beliefs that specific individuals or groups think he should or should not perform the behavior" [Ajzen, 1985, p. 14]), and (3) perceived behavioral control (the ease or difficulty of being able to perform a behavior) (Ajzen, 2002). Three types of beliefs underlie these determinants: (a) Behavioral beliefs (expected outcomes of performing the behavior), (b) normative beliefs (the expectations of significant other people in regard to the behavior), and (c) control beliefs (presence of factors that will assist or deter performance of a behavior) (Ajzen, 2002). "The TPB may also include antecedents that may influence the 3 belief variables" (Dodgson et al., 2003, p. 149).

Knowledge and experience are antecedents to the TPB model (Dodgson et al., 2003; Dodgson & Tarrant, 2007; Duckett, 1998; Duckett, Henly, & Garvis, 1993). Together these constructs provide a framework for explaining, understanding, and predicting behavior (see Figure 1).

Figure 1. *Theory of Planned Behavior*

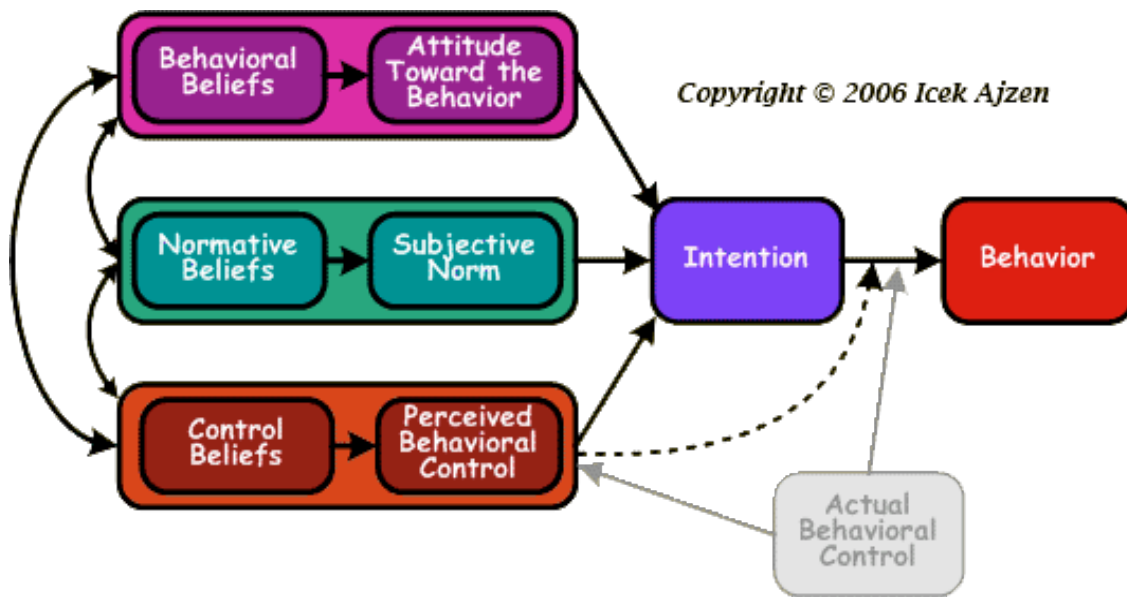


Figure 1. Retrieved from <http://people.umass.edu/aizen/tpb.diag.html>. Copyright 2006 by Icek Ajzen. Reprinted with permission.

Operationalization of the TPB

The ability to operationalize and empirically test the TPB increases its usefulness as a research framework. Whereas, only a brief description of the operationalization of the TPB framework is presented here, a more detailed account may be read elsewhere (Ajzen, 2012b; Ajzen & Fishbein, 1980). In conducting research using the TPB, the first step is to undertake an elicitation study to identify the salient beliefs on which the independent variable(s) are based (Ajzen & Fishbein, 1980; Bai, Wunderlich, &

Weinstock, 2011). The salient beliefs are then used to construct a questionnaire that is given to a representative sample of people drawn from the target population; the relative importance of the determinants of the target behavior is evaluated. Duckett et al. (1998) undertook this type of study to develop a set of TPB questionnaires focused on breastfeeding behavior. An intervention can then be constructed based on those components that were most strongly associated with the target behavior; the questionnaire would be used to evaluate the effectiveness of the intervention (e.g., pre-posttest) (Ajzen & Fishbein, 1980).

Scope of the TPB in Breastfeeding Research

Breastfeeding research using the TPB framework over the past 10 years has been diverse, but the evidence base is still largely rooted in descriptive research, using self-report cross-sectional surveys (Nelson, 2006; Watkins & Dodgson, 2010). Further, only 4 breastfeeding-related studies using the TPB had healthcare providers as participants (Brown et al., 2011; Daneault et al., 2004; Dodgson & Tarrant, 2007; Radcliffe & Payne, 2011). Brown and colleagues (2011) compared healthcare professionals' ($n = 20$) and mothers' perceptions ($n = 23$) of factors that influence decisions to breastfeed or formula feed; the study did not address healthcare provider's (e.g., midwives, health visitors, social workers, and breastfeeding counselors) intention to provide evidence-based breastfeeding support or their lactation management practices. Dodgson and Tarrant (2007) and Radcliffe and Payne (2011) used selected constructs of the TPB to examine changes in intentions of nursing ($N = 273$) and nutrition/dietetics ($N = 34$) students (respectively) to provide evidence-based breastfeeding support. In both studies significant improvements in knowledge, attitudes, and intentions were reported.

However, these interventions were undertaken within the university setting and are not comparable to currently practicing healthcare professionals. Daneault, Beaudry, & Godin (2004) used a self-report mail survey based on a modified model of the TPB to determine variables that contributed to the prediction of intention to promote breastfeeding among nurses ($n = 124$) and dietitians ($n = 27$). Perceived behavioral control explained 47% of the variance in intention. No professional breastfeeding educational interventions were reported for healthcare providers. Watkins and Dodgson (2010) reviewed breastfeeding educational interventions ($N = 14$) for healthcare providers and found similar results. This paucity of theoretically based research for healthcare providers is a critical gap that needs to be addressed in future breastfeeding studies.

In the proceeding sections, each of the concepts of the TPB model will be defined along with how researchers have operationalized each will be reviewed. These concepts will be discussed from the left to right across the flow of the model, beginning with the antecedents (Figure 1).

Antecedents

Previous breastfeeding history and knowledge acquisition are known antecedents of the TPB model. A brief discussion of these variables follows.

Previous breastfeeding history. Previous breastfeeding history has been used as an antecedent in the TPB model by a number of researchers to increase its explanatory and predictive power (Dodgson & Tarrant, 2007; Giles et al., 2007; Giles et al., 2010; Radcliffe & Payne, 2011; Wambach et al., 2011). Paradoxically, these situational (background) factors are conceptualized in the TPB as antecedents to beliefs and are theorized to have an indirect effect on intention and resultant behavior (Ajzen, 2011).

According to Ajzen (2002) it is consistent with the theory to incorporate antecedents that may increase the model's explanatory utility.

Knowledge Acquisition. To date, knowledge acquisition is the most commonly measured outcome in breastfeeding educational research. Educating health professionals and paraprofessionals (e.g., community-based lay health workers) regarding evidence-based breastfeeding support and promotion has demonstrated improvements in knowledge, as measured by pre- and posttest surveys (Lewin & O'Connor, 2012; O'Connor et al., 2011). Lewin and O'Connor (2012) compared mean pretest and posttest scores of 15,020 healthcare professionals (nurses, physicians, midwives, dietitians, and community lay health workers) and students who took a free web-based program between 1999 and 2009. The program covered 8 of 11 (73%) knowledge competencies as recommended by the USBC (2010). Mean posttest scores increased for all modules ($p < .001$). Using this same online program, O'Connor, Brown & Lewin (2011) looked at pre- and posttest scores of 2,237 maternal-child health providers (midwives, nurse practitioners, physician assistants, physicians, and resident physicians) that completed the program between 1999 and 2008. They found mean posttest scores for each of the 7 modules (response rate varied from 27-47% for each of the modules) increased significantly. Knowledge acquisition was the only outcome measured in both studies.

Researchers have also used self-report surveys to measure practice changes, as a means to verify knowledge acquisition post-intervention. In a quasi-experimental, pre-posttest multi-professional breastfeeding educational intervention, Ingram (2006) found that health visitors ($n = 18$), general practitioners ($n = 29$), and midwives ($n = 3$) increased their knowledge scores post intervention; however, knowledge of particular

lactation management strategies varied on 2 variables: (a) Profession and (b) parental status. Changes in knowledge and practice were self-reported and focused upon treating pathology (e.g., mastitis), improving symptomatology (e.g., sore nipples), and did not directly assess performance of breastfeeding practices or promotional aspects of breastfeeding.

Other researchers have measured knowledge acquisition by measuring breastfeeding duration, patient satisfaction, or by intention to provide breastfeeding support (Kronborg, Vaeth, Olsen & Harder, 2007; Labarere et al., 2005; Shinwell, Churgin, Shlomo, Shani, & Flidel-Rimon, 2006). Labarere et al. (2005) conducted a prospective, randomized, parallel-group study and found no significant differences in rate of 'any' breastfeeding at 4 weeks between the intervention ($n = 112$; received care from a provider who had completed 5 hours of breastfeeding training) and control ($n = 114$; typical maternity ward assistance) groups; however, mothers in the intervention group were significantly more likely to report exclusive breastfeeding at 4 weeks and longer overall duration of breastfeeding. The authors concluded that a brief training program for physicians might improve breastfeeding outcomes. In a before-and-after study, Shinwell, Churgin, Shlomo, Shani, and Flidel-Rimon (2006) found that breastfeeding initiation and duration rates increased significantly after professional staff (no N reported) in a hospital neonatal and obstetrics department received a breastfeeding course. However, in a randomized intervention study, Kronborg, Vaeth, Olsen, and Harder (2007) found that mothers' ($N = 1302$) perceptions of health visitors' supportive behaviors were associated with providers' knowledge, but not their intention to engage in breastfeeding support. The authors acknowledged that the health visitors in both the intervention ($n = 52$) and

control ($n = 57$) groups had a strong interest in supporting breastfeeding; this may have influenced the results. Additionally, it is possible that the health visitors' actual behavior differed from the mothers' perceptions.

Although researchers have demonstrated that breastfeeding education may improve health professionals' knowledge, which may or may not change their actual practice and improve breastfeeding rates, the modifying and confounding variables have not been clearly examined. In part, this is due to the difficulty in designing studies that could measure these variables, as well as, changes in professional practice. A clear understanding of the concepts (i.e., beliefs) underlying attempts to change professional behavior is critical to developing meaningful interventions.

Beliefs

Three beliefs (behavioral, normative, and control) underlie the key determinants of intention. Behavioral beliefs, in theory, are predicted by beliefs about the outcome of performing a behavior; normative beliefs are predicted by the perceived expectations of significant others in regard to the behavior; and control beliefs are predicted by the presence of factors that would assist or deter the behavior (Ajzen & Fishbein, 1980).

Although the TPB has proved useful in breastfeeding research, studies lack consistency in their operational definitions and measurement (Dodgson et al., 2003, p. 149).

Behavioral beliefs. Beliefs about the outcome of performing a behavior have most commonly been measured by a series of items on a 7-point Likert scale (*unlikely – likely*) (Ajzen & Fishbein, 1980; Duckett, 1998). Duckett et al. (1998) developed scales (Minnesota Infant Feeding Questionnaires [MIFQs]) using Ajzen's theoretical definitions to measure beliefs about the outcomes of breastfeeding and formula-feeding. These

scales have been used in numerous studies, and across cultures, to assess mother's beliefs (Dodgson et al., 2003; Duckett, 1998). The scales have also been used to measure beliefs of student nurses (Dodgson & Tarrant, 2007), general health science students (Dodgson, Bloomfield, & Choi, 2014), and healthcare professionals/paraprofessionals taking a continuing education breastfeeding course (Watkins & Dodgson, 2014). Watkins and Dodgson (2014) conducted a non-experimental pre-posttest study of healthcare professionals ($N = 79$) enrolled in a 45-hour breastfeeding and human lactation management course offered (as continuing education) through a community college course located in the southwestern U.S. The researchers used an updated (e.g., reflected changes that have occurred in professional guidelines) version of the MIFQs. Although participants' beliefs about breastfeeding were significantly improved from pre to posttest, no significant changes occurred in participants' beliefs about formula feeding. More research is needed to further explore the use of these scales in this population (i.e., healthcare providers) and to confirm the findings.

Normative beliefs. Ajzen and Fishbein (1980) recommend that investigators use the expectancy-value format to measure the likelihood of an outcome and its importance. However, Duckett et al. (1998) and Dodgson et al. (2003) measured the normative beliefs of mothers with simple rating scales rather than the expectancy-value format. Duckett et al. (1998) and Dodgson et al. (2003) did not use the “weighting variables...because...[it] did not increase zero order correlations...and would have doubled the number of items needed for the measurement of the TPB constructs” (p. 151). There is no precedent in the breastfeeding literature pertaining to healthcare providers for the use of this construct in the model. The multi-professional nature of lactation courses makes it infeasible to

determine the normative beliefs (i.e., perceived expectations of significant others about the behavior) for healthcare providers. It is quite plausible (and more than likely) that healthcare providers' normative beliefs may differ according to their discipline and workplace. Therefore, this concept was not measured in the current study.

Control beliefs. The presence of factors that would help or hinder the performance of a behavior is control beliefs. Duckett et al. (1998) used 7-point scales (-3 to +3) to measure specific control beliefs (e.g., "I will be able to get enough help if I encounter breast-feeding problems" p. 12) in 602 mothers. Structural equation modeling was used to illustrate control beliefs related only indirectly to duration of breastfeeding, through intention (p. 15). Dodgson et al. (2003) also demonstrated that control beliefs significantly predicted perceived behavioral control in breastfeeding mothers in Hong Kong ($N = 209$); perceived behavioral control significantly and independently predicted intention. Given the heterogeneity of healthcare providers' professional backgrounds and workplaces, and the lack of evidence on this topic for this population, it was not measured in this study.

Each of the 3 categories of beliefs described gives rise to: (a) Attitudes toward the behavior, (b) subjective norm, and (c) perceived behavioral control. These 3 variables are considered the proximal determinants of intention (Ajzen, 1985). A description of each follows below.

Attitudes toward the behavior. Early breastfeeding research using the TPB did not make the distinction between attitudes toward breastfeeding and beliefs about the outcomes of breastfeeding (Janke, 1992; Janke 1994). Duckett et al. (1998) used the theoretical definitions to more precisely operationalize this measure in her Minnesota

study; they measured attitudes toward breastfeeding and bottle-feeding (for 6 months or more) by asking women ($N = 602$) to evaluate 6 adjective pairs (e.g., ‘unpleasant – pleasant’, ‘healthy – not healthy’) using 7-point semantic differential scales (-3 to +3). As previously described, beliefs about the outcomes of breastfeeding and bottle-feeding were also measured (e.g., behavioral beliefs). Duckett and colleagues (1998) demonstrated a direct association (e.g., direct path) between attitudes toward breastfeeding/bottle-feeding and breastfeeding duration. This finding contradicts the TPB, which postulates that intention completely mediates the effect of the other TPB variables on behavior (Duckett et al., 1998, p. 20). Dodgson et al. (2003) confirmed the same finding in their Hong Kong study; the structural equation model replicating Duckett et al.’s (1998) ‘Model for Employed Women’ illustrated significant independent pathways from attitudes toward formula feeding/breastfeeding and breastfeeding duration. This finding is significant in that it occurred in separate studies with distinct samples of mothers from differing cultures. In the aforementioned study by Watkins and Dodgson’s (2014), participants demonstrated significantly improved attitudes toward formula feeding; however, only paraprofessionals demonstrated significantly improved attitudes toward breastfeeding. Further exploration of these findings in healthcare providers is warranted to expand the evidence base on this topic.

Subjective norm. Subjective norm can be described as an individual’s perceived social pressure (Ajzen, 1985). Most often this has been measured by asking the mother’s overall evaluation of the degree to which influential persons in her life approve of and support breastfeeding (as measured by 1-Likert item) (Ajzen, 2002; Dodgson et al., 2003; Duckett, 1998). In the aforementioned reviewed studies conducted by Duckett et al.

(1998) and Dodgson et al. (2003), subjective norm was not found to be a significant determinant of intention. Dodgson et al. (2003) demonstrated subjective norm was significantly correlated with PBC in their 'TPB Perceived Control Mediated Model'. However, no independent significant correlations between subjective norm and breastfeeding intention were found. No TPB-related breastfeeding research studies (i.e., interventions) with healthcare providers as participants (using the subjective norm construct) were found in the literature.

Perceived behavioral control. Other health fields have examined the translation of knowledge into clinical practice using theory (Eccles et al., 2006). Eccles and colleagues conducted a systematic review of quantitative studies examining the relationship between intention and behavior ($N = 10$). How cognitive theories perform in health professionals has not been clearly understood; "it has been argued that the intentions and behavior of clinicians are influenced by measureable psychological variables (e.g., attitudes) in the same way as the intentions and behavior of any individual" (p. 2). A key distinguishing feature, however, is consequences of clinicians' behaviors are often experienced by another person (i.e., if I support my patient's breastfeeding, she and her baby will have improved health outcomes). Although the authors demonstrated that measuring the intentions of healthcare providers might provide limited predictive utility, including additional psychological variables, particularly perceived behavioral control, may increase its explanatory utility. Understanding the underlying constructs of the TPB is important for explaining motivation to perform a behavior. Without a clearer understanding of healthcare provider's perceived control, the structural and functional issues within agencies serving breastfeeding families (and how

these issues affect healthcare providers' practice patterns) are not likely to be understood or addressed (Watkins & Dodgson, 2014). Knowledge acquisition (alone) has proved to be an inadequate strategy for changing practice. Healthcare provider's sense of agency and workplace power structures must be taken into account for educational programs to be successful.

Watkins and Dodgson (2014) have been conducting multidisciplinary breastfeeding education programs for professional and paraprofessional healthcare providers for 4 years. The researchers have demonstrated through routine pre- and post-testing that the program is effective in transferring knowledge (Watkins & Dodgson). During their 2013 courses, 190 participants completed surveys measuring their control beliefs (i.e., self-efficacy and workplace controllability). Together these scales represent the participants' perceived behavioral control. Although the data are still being analyzed, significant positive changes (compared to pretest means) were found for all self-efficacy items and some controllability items. These differences varied by cultural-orientation, social class and professional status (professional/paraprofessional). Although the results are preliminary, paraprofessionals scored much lower regarding their ability to act independently to provide best practices. Further, they did not feel they could positively influence breastfeeding practices within their work environment. Looking at educational outcomes beyond knowledge acquisition is critical for understanding healthcare providers' motivation to perform breastfeeding supportive practices and for constructing efficacious educational programs.

Intention. Measuring actual changes in practice, as an outcome has been a critical barrier to conducting research designed to measure the efficacy of breastfeeding

educational interventions. One approach to this methodological issue is to examine the healthcare providers' intention to perform a particular activity, as a way to demonstrate that knowledge has been internalized and motivation to act is present. Behavioral intention has been theorized to be the most direct determinant of one's behavior (Ajzen & Fishbein, 1980). DiGirolamo, Thompson, Martorell, Fein, & Grummer-Strawn (2005) used this theoretical construct to measure mother's intention ($N = 1,665$) as a predictor of continued breastfeeding. The authors "confirmed the utility of the intention construct from the Theory of Reasoned Action (TRA) . . . [and] the value of using behavioral theory to guide the selection of relevant constructs and understand the relationships between these constructs when explaining behavior" (DiGirolamo et al., 2005, p. 222). Additional empirical testing of the intention construct by researchers has demonstrated, on average, approximately 30% of the variation of healthcare providers' intentions on actual behavior is accounted for by the TPB (Eccles et al., 2006). The studies conducted by Duckett et al. (1998) and Dodgson et al. (2003) have confirmed this finding relative to mothers' breastfeeding intentions, as well. Each of the (respective) researchers found that mothers' intention to breastfeed explained between 17 and 30% of the variance in actual breastfeeding duration (depending on the structural equation modeling selected). Although the intention construct has been used widely in breastfeeding research with mothers regarding their decisions to breastfeed and actual behavior, research using this construct with healthcare providers as participants is limited.

Limitations

As is the case with all theoretical models, the TPB has limitations. The model asserts external variables may indirectly influence behavior through beliefs, and the

relative importance of attitudinal and normative components (Ajzen, 2012b; Ajzen & Fishbein, 1980). In other words, external variables will be related to behavior only if they are related to one of the constructs specified in the theory (Ajzen & Fishbein, 1980). There is no necessary relationship between any external factor and a given behavior. Three general categories of external factors are identified by Ajzen & Fishbein: (a) Demographic variables (age, sex, occupation, socioeconomic status, religion, and education), (b) attitudes toward targets (attitudes toward people and institutions), and (c) personality traits (introversion-extraversion, neuroticism, authoritarianism, and dominance). Other external factors may be identified for different types of behavior and may be included in the model if they are shown to be independent predictors (e.g., demonstrate a causal relationship with intention or behavior). Several known external factors may potentially mediate or moderate breastfeeding learning outcomes: (a) age, (b) being a parent, (c) previous breastfeeding experience, (d) race/ethnicity, and (e) educational level (Dodgson et al., 2003; Dodgson & Tarrant, 2007; Duckett, 1998; Tarrant, Dodgson, & Tsang Fei, 2002; Wambach, 1997). The current study is designed to take all of these into consideration.

Summary

A number of breastfeeding educational studies were reviewed, highlighting the methodological issues that limit researchers' ability to draw conclusions from the current state of the science. A significant drawback to each of the reviewed studies is the lack of consistency in educational format, study setting, and study design limiting comparisons and generalizability of results (Watkins & Dodgson, 2010). The multi-professional nature of intervention participants further limits the ability to make comparisons; a

paucity of research exists regarding the learning outcomes of these healthcare professionals. No previous U.S. studies have evaluated the effectiveness of an evidence- and theory-based 45-hour breastfeeding educational intervention for healthcare providers. The TPB provides a framework for exploring the psychological and behavioral outcomes (e.g., learning outcomes) in a meaningful way. The purpose of this investigation is to explore the changes in healthcare provider's learning outcomes related to breastfeeding support and promotion. This study represents the next step in expanding the evidence-base on this topic.

The research questions for this investigation are:

1. What is the feasibility of an online breastfeeding course for healthcare providers?
2. What are healthcare providers' psychological and behavioral changes occurring after completion of an online course?
3. How do the post-intervention psychological and behavioral outcomes of the online format compare with those of the previous format (hybrid) of this breastfeeding course?

Chapter 3

METHODOLOGY

In this chapter, the methodology used for this study is described and organized by 8 subsections (design, setting, sample, educational setting, human subjects protection, data collection, measurement, and data analysis). The measurement, data collection, and data analysis sections are further organized according to research question to provide a clear and detailed account of the investigation.

Design

A non-experimental pre-posttest self-report survey design was used to assess the feasibility and preliminary efficacy of an online breastfeeding educational intervention for healthcare providers. Self-report survey designs have been widely used to measure participants' psychological and behavioral outcomes in health-related research (Eccles et al., 2006; Trochim & Donnelly, 2008). This approach provided the most appropriate means for accomplishing the aims of this study.

Setting

The online continuing education course was conducted through the Southwest Clinical Lactation Education Program (SWCLEP), a continuing education program at Arizona State University. This major university is located in the southwestern United States and serves a large and ethnically diverse urban area: Caucasian (57.9%), Hispanic (30.0%), American Indian (2.7%), African American (5.6%), Asian (3.9%), and other (0.3%) (U.S. Census Bureau, 2013). Although it was possible that the online course would draw from outside the state, it was deemed unlikely due to locally focused

marketing efforts. The sample setting is reported and discussed in greater depth in the results and discussion chapters.

The educational course took place within an online platform, Blackboard, with participants using their workplace or personal computers (Blackboard, 2010). The Blackboard platform accommodates submitting assignments, testing, sequential viewing of content, and discussion through chat rooms and discussion boards. This medium supported all necessary components of course delivery.

Sample

A non-probability sample of all participants ($N=119$) who completed the online course between February 1, 2014 and September 30, 2014 were eligible to participate in this study. Professionals (licensed health professional or baccalaureate degree) and paraprofessionals (not a licensed health professional or without a baccalaureate degree) chose to take the course for professional development and/or as part of a work requirement. Eighty-five (71.4%) course participants completed the posttest, with 71 (59.7%) participants completing both the pretest and posttest (i.e., matched pairs). Thus, the subsample ($n = 71$) was used to conduct the analyses for research questions 1 and 2; the full sample ($N = 85$) was used to describe the demographic and biographical characteristics of the participants and to answer research question 3.

Of the 85 students who completed surveys, 83 students answered the demographic and biographical questions. Eighty participants provided demographic information regarding their age; participants ranged in age from 21 to 68 years ($M = 36.53$, $SD = 10.36$). More than three-quarters of the participants were parents (78%), with the number of children ranging from 1 to 6 ($M = 2.41$, $SD = 1.24$). Participants' professional

backgrounds are displayed in Table 1; the proportion of sample characteristics varied by professional status and is reported in Table 2.

Table 1

Professional background of study participants

Profession	<i>n</i>
Registered nurse	35
Registered dietitian	7
Nurse practitioner	1
Midwife	2
IBCLC	1
Social worker	9
Community health worker ^a	11
Peer counselor	7
Student	11
Other ^b	17

Note. $N = 85$; categories are not mutually exclusive. IBCLC = International Board Certified Lactation Consultant.

^aCommunity health workers include paraprofessional healthcare providers employed by community health programs.

^bOther includes other professions outside of healthcare, including stay at home mothers.

Table 2

Description of sample characteristics grouped by professional and paraprofessional status

Characteristic	Professional <i>n</i> (%)	Paraprofessional <i>n</i> (%)	χ^2
Gender ^a			N/A
Male	1 (1.6)	0 (0.0)	
Female	62 (98.4)	17 (100.0)	
Marital Status ^b			5.29*
Married or living with partner	54 (84.4)	10 (58.8)	
Not married or living with partner	10 (15.6)	7 (41.2)	
Ethnicity ^a			9.44**
White	46 (73.0)	6 (35.3)	
Latina/Hispanic	5 (7.9)	5 (29.4)	
Other	12 (19.1)	6 (35.3)	
Parent ^b	50 (78.1)	13 (76.5)	.02
Participant breastfed ^{c,d}	47 (97.9)	12 (92.3)	1.02
Employer required class	11 (16.7)	3 (17.6)	.01
Has taken previous breastfeeding class/seminar	37 (56.1)	13 (76.5)	2.35

Note. *N* = 85; 2 participants did not complete the demographic and biographical questionnaire, *n* = 83. Professionals (*n* = 66; 79.5%) include licensed healthcare workers or participants with baccalaureate degree or higher; paraprofessionals (*n* = 17; 20.5%) include participants with less than 4 years college education who are not licensed healthcare workers. N/A = not applicable.

^aFive participants did not answer. ^bFour participants did not answer. ^cSample consisted of parents only (*n* = 63, 74.1%). ^dTwo participants did not answer the question.

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

A university statistician (committee member) was consulted and conducted the power analysis. G*Power 3.1.2 (Faul, Erdfelder, Lang, & Buchner, 2007) was used to conduct power calculations for the paired samples *t*-tests, the primary method of analysis for Research Question 2. Effect sizes were calculated using previously collected outcome data (knowledge acquisition, beliefs, attitudes, and intention) for a similar in-person course (Watkins & Dodgson, 2014). Power calculations were based on the average expected effect size (.45, ranging from .21 to .72). “The power to detect an effect size of .45 with an $N = 45$ and an alpha level of .05 is .84 for two-tailed paired samples *t*-tests. This indicates there will be adequate power to detect medium effect sizes using *t*-test analyses to examine Research Question 2” (D. McClain, personal communication, January 16, 2014).

Educational Course

The SWCLEP was developed with the aim of providing evidence based breastfeeding and lactation management courses as continuing education opportunities for healthcare providers. Graduate level breastfeeding specialists with expertise in educational design developed the *Lactation Educator* course. It was a collaborative effort between public health and lactation professionals to meet identified learning needs of professionals and paraprofessionals working with breastfeeding families within Arizona. The curriculum meets international standards for this level course (USLCA, 2009) and was recently awarded approval status through the Lactation Education Approval and Accreditation Review Committee (LEAARC).

The education program focused on the current standard of care with an emphasis on breastfeeding supportive behaviors (WHO, 1998). Course content covered evidence-based breastfeeding material outlined in the IBLCE's *Exam Blueprint* and the ILCA's *Core Curriculum for Lactation Consultant Practice* (IBLCE, 2005; ILCA, 2008). To ensure consistency across the 6-week self-paced course, a structured uniform curriculum consisting of instructor narrated PowerPoint presentations, case studies, interactive exercises, formative activities, and a final exam was used. Additionally, student progression through the 20 course modules was sequential.

All 5-faculty members were experts in the topics they teach. The 3 primary faculty members were International Board Certified Lactation Consultants (IBCLCs) that have been recertified at least once (i.e., held the IBCLC credential for more than 5 years). Three of the instructors were Registered Nurses and 1 was a Registered Dietitian; 3 instructors held graduate degrees (2 master's degrees and 1 PhD).

Measurement

The self-report *Infant Feeding Survey* (IFS; Appendix B) consisted of a (1) demographic and biographical questionnaire; (2) 14 questions to assess knowledge acquisition; scales that measured (3) beliefs (about breastfeeding and formula feeding), (4) infant feeding attitudes (toward breastfeeding and formula feeding), (5) perceived behavioral control, and (6) intention to act on the knowledge presented during the intervention; and (7) a questionnaire about the feasibility of the online format. Estimated time to complete the survey was 15 minutes. Estimates of internal consistency using Cronbach's alpha for all scales used in this investigation are reported in Table 3; all

scales were found to be internally consistent. A description of the instruments of measurement follows (see Figure 2 for the conceptual model for this study).

Table 3

Reliability Analysis Results for the Measured Constructs

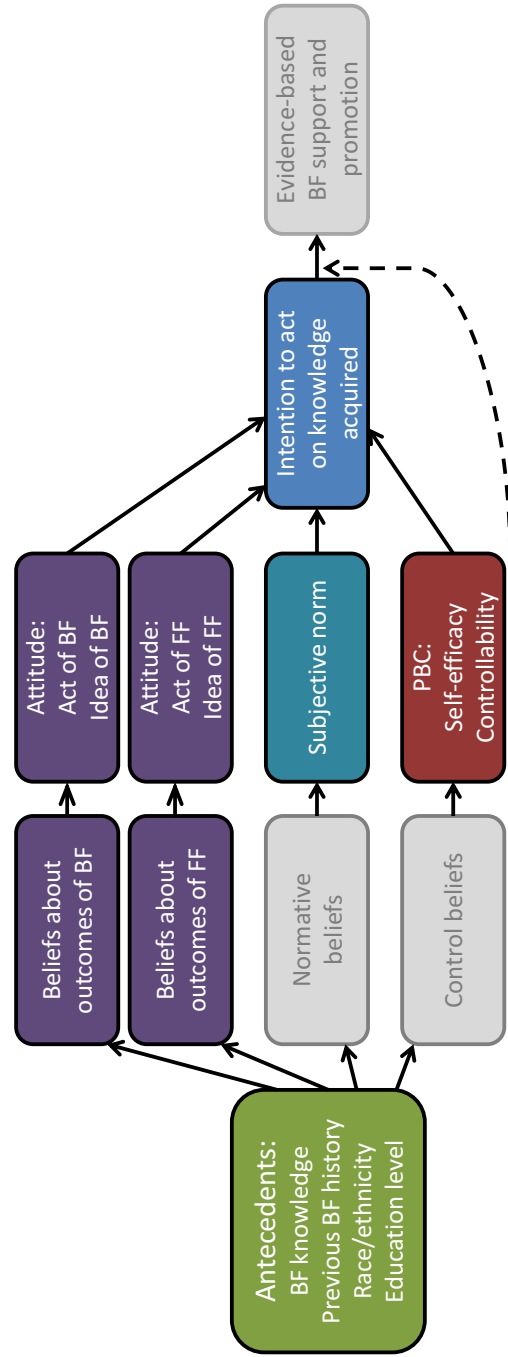
Construct	Number of Items	Cronbach Alpha	
		Online LEC	Hybrid LEC ^a
Infant feeding beliefs			
Beliefs about the outcomes of BF	19	.92	.85
Beliefs about the outcomes of FF	19	.91	.92
Infant feeding attitudes			
Attitudes toward BF	12	.89	.90
Attitudes toward FF	12	.92	.91
Perceived behavioral control ^b	15	.89	.92
Self-efficacy	10	.92	.87
Controllability	5	.80	.84
Intention to act on acquired knowledge	14	.75	.75

Note. LEC = Lactation Educator Course. BF = breastfeeding. FF = formula-feeding.

^a The reliability analysis was conducted using data collected from participants who took the LEC hybrid instructional format (3 days in person and 2 days online instruction).

^b The perceived behavioral control scale = the self-efficacy + controllability subscales.

Figure 2. An exploration of changes in healthcare providers' learning outcomes related to breastfeeding support and promotion: A conceptual model using the Theory of Planned Behavior framework.



Note. BF = breastfeeding; FF = formula feeding; PBC = perceived behavioral control. Gray areas represent concepts not measured.

Demographic and biographical variables (antecedents). Participants were asked 10 demographic questions (e.g., gender, birth year, marital status, residency (U.S. and Arizona), race/ethnicity, professional background, educational background, whether they were parents, and number of children). Participants' experience with breastfeeding was determined by 2 questions: (a) Experience breastfeeding children and (b) employer required class as part of their employment.

Knowledge acquisition. Knowledge acquisition about healthcare providers' breastfeeding supportive behaviors and unsupportive breastfeeding activities occurring during the intervention was measured using a modification of the *Breastfeeding Knowledge Questionnaire* (BKQ) (Dodgson & Tarrant, 2007). The original BKQ consisted of 19 questions with *true*, *false*, and *I don't know* responses. However, after analysis by 2 lactation experts with graduate degrees, 5 questions were removed because the activities did not clearly address current evidence-based practice guidelines (e.g., 'breastfed babies need to be burped'). A 2-week test-retest reliability analysis was conducted with an independent sample of students ($n = 12$) that demonstrated adequate reliability (Pearson's $r = .60$, $p < .05$) for this questionnaire (Cohen, Cohen, West, & Aiken, 2003).

Infant feeding beliefs. Two scales developed by Duckett et al. (1998) and validated by Dodgson et al. (2003) and O'Keefe et al. (1998) were used to measure beliefs about the outcomes of breastfeeding and formula feeding. The beliefs about the outcomes of breastfeeding and formula feeding scales each consist of 19 items with a 7-

point Likert scale anchored with *unlikely* (1) to *likely* (7). Higher scores represent more positive evidence-based infant feeding beliefs.

Infant feeding attitudes. Attitudes toward breastfeeding and formula feeding were measured using scales developed by Duckett et al., (1998) and previously validated by other researchers across various settings and cultures (Dodgson et al., 2014; Dodgson et al., 2003; O’Keefe et al., 1998). The breastfeeding and formula feeding attitudes’ scales each consist of 12 items with a 7-point semantic differential scale (Duckett et al., 1998). Participants respond to adjective pairs (e.g., *unpleasant* and *pleasant*, *embarrassing* and *not embarrassing*) corresponding to the idea of breastfeeding and formula feeding and the act of breastfeeding and formula feeding. Higher scores indicate more positive evidence-based attitudes toward infant feeding.

Subjective norm. Subjective norm is the healthcare provider’s overall evaluation of the degree to which the people they work with support breastfeeding. Consistent with Ajzen and Fishbein’s (1980) recommendations for measuring this construct, 1 item with a 5-point Likert scale, ‘I work with people who are very supportive of breastfeeding’ (*strongly agree* to *strongly disagree*) was used.

Perceived behavioral control. Beliefs about the presence of factors that may facilitate or impede evidence-based supportive breastfeeding practices (perceived self-efficacy) and the perceived control over the performance of these practices (perceived controllability) was measured using the *Workplace Perceived Behavioral Control Scale* (WPBCS). The WPBCS was developed by Dodgson (2013) and reviewed by a panel of content specialists (1 PhD and 2 PhD students who were also IBCLCs) to establish

content validity. The scale, composed of two subparts, consisted of 15 items with a 5-point Likert scale. Ten items ask respondents to rate their ability (*very easily* to *very difficult*) to perform specific breastfeeding promotion and support activities (self-efficacy). Examples of items include: (a) Assist in positioning a baby correctly at the breast, (b) motivate mothers to breastfeed their babies, and (c) carry out activities necessary to support breastfeeding women. Five questions asked respondents to rate (*strongly agree* to *strongly disagree*) their ability to implement best breastfeeding practices in their workplace (controllability). Scale items examples include: (a) ‘implement what I learned in class to my work setting’, (b) ‘follow best breastfeeding practices in my work setting’, and (c) ‘influence breastfeeding policy in my work setting’). The scale(s) represents Ajzen’s (2002) conception of the unitary nature of PBC, although comprised of two separate (but interrelated) concepts (i.e., self-efficacy and controllability).

Intention to act on knowledge acquired. Intention to act on knowledge acquired is defined as the participants’ expressed aim to perform actions that are consistent with the evidence-based breastfeeding supportive behaviors. To measure this variable, an adapted version of the *Breastfeeding Promotion Behaviors Scale* (BPBS) was used (Anderson, Chiu, & Henly, 1999). The BPBS was developed using the World Health Organization’s *Ten Steps for Successful Breastfeeding* (WHO, 1998), which is the ‘gold standard’ for supportive breastfeeding behaviors. Five questions were removed because they are not applicable to both the professional and paraprofessional participants (e.g., ‘provide training on breastfeeding to other healthcare providers’).

This 13-item scale was used to measure intention to act on knowledge acquired during the intervention. Participants will be asked to rate specific behaviors on a 5-point Likert scale anchored by *strongly agree* – *strongly disagree* indicating how likely they would be to carry out a specific behavior. The behaviors described are either supportive or detrimental to breastfeeding and seek to determine participants’ understanding of evidence-based practice. Items are relevant for both professionals and paraprofessionals within hospital or community settings; for example, ‘show a mother how to express her breast milk manually to store for later use.’ A lower score represents higher intention to act on knowledge acquired during the intervention.

Feasibility. To assess the feasibility of the online format, an author-designed questionnaire was used (Appendix C). Seven variables were measured by asking participants about the ease of use, self-pacing format, satisfaction, recommend course, level of material presented, expectations, and length of time spent on each module; 11 Likert-type questions (*strongly agree* to *strongly disagree*) measured these variables. Additionally, participants were asked ‘where did you complete your course work?’ (i.e., 4 possible choices: Home, work, public Wi-Fi, or various locations) and were invited to provide additional comments (optional).

Human Subjects Protection

Approval from the university Institutional Review Board (IRB) was obtained prior to participant recruitment and data collection (Appendix D). All potential participants (*Lactation Educator* enrollees) were sent an email containing information about the purpose, aims, and goals of this research project prior to the start of the class

(Appendix E). Interested individuals followed a link to the secure online survey.

Completion of the survey was considered agreement to participate; all participants were advised that they could withdraw from the study at any point with no punitive consequences. No foreseeable risks were associated with this study.

In order to protect the personal information of study participants, a computer generated code number was used to uniquely identify each participant. Participation in this study was confidential. The researcher stored any electronic files on a password protected computer that was secured in a locked office at all times; all personally identifiable information (e.g., email addresses) were delinked (and deleted) before data analysis. Any physical records associated with this research were kept in a locked file cabinet, in a locked room, in a secured building accessible only to the researcher for the duration of the study. Upon completion of this study, the data obtained will only be accessible to the researcher and research supervisor (dissertation committee chair).

Data Collection

Data was captured electronically using REDcapTM (Research Electronic Data Capture), a secure, web-based program designed for creating and managing surveys (Harris et al., 2009). All data was encrypted and exported to statistical software for analysis. Timing and access to the pretest and posttest were controlled through the sequential delivery of the course (e.g., the link to the posttest survey was not sent until all modules were completed). Students who did not complete the course were not sent a link to complete the posttest survey.

Question 1. Data related to the feasibility of the online format was collected during the posttest (e.g., after completion of the course).

Question 2. To assess the changes in learning outcomes, the survey was available prior to the start of the class (pretest) and once the participant completed the course (posttest). A \$20 gift card was offered to participants who completed both the pretest and posttest.

Question 3. To address research question 3, outcome data collected between March 2011 and December 2013 from the previous hybrid (face-to-face and online) format were used as the comparison. Data were routinely collected at each course offering; however, the survey instruments used evolved over time. For this reason, earlier surveys did not measure the perceived behavioral control and subjective norm variables; later surveys did not measure the knowledge acquisition and intention variables. Therefore, two convenience samples of previously collected data were used: One sample consisted of all outcome variables, except knowledge acquisition and intention to act on knowledge acquired, whereas the other sample contained these missing variables. The hybrid and online courses were identical in all respects with the exception of delivery format (e.g., same learning and course objectives, instructors, PowerPoint presentations, etc.). The hybrid course was delivered as an 8-hour day once a week for 5 weeks (alternating face-to-face and online days).

Data Analysis

An overview of the data analysis plan including research questions, variables, instruments of measurement, and statistical tests is presented in Table 4. Both qualitative

and quantitative approaches were used. Content analysis, a qualitative approach, was used to evaluate additional comments provided by participants on the feasibility questionnaire. Atlis.ti (version 7) qualitative data analysis software was used to organize, code and systematically analyze participants' comments (2012, Scientific Software Development). Comments were read and re-read to ensure the meanings were captured; conceptually congruent comments were assigned categorical codes; and frequencies of comments in each category were recorded.

Quantitative analyses were performed for the 3 research questions. Descriptive statistics (means and standard deviations or tabulations and cross tabulations, as appropriate) were calculated for all variables to identify outliers and non-normally distributed variables. All data were normally distributed (skewness of data was less than 2.5 and kurtosis was below 12) with the exception of the attitudes toward breastfeeding scale, which had a kurtosis of 15 (to be discussed further in the results and discussion sections). Data were examined to identify missing and non-response patterns; a statistician (committee member) was consulted to ensure missing data were handled appropriately (i.e., average scale scores were calculated for participants who answered 75% or more of scale items). To ensure sample equivalency, differences between hybrid and online demographic/biographical data were assessed with contingency table analyses (categorical data) and *t*-tests (continuous variables) prior to performing independent *t*-tests on the outcome data for the two educational formats. SPSS (version 21) was used for all quantitative analyses (IBM Corporation, 2010). All statistical tests were two-tailed, tested at alpha .05.

Table 4

Methodology and Data Analysis Plan

Question	Variables	Scale (Y/N)	Measurement	Data Analysis
1. What is the feasibility of the online format?	<ul style="list-style-type: none"> Ease of use Self-pacing format Satisfaction Recommend Level of material Expectations Estimated time spent on each module 	N	Author designed questionnaire	<ul style="list-style-type: none"> Frequencies Means (<i>SD</i>) Content Analysis
2. What are HCP's psychological and behavioral changes occurring after completion of an online course?	<ul style="list-style-type: none"> Infant feeding knowledge BF/FF Beliefs BF/FF Attitudes Workplace perceived behavioral control Intention to perform supportive breastfeeding behaviors 	N Y Y Y	Revised BKQ Revised MIFQ's Revised MIFQ's WPBC Scale	<ul style="list-style-type: none"> Cronbach alpha Means (<i>SD</i>) <i>t</i>-tests (paired/dependent)
3. How do the post-intervention psychological and behavioral outcomes of the online format compare with those of the previous format (hybrid) of this breastfeeding course?	<ul style="list-style-type: none"> Infant feeding knowledge BF/FF Beliefs BF/FF Attitudes Workplace perceived behavioral control Intention to perform supportive breastfeeding behaviors 	N Y Y Y	Revised BKQ Revised MIFQ's Revised MIFQ's WPBC Scale	<ul style="list-style-type: none"> Means (<i>SD</i>) <i>t</i>-tests (independent)

Note. HCP's = healthcare providers; BF = breastfeeding; FF = formula feeding; BKQ = Breastfeeding Knowledge Questionnaire; MIFQ's = Minnesota Infant Feeding Questionnaires; WPBC Scale = Workplace Perceived Behavioral Control Scale; BPBS = Breastfeeding Promotion Behaviors Scale.

Chapter 4

RESULTS

The results of the data analysis for each of the 3 research questions are presented in this chapter.

Question 1 (Feasibility)

Feasibility of the online *Lactation Educator* course was evaluated by quantitative and qualitative analysis of the feasibility questionnaire, as well as, examination of course completion rates. The results of this analysis are presented below.

Feasibility questionnaire responses. Seventy-one participants (83.5%) completed the feasibility questionnaire that was distributed at the completion of the 6-week course as part of the posttest survey. Participants answered 11 Likert questions (5 point scale, *strongly agree* to *strongly disagree*) relating to the ease of use, self-pacing format, level of material, satisfaction, recommend course, and expectations (see Table 5). The most frequent answer for all questions was *strongly agree*. The item with the lowest number of participants answering *strongly agree* ($n = 25$, 35.2%) was “I prefer the online learning environment over that of traditional (in-person) classrooms”. Greater than 50% of participants *strongly agreed* with the other 10 questions. Participants answered *disagree* or *strongly disagree* with higher frequency to “I prefer the online learning environment over that of traditional (in-person) classrooms” ($n = 11$, 14.5%) and “I had little or no problems accessing the online content” ($n = 10$, 14.1%). Less than 5% of participants answered *disagree* or *strongly disagree* to the other 9 questions. A summary of the feasibility questionnaire responses follows.

Table 5

Frequency distribution of Feasibility Questionnaire (Likert Questions)

Question	Strongly Agree (n) %	Agree (n) %	Ambivalent (n) %	Disagree (n) %	Strongly Disagree (n) %	N/A (n) %
Ease of use						
The speed and quality of my Internet connection was appropriate for accessing the course materials.	48 (67.6)	18 (25.4)	3 (4.2)	2 (2.8)	0 (0.0)	
I had little or no problems accessing the online content.	37 (52.1)	21 (29.6)	3 (4.2)	9 (12.7)	1 (1.4)	
I was able to reach someone that could help me when I had a question.	38 (53.5)	14 (19.7)	10 (14.1)	2 (2.8)	0 (0.0)	7 (9.9)
Self-pacing format						
I was able to complete the course modules at my own pace.	50 (70.4)	17 (23.9)	2 (2.8)	2 (2.8)	0 (0.0)	
Level of material						
The level of material was appropriate for my needs ^a .	38 (53.5)	28 (39.4)	2 (2.8)	2 (2.8)	0 (0.0)	
This course will be helpful to me ^b .	53 (74.6)	15 (21.1)	1 (1.4)	0 (0.0)	0 (0.0)	
Satisfaction						
I would take a breastfeeding course online again.	50 (70.4)	15 (21.1)	3 (4.2)	3 (4.2)	0 (0.0)	
I prefer the online learning environment over that of traditional (in-person) classrooms.	25 (35.2)	17 (23.9)	18 (25.4)	8 (11.3)	3 (4.2)	
This content is appropriate for an online course.	45 (63.4)	22 (31.0)	2 (2.8)	2 (2.8)	0 (0.0)	
Recommend course						
I would recommend this course to others	51 (71.8)	16 (22.5)	3 (4.2)	1 (1.4)	0 (0.0)	
Expectations						
This course met my expectations ^a .	42 (59.2)	24 (33.8)	3 (4.2)	1 (1.4)	0 (0.0)	

Note. $n = 71$. N/A = not applicable; N/A was an option for question 3 only. Most frequent answers are in boldface.

^aOne participant did not answer. ^bTwo participants did not answer.

Ease of use. Participants were overwhelmingly positive regarding the ease of use of the course. When asked if the speed and quality of their Internet connection was appropriate for accessing the course materials, 93.0% ($n = 66$) of participants responded *agree* or *strongly agree*. Eighty-two percent ($n = 58$) of participants responded *agree* or *strongly agree* when asked if they had little or no problems accessing the online content and 81.3% ($n = 52$) of participants *agreed* or *strongly agreed* they were able to reach someone who could help them when they had a question (7 participants answered non-applicable to this question).

Self-pacing format. Over ninety-four percent ($n = 67$) of participants responded *agree* or *strongly agree* with the statement “I was able to complete the course modules at my own pace”.

Level of material. Participants found the level of material to be appropriate for their needs; 94.3% ($n = 66$; one participant did not answer) responded *agree* or *strongly agree* to this item. When asked if the course would be helpful to them, 98.6% ($n = 68$; two participants did not answer) responded *agree* or *strongly agree*.

Satisfaction. Although just over half of participants (59.2%, $n = 42$) responded *agree* or *strongly agree* to the statement “I prefer the online learning environment over that of traditional (in-person) classrooms”, 91.5% ($n = 65$) of participants responded *agree* or *strongly agree* when asked if they would take a breastfeeding course online again. Participants also found the content to be appropriate for an online course (94.4%, $n = 67$).

Recommend course. When asked if they would recommend this course to others, 94.4% ($n = 67$) responded *agree* or *strongly agree*.

Expectations. 94.4% ($n = 67$) of participants responded *agree* or *strongly agree* to “this course met my expectations”.

Completion time. The feasibility questionnaire also asked participants where they completed their coursework and to estimate the average amount of time it took to complete each of the 20 course modules (units). Nearly three quarters of the participants ($n = 53$, 74.6%) completed their course work at home; 15.5% ($n = 11$) completed it at their place of employment; and the remaining participants ($n = 7$, 9.9%) completed the work at “various” locations. Of the 62 participants who responded to the completion time question, 32 (51.6%) estimated the time to complete an average course module was 2 hours or less; 12 (19.3%) completed the modules in approximately 3 hours; and 12 (19.3%) indicated it took between 4 and 6 hours to complete each module. Nearly 10% ($n = 6$) reported the completion time varied too much to provide an estimate.

Additional comments. As a vital part of the feasibility questionnaire, participant comments were solicited. Content analysis of the comments provided by 32 participants highlighted 6 general categories, which group conceptually congruent comments together: (a) Content quality ($n = 9$), (b) online environment ($n = 10$), (c) workload ($n = 4$), (d) audience relevance ($n = 8$), (e) enjoyability ($n = 15$), and (f) delivery ($n = 33$). The results of this analysis follow and are presented according to the 6 identified categories.

Content quality. Comments relating to the accuracy and meaningfulness of content were made ($n = 9$). Two (22.2%) participants expressed concerns relating to the

formal assessments: “I feel some of the questions on the final test were very broad and could have been interpreted and answered differently” and “the wording of several of the quiz questions created a higher likelihood of someone answering incorrectly even though they knew the content.” A concern was raised regarding the number of grammatical and typographical errors course materials contained ($n = 4$, 44.4%) and was best expressed by one participant’s comment: “...someone may want to proofread the materials and communications that go out to the students. The course content was extremely useful and informative, however the typos, misspellings, grammatical errors, etc. impact the overall quality of the course.” Others ($n = 2$, 22.2%) praised the content quality stating, “I thought the content of the modules was very helpful, concise, and easy to understand” and “I have taken a few online courses and this was by far the best in terms of content, structure and availability of lecturers/tutors to address any difficulties encountered.”

Online environment. Participants’ comments ($n = 10$) illustrated the diverse views and experiences of their interaction with the online environment. While participants reported liking the self-paced nature of the online course ($n = 5$, 50%), others were uncomfortable with the technology and preferred a traditional in-person classroom ($n = 5$, 50%). One participant wrote, “I liked the self-paced work because I could work on the course whenever I had free time”, whereas another stated, “the on-line aspect was difficult for me. I don’t have background using ‘word’ format etc. so anything requiring specific formats was beyond my scope and required outside help.” Several participants expressed a desire for more personal interaction. “I was disappointed that there wasn’t more opportunity for discussion and questions with the instructors and other

participants”; another participant stated she “would like more interaction with chat topics” and a third participant stated, “I really enjoyed this course but feel I could have gotten more from an in-person experience where active class discussion could happen, questions could be asked to instructor IBCLC as they came up for immediate feedback. Possibly even demonstrate role play etc.”

Workload. Workload was defined by the amount of work (e.g., time and expenditure of effort) that was necessary to complete the course study modules ($n = 4$). Two participants (50%) expressed difficulty with gaining access to breastfeeding dyads to complete required assignments: “...modules that required interviews and observations required more time since I am nonclinical staff and do not see pregnant women on a regular basis.” Another participant noted, “...I don’t have ongoing access to mother’s who are breastfeeding.” Other ($n = 2$, 50%) participants felt the workload was reasonable, as indicated by this statement: “Most of the work was great and do-able in a relatively reasonable amount of time.”

Audience relevance. Participants commented about the relevance (meaningfulness or purposefulness) of particular exercises. Participant comments ($n = 8$) were equally split regarding the usefulness of assignments. One participant expressed their concern by stating, “some of the assignments were not relevant to me because I do not work in the medical field. It is important to keep in mind the audience of those who are taking the class.” Conversely, other participants stated: “I was very pleased with the class...it has so much information I needed” and “I learned so much more than I ever expected about BF!...I can’t wait to put it to work at my job where we lack the proper

education!” One international participant wrote, “although some of the content is very rightly directed and applicable to those working in the field of lactation in the state of Arizona, the overall content had a very international feel and the fact that I reside in Ireland did not detract from the effectiveness of this course. In fact, I learned so much that could be contextualized for Irish mothers.”

Enjoyability. Comments that related to the pleasurable or non-pleasurable nature of the online environment or curricular activities were frequent ($n = 15$). The overwhelming majority ($n = 11$, 73.3%) of comments were favorable and expressed appreciation for the course. The following are a few favorable exemplars: “...I did learn a lot in the class and I felt the teachers were very knowledgeable!!!! Thank you for this opportunity and experience!!!”, “the course was great!”, “I loved the pictures, presentations and videos—it was like being in class”, “thoroughly enjoyed the class”, and “...excellent class!”. A few participants ($n = 4$) expressed displeasure with the course, specifically the online experience. One participant summed up the sentiment of this group by stating, “I did not enjoy the computer aspect of the classroom!”

Delivery (technical, instructor, and curriculum). Participants described favorable and unfavorable aspects related to the delivery of the course (e.g., giving of the course and materials). The 33 delivery comments were further categorized according to the delivery of the technical aspects of the course, instructor delivery, or the delivery of the curriculum. Technical delivery difficulties were reported by few students ($n = 2$, 6.1%) and included trouble accessing course materials and/or streaming online videos. One participant wrote, “on my computer it was some of the videos that were very slow like

the Kittie Frantz, the one where the newborn crawled up the mother's chest, the ASU videos etc.". Another participant had "trouble accessing audio with presentations." Participant comments about the instructors were mixed; participants offered both positive ($n = 4$, 12.1%) and constructive ($n = 3$, 9.1%) feedback regarding instructors' delivery of material. A few of the positive comments provided by participants include: "The staff did a wonderful job at introducing themselves at each presentation and on Blackboard. They also went above and beyond in responding promptly to my emails; I felt they were available" and "most sections were very informative and [instructors] effectively explained the material". Constructive feedback focused on instructor preparedness and consistency of messages. Regarding instructor preparedness, one participant had this to say:

It was obvious which instructors prepared before recording their lectures. It was a little frustrating and a bit of a waste of time sitting through a lecture listening to an instructor fumble through the presentation. It also significantly added to the time. I truly appreciated when the instructor prepared their lecture ahead of time and utilized their time effectively and efficiently.

Another participant noted that there were inconsistencies in instructor messages (e.g., philosophies); she noted the following:

Sometimes even the presenters were inconsistent from one another. For example, one presenter strongly advocated not using the word 'supply' and instead referring to it as 'production'. The following presenters kept referencing supply, so the message differed philosophically. Also, toward the end it got confusing

because the lectures would reference module 18 when we were only on module 17. It's not a huge deal but it tripped me up a few times!

Issues concerning the delivery of the curriculum and grading of formal assessments were brought out in participant comments ($n = 4$, 12.1%). The course was delivered in a sequential format; participants could not view the next module until the one they were currently working on was completed. Three participants (9.1%) commented on disliking this aspect of the course and was best summarized by this comment:

I would have liked to be able to have the assignments known in advance so that I could have managed my time better. With working nights and doing the homework in the middle of the night it made it very difficult to plan my reading and assignments because if the assignment entailed getting our policy from work and I was not going to go to work for 2 days I was at a stand still because I was not able to advance to the next module [and] this was frustrating.

Assignments are graded as either passing or failing; 2 (6.1%) participants expressed frustration with this: "...feedback on written assignments would be much appreciated. I felt that I spent a fair amount of time completing written assignments and would have liked feedback or possible even discourse on the assignment" and "1-2 of the modules stated that they were being graded yet the grade was never displayed. That was very concerning to me. All of the other modules displayed a grade".

Course completion rate. Of the 127 students who originally enrolled and started the course, 119 (94%) completed the course.

Question 2

The self-report IFS was used to measure the psychological and behavioral changes in healthcare providers that occurred after completion of the online *Lactation Educator* course. The results of the analyses for the (1) demographic and biographical questionnaire; (2) knowledge acquisition questionnaire; scales that measure (3) beliefs (about breastfeeding and formula feeding), (4) infant feeding attitudes (toward breastfeeding and formula feeding), (5) subjective norm, (6) perceived behavioral control, and (7) intention to act on the knowledge presented during the intervention are presented in the proceeding section. Paired samples t-tests were used to compare pretest and posttest means; all analyses were based on the subsample consisting of 71 (83.5%) matched pretest/posttest pairs.

Demographic and biographical variables. No significant differences were found between the total sample ($N = 85$) and subsample ($n = 71$) for the demographic and biographical variables, indicating the samples were equivalent. A description of the demographic and biographical variables was presented in the methods section and thus, will not be repeated here.

Knowledge acquisition. Pretest breastfeeding knowledge scores ranged from 3 (21.4% answers correct) to 14 points (100% answers correct), with a mean of 11.32 points (80.9% answers correct, $SD = 2.55$), indicating high baseline knowledge levels. Posttest knowledge scores were significantly higher ($M = 12.45$, $SD = 1.44$), indicating participants who completed the *Lactation Educator* course had significantly increased breastfeeding knowledge levels ($t(65) = 4.42$, $p < .001$). The pretest/posttest scores for

each of the breastfeeding knowledge questionnaire questions are presented in Table 6. Participants demonstrated significant knowledge increases in advising mothers about preparing their nipples before birth ($\chi^2 = 10.48, p < .01$), the use of one breast during feedings ($\chi^2 = 40.15, P < .001$), the use of both breasts during feedings ($\chi^2 = 8.95, p < .01$), how to start the baby nursing ($\chi^2 = 15.02, p < .001$), breastfeeding even if nipple is sore ($\chi^2 = 23.84, p < .001$), and breastfeeding during a breast infection ($\chi^2 = 25.43, p < .001$) after completing the course.

Infant feeding beliefs. Improvements in participants' beliefs about the outcomes of breastfeeding were demonstrated with significantly higher posttest scale scores [$M = 6.08, SD = 0.76$ (pretest) and $M = 6.36, SD = 0.55$ (posttest); $t(69) = 3.32, p < .001$] (Table 7). However, participants' beliefs about the outcomes of breastfeeding were not changed after completing the course for 7 items: (a) Baby will have few illnesses, (b) baby will have good jaw and facial development, (c) baby will associate the smell of milk and the feel of mother's skin with positive feelings, (d) mother and baby will have lots of skin-to-skin contact, (e) feedings will be a rewarding time, (f) breastfeeding will be convenient, and (g) mother's interest in sex will return rapidly. Participants' overall beliefs about the outcomes of formula feeding were significant and not in the expected direction [$t(68) = 4.35, p < .001$]: Participants' higher posttest scale scores ($M = 5.23, SD = 0.96$; pretest $M = 4.73, SD = 0.94$) indicated less favorable evidence-based formula feeding beliefs. All scale items, with the exceptions of 'baby will have few illnesses' and 'mother will save money by bottle-feeding', were significantly higher (less favorable) (Table 8).

Table 6

Breastfeeding Knowledge Questions with Frequency of Pretest and Posttest Correct Responses

Variable	Correct	
	Pretest <i>n</i> (%)	Posttest <i>n</i> (%)
Mothers should nurse from one breast only at each feeding.	68 (95.8)	64 (92.8) ^a
Mothers should breastfeed on a demand schedule.	59 (84.3) ^b	56 (78.9) ^b
Mothers should use special cleaning agents on their nipples.	64 (91.4) ^b	66 (94.3) ^b
Mothers should prepare before giving birth by expressing colostrum and by massage.	42 (59.2)	58 (82.9) ^b
Mothers should use a supplementary bottle of formula until their milk supply is established.	66 (93.0)	70 (100.0) ^b
Mothers should weigh their babies after each feeding to be sure they are getting enough milk.	65 (91.5)	69 (98.6) ^b
Mothers do not need to use both breasts at each feeding.	40 (56.3)	58 (81.7) ^b
Mothers should breastfeed on a four hour schedule.	64 (90.1)	69 (100.0) ^a
To start the baby nursing, the mother should push the baby's head towards the nipple.	45 (63.4)	55 (78.6) ^b
Solid food should be started in the newborn before three months of age.	68 (95.8)	69 (98.6) ^b
Mothers should nurse from a breast even if the nipple is sore and/or cracked.	42 (59.2)	45 (64.3) ^b
Mothers should avoid frequent nursing at first to protect the nipples	69 (97.2)	69 (98.6) ^b
If a breast infection develops, the mother should stop nursing on the affected side temporarily.	44 (62.0)	57 (81.4) ^b
Breastmilk takes as long to digest as formula.	65 (91.5)	68 (97.1) ^b

Note. *n* = 71. Participants responded to breastfeeding statements as being 'true', 'false', or 'I don't know'; 'I don't know' statements were counted as incorrect.

^a Missing values = 2. ^b Missing values = 1.

Table 7. Comparison of Pretest and Posttest Scores on the Beliefs about the Outcomes of Breastfeeding Scale

Variable	Mean (SD)		t	df	P
	Pretest	Posttest			
Beliefs about BF Scale	6.08 (0.76)	6.36 (0.55)	3.32	69	.001
Baby will have few illnesses	6.49 (0.97)	6.53 (1.27)	0.23	69	.816
Any illnesses will be mild ^a	6.06 (1.15)	6.51 (0.93)	2.92	68	.005
Baby will have no (or mild) allergies	5.64 (1.46)	6.20 (1.11)	3.33	69	.001
Good jaw and facial development	6.23 (1.02)	6.49 (0.97)	1.91	69	.060
Baby will not be overweight	5.89 (1.30)	6.26 (1.29)	2.93	69	.019
Baby will not be underweight	5.61 (1.38)	6.21 (1.03)	3.65	69	.001
Baby will not become obese later in life	5.80 (1.36)	6.11 (1.14)	2.46	69	.017
Baby will associate smell of milk/feel of mothers skin with positive feelings	6.71 (0.66)	6.83 (0.68)	1.11	69	.270
Mother and baby will have lots of skin-to-skin contact	6.79 (0.61)	6.83 (0.68)	0.42	69	.678
Feedings will be a rewarding time	6.53 (1.14)	6.80 (0.67)	1.85	69	.068
Mother will feel close to baby	6.47 (1.06)	6.74 (0.74)	2.09	69	.041
Mother will feel satisfied with mothering role	6.30 (1.01)	6.66 (0.72)	2.77	69	.007
Mother will feel satisfied with her ability to feed baby	6.27 (0.96)	6.67 (0.58)	3.76	69	.000
Mother will feel satisfied that baby is getting the best type of milk ^b	6.51 (0.89)	6.78 (0.69)	2.36	67	.021
Mother will return to her pre-pregnant weight within a year	5.37 (1.42)	6.00 (1.02)	5.07	69	.000
Mother will save time by BF ^a	5.77 (1.55)	6.19 (1.23)	3.09	68	.003
Mother will save money by BF	6.67 (0.76)	7.00 (0.00)	3.64	69	.001
BF will be convenient	5.96 (1.47)	6.00 (0.00)	0.24	69	.808
Mothers interest in sex will return rapidly	4.36 (1.68)	4.00 (0.00)	1.78	69	.079

Note. $n = 71$; missing values: 1 participant did not answer the beliefs about the outcomes of breastfeeding questions. Participants' beliefs about breastfeeding ranged from 1 = *unlikely* to 7 = *likely*, with higher scores being more favorable. Average scale scores were produced for participants answering 75% of scale items. BF = breastfeeding.

^aTwo participants were not included in analysis due to missing data. ^bThree participants were not included in analysis due to missing data.

Table 8. Comparison of Pretest and Posttest Scores on the Beliefs about the Outcomes of Formula Feeding Scale and Individual Items

Variables	Mean (SD)		t	df	P
	Pretest	Posttest			
Beliefs about Formula Feeding Scale ^a	4.73 (0.94)	5.23 (0.97)	4.35	68	.000
Baby will have few illnesses	5.04 (1.38)	5.00 (.000)	0.26	70	.797
Any illnesses will be mild ^a	5.07 (1.26)	5.86 (1.31)	4.27	68	.000
Baby will have no (or mild) allergies ^b	5.25 (1.36)	5.87 (1.30)	3.12	66	.003
Good jaw and facial development ^c	4.54 (1.35)	5.32 (1.40)	4.36	67	.000
Baby will not be overweight ^d	5.12 (1.48)	5.48 (1.37)	2.16	68	.034
Baby will not be underweight ^a	3.77 (1.89)	4.62 (1.82)	2.87	68	.005
Baby will not become obese later in life ^a	4.99 (1.38)	5.48 (1.39)	2.82	68	.006
Baby will associate smell of milk/feel of mothers skin with positive feelings ^a	5.32 (1.80)	5.80 (1.42)	2.11	68	.039
Mother and baby will have lots of skin-to-skin contact ^a	5.36 (1.51)	5.78 (1.41)	2.23	68	.029
Feedings will be a rewarding time ^a	4.09 (1.77)	4.78 (1.66)	3.38	68	.001
Mother will feel close to baby ^c	3.75 (1.60)	4.31 (1.66)	3.16	67	.002
Mother will feel satisfied with mothering role ^a	3.57 (1.45)	4.19 (1.59)	3.51	68	.001
Mother will feel satisfied with her ability to feed baby ^a	3.84 (1.65)	4.45 (1.54)	3.23	68	.002
Mother will feel satisfied that baby is getting the best type of milk ^c	4.85 (1.61)	5.41 (1.50)	2.89	67	.005
Mother will return to her pre-pregnant weight within a year ^a	4.75 (1.32)	5.16 (1.34)	2.18	68	.033
Mother will save time by bottle-feeding ^a	5.30 (1.67)	5.80 (1.54)	2.59	68	.012
Mother will save money by bottle-feeding ^c	6.66 (0.80)	6.74 (0.79)	0.76	67	.450
Bottle-feeding will be convenient ^c	4.75 (1.84)	5.28 (1.83)	2.64	67	.006
Mothers interest in sex will return rapidly ^d	3.82 (1.23)	4.26 (0.16)	2.82	65	.000

Note. $n = 71$. Participants' beliefs about the outcomes of formula feeding ranged from 1 = *unlikely* to 7 = *likely*, with lower scores being more favorable of evidence-based infant feeding practices. Average scale scores were produced for participants answering 75% of scale items.

^a Two participants were not included due to missing data. ^b Four participants were not included due to missing data. ^c Three participants were not included due to missing data. ^d Five participants were not included due to missing data.

Infant feeding attitudes. Participants' overall baseline attitudes toward breastfeeding were positive ($M = 6.69$, $SD = 0.55$) and remained unchanged ($M = 6.75$, $SD = 0.50$) after completing the course [$t(70) = 0.93$, $p = .354$] (Table 9). Noteworthy, the breastfeeding attitudes scale was non-normally distributed, as demonstrated by a kurtosis of 15, indicating there was little room for improvement on the attitudes scale. One individual item was significant between the pretest and posttest groups: To me, the idea of breastfeeding six months or more is convenient. The total attitudes toward formula feeding scale scores (pretest $M = 4.62$, $SD = 1.16$; posttest $M = 5.54$, $SD = 1.02$) were significantly higher after completing the course [$t(69) = 7.83$, $p < .001$], indicating improved evidence-based attitudes toward formula. Posttest scores for the 12 formula feeding attitude scale items were significantly higher at posttest (Table 10).

Subjective norm. Participants' ($n = 68$) perception of how supportive the people they work with are regarding breastfeeding did not change after the course. The average pretest and posttest scores were (respectively) 1.72 ($SD = .94$) and 1.60 ($SD = .90$) [$t(67) = 1.05$, $p = .297$], with lower scores indicating more favorable perceptions.

Perceived behavioral control. Average posttest composite scores for the WPBC Scale ($M = 1.69$, $SD = 0.69$) showed significant improvement [$t(67) = 7.37$, $p < .001$] in participants' beliefs about the presence of factors that may facilitate or impede evidence-based supportive breastfeeding practices (perceived self-efficacy) and the perceived control over the performance of these practices (perceived controllability) (Table 11). Self-efficacy subscale scores (and each of the 10 individual items comprising the subscale) were significantly lower after the course, indicating participants' perceptions

about their ability to perform supportive behaviors were improved [$M = 2.35$, $SD = 0.87$ (pretest) and $M = 1.64$, $SD = 0.56$ (posttest); $t(70) = 8.57$, $p < .000$]. Conversely, the posttest controllability subscale scores did not significantly differ from the pretest scores [$M = 1.85$, $SD = 0.79$ (pretest) and $M = 1.81$, $SD = 0.71$ (posttest); $t(66) = 0.52$, $p = .606$]; none of the 5 individual items relating to participants' ability to implement breast breastfeeding practices in their workplace significantly differed.

Intention to act on knowledge acquired. Participants scored significantly lower on the posttest BPBS [$M = 1.32$, $SD = 0.30$ (posttest) and $M = 1.55$, $SD = 0.41$ (pretest); $t(69) = 5.12$, $p < .000$], indicating greater intention to act on knowledge acquired during the course to perform actions that are consistent with the evidence-based breastfeeding supportive behaviors (Table 12). Posttest scores for the 4 individual items considered to be detrimental to breastfeeding were significantly lower, indicating they were less likely to engage in these behaviors. No significant changes between pretest and posttest scores occurred for the 9 items known to be supportive of breastfeeding.

Table 9

Comparison of Pretest and Posttest Scores on the Attitudes toward Breastfeeding Scale

Variables	Mean (<i>SD</i>)		<i>t</i>	<i>df</i>	<i>P</i>
	Pretest	Posttest			
Attitudes Toward BF Scale	6.69 (0.55)	6.75 (0.50)	0.93	70	.354
The idea of BF 6 months or more is:					
Unpleasant — Pleasant ^a	6.76 (0.69)	6.80 (0.60)	0.52	69	.605
Embarrassing — Not embarrassing ^a	6.84 (0.56)	6.89 (0.47)	0.50	69	.616
Unhealthy — Healthy	6.94 (0.37)	6.77 (1.06)	1.27	70	.208
Repulsive — Attractive ^b	6.62 (0.82)	6.68 (0.87)	0.60	68	.550
Inconvenient — Convenient ^a	6.07 (1.55)	6.46 (0.96)	2.25	69	.028
Unnatural — Natural	6.87 (0.45)	6.89 (0.52)	0.21	70	.837
The act of BF feeding 6 months or more is:					
Pleasant — Pleasant ^a	6.61 (0.91)	6.83 (0.56)	1.78	69	.079
Not embarrassing — Not embarrassing ^c	6.78 (0.57)	6.78 (0.81)	0.00	67	1.00
Unhealthy — Healthy	6.93 (0.39)	6.94 (0.37)	0.23	70	.820
Repulsive — Attractive ^a	6.61 (0.86)	6.66 (0.87)	0.43	69	.671
Inconvenient — Convenient ^a	6.26 (1.39)	6.43 (0.99)	1.22	69	.228
Unnatural — Natural ^c	6.91 (0.41)	6.88 (0.53)	0.45	67	.658

Note. *n* = 71. Participants responded to adjective pairs that ranged from 1 = *unlikely* to 7 = *likely*, with higher scores being more favorable.

Average scale scores were produced for participants answering 75% of scale items. BF = breastfeeding.

^a One participant was not included due to missing data. ^b Two participants were not included due to missing data. ^c Three participants were not included due to missing data.

Table 10

Comparison of Pretest and Posttest Scores on the Attitudes toward Formula Feeding Scale

Variables	Mean (<i>SD</i>)		<i>t</i>	<i>df</i>	<i>P</i>
	Pretest	Posttest			
Attitudes Toward Formula Feeding Scale ^a	4.62 (1.16)	5.54 (1.02)	7.83	69	.000
The idea of formula feeding 6 months or more is:					
Pleasant — Unpleasant	5.13 (1.63)	6.13 (1.13)	6.33	70	.000
Not embarrassing — Embarrassing	3.42 (1.97)	4.35 (1.97)	3.63	70	.001
Healthy — Unhealthy ^a	4.87 (1.70)	5.93 (1.46)	5.33	69	.000
Attractive — Unattractive	4.54 (1.22)	5.15 (1.15)	4.23	70	.000
Convenient — Inconvenient ^a	4.39 (2.09)	5.47 (1.64)	4.25	69	.000
Natural — Unnatural	5.48 (1.52)	6.31 (1.13)	5.10	70	.000
The act of formula feeding 6 months or more is:					
Pleasant — Unpleasant ^a	4.61 (1.48)	5.57 (1.22)	5.53	69	.000
Not embarrassing — Embarrassing ^a	3.33 (1.78)	4.53 (1.88)	6.13	69	.000
Healthy — Unhealthy ^b	4.90 (1.66)	6.04 (1.41)	5.87	68	.000
Attractive — Repulsive ^a	4.47 (1.18)	5.19 (1.31)	5.34	69	.000
Convenient — Inconvenient ^c	4.45 (2.01)	5.38 (1.73)	3.53	65	.000
Natural — Unnatural ^a	5.49 (1.35)	6.33 (1.05)	6.20	69	.000

Note. $n = 71$. Participants responded to adjective pairs that ranged from 1 = *unlikely* to 7 = *likely*, with higher scores being more favorable.

Average scale scores were produced for participants answering 75% of scale items.

^a One participant was not included due to missing data. ^b Two participants were not included due to missing data. ^c Five participants were not included due to missing data.

Table 11. Comparison of Pretest and Posttest Scores on the Workplace Perceived Behavioral Control Scale with Self-efficacy and Controllability Subscales

Variables	Mean (SD)		t	df	p
	Pretest	Posttest			
Self-efficacy subscale	2.35 (0.87)	1.64 (0.56)	8.57	70	.000
Assist in positioning a baby at the breast	2.34 (1.15)	1.80 (0.87)	4.89	70	.000
Recognize the signs of a good latch	2.31 (1.02)	1.59 (0.71)	6.63	70	.000
Determine that a baby is getting enough breastmilk ^a	2.50 (1.07)	1.63 (0.66)	6.78	69	.000
Support BF without formula supplements	2.06 (1.15)	1.56 (0.63)	3.94	70	.000
Manage the BF dyad to my satisfaction	2.83 (1.16)	1.82 (0.66)	7.85	70	.000
Teach mother to keep baby awake at the breast ^a	2.43 (1.08)	1.73 (0.70)	7.12	69	.000
Motivate others to breastfeed their babies	1.96 (1.03)	1.52 (0.69)	3.93	70	.000
Tell when a baby is finished BF ^a	2.16 (1.03)	1.47 (0.72)	6.10	69	.000
Carry out activities to support BF women ^a	2.30 (1.08)	1.59 (0.71)	5.68	69	.000
Make independent decisions about how to teach BF mothers	2.55 (1.14)	1.68 (0.77)	7.16	70	.000
Controllability subscale ^b	1.85 (0.79)	1.81 (0.71)	0.52	66	.606
Work with people who know a lot about BF ^b	2.30 (1.29)	2.12 (1.11)	1.39	66	.170
Follow BF best practices in my work setting ^b	1.85 (0.97)	1.69 (0.87)	1.50	66	.139
Implement what I learned in my work setting ^c	1.41 (0.70)	1.44 (0.76)	0.42	67	.673
Influence BF policy in my work setting ^c	1.93 (1.15)	1.96 (1.01)	0.21	67	.831
Control best practices in my work setting ^c	1.78 (1.03)	1.84 (0.97)	0.44	67	.662
WPBC Scale ^c	2.18 (0.69)	1.69 (0.48)	7.37	67	.000

Note. $n = 71$. Participants' perceptions of their ability to perform supportive behaviors (self-efficacy) range from 1=*very easily* to 5=*very difficult*; participants' work place characteristics that affect breastfeeding best practices (controllability) range from 1=*strongly agree* to 5=*strongly disagree*; WPBC Scale is the combined average score for the self-efficacy and controllability subscales; lower scores are more favorable on all scales. Average scale/subscale scores were produced for participants answering 75% of scale items. BF=breastfeeding. WPBC Scale = Workplace Perceived Behavioral Control. ^aOne participant was not included in analysis due to missing data. ^bFour participants were not included in the analysis due to missing data. ^cThree participants were not included in analysis due to missing data.

Table 12

Comparison of Pretest and Posttest Scale Scores on the Intention to Support Evidence-based Breastfeeding

Variables	Mean (SD)		<i>t</i>	<i>df</i>	<i>P</i>
	Pretest	Posttest			
Intention Scale	1.55 (0.41)	1.32 (0.30)	5.12	69	.000
Be an advocate for an infant feeding policy with a state preference for BF ^a	1.16 (0.37)	1.09 (0.28)	1.69	68	.096
Attend an annual BF workshop offered at no cost	1.17 (0.42)	1.16 (0.56)	0.17	69	.863
Attend a BF workshop that your employer pays for	1.19 (0.39)	1.21 (0.61)	0.33	69	.741
Present breast and bottle feeding as equally good alternatives for infant feeding	2.34 (1.27)	1.97 (1.39)	2.35	69	.021
Explain the benefits of BF to all patients	1.17 (0.38)	1.10 (0.35)	1.52	69	.133
Encourage BF to a mother who is planning to bottle-feed her baby ^a	1.61 (0.71)	1.51 (0.68)	1.12	68	.265
Discuss hazards of formula with women who are bottle-feeding ^a	2.20 (1.17)	2.03 (1.15)	1.18	68	.242
Encourage a mother to express her milk should she become separated from her infant	1.17 (0.42)	1.10 (0.35)	1.22	69	.228
Encourage a mother to discontinue BF if she should be separate from her infant ^a	1.51 (1.02)	1.22 (0.75)	2.02	68	.047
Encourage a mother to offer formula supplements if the infant seems hungry	1.97 (1.20)	1.26 (0.72)	5.01	69	.000
Advise a mother to BF her newborn on a schedule ^a	2.35 (1.48)	1.32 (0.90)	5.72	68	.000
Provide a mother with information about who to contact if she has BF questions	1.13 (0.38)	1.09 (0.50)	0.57	69	.567
Refer a mother to a BF support group ^b	1.13 (0.38)	1.07 (0.26)	1.07	67	.288

Note. *n* = 70; missing values: 1 participant did not answer the Intention to Support Evidence-based Breastfeeding questions. Participants' intentions to practice evidence-based breastfeeding support ranged from 1 = *strongly agree* to 5 = *strongly disagree*, with lower scores being more favorable. Average scale scores were produced for participants answering 75% of scale items. BF = breastfeeding.

^aTwo participants were not included in analysis due to missing data. ^bThree participants were not included in analysis due to missing data.

Question 3

Using the self-report IFS, post-intervention psychological and behavioral outcomes for participants of the online format were compared with those of the previous format (hybrid) of the *Lactation Educator* course. The results of the analyses for the (1) demographic and biographical questionnaire; (2) knowledge acquisition questionnaire; scales that measure (3) beliefs (about breastfeeding and formula feeding), (4) infant feeding attitudes (toward breastfeeding and formula feeding), (5) subjective norm, (6) perceived behavioral control, and (7) intention to act on the knowledge presented during the intervention are presented in the following section. The online format ($N = 85$) was compared to the hybrid format using a convenience sample of 75 participants for all measures except knowledge acquisition and intention, which were measured using a separate sample consisting of 37 participants. Independent t-tests were conducted to compare the posttest means of the groups (i.e., online group vs. hybrid group).

Demographic and biographical variables. T-tests (i.e., continuous variables) and Chi-Square analyses (i.e., categorical variables) indicated no significant differences between the online ($N = 85$) and hybrid ($N = 75$ and $N = 37$) samples for the demographic and biographical variables. Therefore, sample equivalency was demonstrated (see Table 2 for a description of the sample characteristics).

Knowledge acquisition. Composite posttest knowledge scores did not significantly differ between the online ($M = 12.33$, $SD = 1.47$) and hybrid ($M = 12.60$, $SD = 1.14$) course delivery groups [$t(113) = 0.98$, $p = .328$], indicating participants who completed the two class formats of the *Lactation Educator* course had similar

breastfeeding knowledge levels. The online and hybrid posttest scores for each of the breastfeeding knowledge questionnaire items are presented in Table 13. Differences in participants' posttest knowledge scores between the two class formats were found for several knowledge questions: Participants of the hybrid course demonstrated significantly higher posttest knowledge scores for advising mothers about preparing their nipples before birth ($\chi^2 = 5.92, p < .05$), how to start the baby nursing ($\chi^2 = 8.49, p < .01$), and breastfeeding during a breast infection ($\chi^2 = 4.18, p < .05$), as compared to participants of the online course.

Infant feeding beliefs. Participants' beliefs about the outcomes of breastfeeding did not significantly differ between the online ($M = 6.38, SD = 0.55$) and hybrid ($M = 6.46, SD = 0.47$) groups [$t(156) = 0.98, p = .331$]; however, participants of the hybrid course had significantly higher (i.e., more favorable) posttest scores on one individual item ('breastfeeding will be more convenient') (Table 14). Significant differences were found between the two groups (online $M = 4.87, SD = 1.34$; hybrid $M = 2.72, SD = 0.91$) on the beliefs about the outcomes of formula-feeding scale [$t(143.06) = 11.81, p < .001$] (Table 15). In fact, participants of the hybrid group scored significantly lower (more favorable) on 17 of the 19 items relating to the beliefs about the outcomes of formula feeding ('mother will feel satisfied with her mothering role' and 'mother will feel close to baby 12 months after delivery') were not significantly different between the two groups.

Table 13

Breastfeeding Knowledge Questions with Frequency of Correct Posttest Responses for Online (N = 85) and Hybrid (N = 37) Participants

Variable	Correct	
	Online n (%)	Hybrid ^a n (%)
Mothers should nurse from one breast only at each feeding.	76 (92.7) ^b	30 (85.7)
Mothers should breastfeed on a demand schedule.	66 (79.5) ^a	31 (88.6)
Mothers should use special cleaning agents on their nipples.	79 (95.2) ^a	34 (97.1)
Mothers should prepare before giving birth by expressing colostrum and by massage.	66 (79.5) ^a	34 (97.1)
Mothers should use a supplementary bottle of formula until their milk supply is established.	81 (97.6) ^a	35 (100.0)
Mothers should weigh their babies after each feeding to be sure they are getting enough milk.	80 (96.4) ^a	33 (94.3)
<i>Mothers do not need to use both breasts at each feeding.</i>	67 (80.7) ^a	31 (88.6)
Mothers should breastfeed on a four hour schedule.	82 (100.0) ^b	35 (100.0)
To start the baby nursing, the mother should push the baby's head towards the nipple.	65 (79.3) ^b	35 (100.0)
Solid food should be started in the newborn before three months of age.	82 (98.8) ^a	35 (100.0)
Mothers should nurse from a breast even if the nipple is sore and/or cracked.	49 (59.0) ^a	17 (48.6)
Mothers should avoid frequent nursing at first to protect the nipples	82 (98.8) ^a	35 (100.0)
If a breast infection develops, the mother should stop nursing on the affected side temporarily.	65 (78.3) ^a	21 (60.0)
Breastmilk takes as long to digest as formula.	81 (97.6) ^a	35 (100.0)

Note. Participants responded to breastfeeding statements as being 'true', 'false', or 'I don't know'; 'I don't know' statements were counted as incorrect.

^a Missing values = 2. ^b Missing values = 3.

Table 14. Comparison of Online (N = 85) and Hybrid (N = 75) Group Posttest Scores on the Beliefs about the Outcomes of Breastfeeding Scale

Variable	Mean (SD)		t	df	P
	Online	Hybrid			
Beliefs about BF Scale	6.38 (0.55) ^a	6.46 (0.47)	0.98	156.00	.331
Baby will have few illnesses	6.42 (1.46) ^a	6.60 (1.20)	0.84	156.00	.405
Any illnesses will be mild	6.39 (1.11) ^b	6.48 (0.84)	0.57	155.00	.572
Baby will have no (or mild) allergies	6.06 (1.29) ^a	6.07 (1.12)	0.03	156.00	.974
Good jaw and facial development	6.46 (0.98) ^a	6.57 (0.72)	0.84	156.00	.404
Baby will not be overweight	6.25 (1.30) ^a	6.29 (1.14)	0.21	156.00	.836
Baby will not be underweight	6.20 (1.09) ^a	6.15 (1.27)	0.31	156.00	.757
Baby will not become obese later in life	6.07 (1.22) ^a	5.83 (1.65)	1.07	156.00	.285
Baby will associate smell of milk/feel of mothers skin with positive feelings	6.82 (0.65) ^a	6.88 (0.52)	0.65	156.00	.519
Mother and baby will have lots of skin-to-skin contact	6.83 (0.64) ^a	6.85 (0.51)	0.24	156.00	.813
Feedings will be a rewarding time	6.82 (0.63) ^a	6.72 (0.61)	1.01	156.00	.314
Mother will feel close to baby	6.77 (0.69) ^b	6.83 (0.48)	0.61	155.00	.542
Mother will feel satisfied with mothering role	6.71 (0.67) ^a	6.72 (0.63)	0.09	156.00	.930
Mother will feel satisfied with her ability to feed baby	6.72 (0.55) ^a	6.80 (0.52)	0.91	156.00	.367
Mother will feel satisfied that baby is getting the best type of milk	6.82 (0.63) ^b	6.88 (0.37)	0.76	155.00	.451
Mother will return to her pre-pregnant weight within a year	6.12 (0.99) ^a	6.17 (1.12)	0.32	156.00	.754
Mother will save time by BF	6.28 (1.16) ^a	6.40 (0.89)	0.74	156.00	.459
Mother will save money by BF	7.00 (0.00)	6.85 (0.69)	1.84	74.00	.070
BF will be convenient	6.12 (0.36)	6.55 (0.76)	4.45	103.17	.000
Mothers interest in sex will return rapidly	4.39 (0.96)	5.13 (1.70)	3.34	113.89	.001

Note. Missing values: 1 online group participant did not answer the beliefs about the outcomes of breastfeeding questions. Participants' beliefs about breastfeeding ranged from 1 = *unlikely* to 7 = *likely*, with higher scores being more favorable. Average scale scores were produced for participants answering 75% of scale items. BF = breastfeeding.

^a One participant was not included in analysis due to missing data. ^b Two participants were not included in analysis due to missing data.

Table 15. Comparison of Online (N = 85) and Hybrid (N = 75) Group Posttest Scores on the Beliefs about the Outcomes of Formula Feeding Scale

Variables	Mean (SD)		t	df	P
	Online	Hybrid			
Beliefs about Formula Feeding Scale	4.87 (1.34) ^a	2.72 (0.91)	11.81	143.06	.000
Baby will have few illnesses	4.80 (1.03)	2.24 (1.37)	13.17	136.07	.000
Any illnesses will be mild	5.33 (1.84) ^a	2.27 (1.21) ^b	12.39	141.17	.000
Baby will have no (or mild) allergies	5.31 (1.86) ^c	2.20 (1.32) ^b	12.05	144.54	.000
Good jaw and facial development	4.93 (1.68) ^a	3.20 (1.49)	6.80	155.00	.000
Baby will not be overweight	4.99 (1.81) ^a	2.32 (1.40)	10.39	150.85	.000
Baby will not be underweight	4.33 (1.93) ^a	3.67 (2.10)	2.07	155.00	.041
Baby will not become obese later in life	5.12 (1.71) ^c	2.52 (1.60)	9.82	154.00	.000
Baby will associate smell of milk/feel of mothers skin with positive feelings	5.24 (1.93) ^a	1.97 (1.45)	12.04	149.44	.000
Mother and baby will have lots of skin-to-skin contact	5.23 (1.96) ^a	1.91 (1.27)	12.72	139.65	.000
Feedings will be a rewarding time	4.57 (1.79) ^a	3.35 (1.64)	4.48	155.00	.000
Mother will feel close to baby	4.10 (1.74) ^c	3.76 (1.79)	1.20	154.00	.232
Mother will feel satisfied with mothering role	4.13 (1.66) ^a	3.91 (1.62)	0.87	155.00	.387
Mother will feel satisfied with her ability to feed baby	4.33 (1.65) ^a	3.61 (1.82)	2.59	155.00	.011
Mother will feel satisfied that baby is getting the best type of milk	4.99 (1.84) ^a	2.29 (1.45)	10.23	151.69	.000
Mother will return to her pre-pregnant weight within a year	4.78 (1.65) ^a	2.41 (1.34)	9.83	155.00	.000
Mother will save time by bottle-feeding	5.32 (2.00) ^c	2.32 (1.63)	10.23	154.00	.000
Mother will save money by bottle-feeding	5.98 (2.04) ^a	1.21 (1.01) ^a	18.76	121.72	.000
Bottle-feeding will be convenient	4.99 (1.96) ^a	2.96 (2.00) ^a	6.37	153.00	.000
Mothers interest in sex will return rapidly	4.17 (1.37) ^c	3.56 (1.63) ^a	2.50	141.06	.013

Note. Missing values: 1 online group participant did not answer the beliefs about the outcomes of formula feeding questions. Participants' beliefs about the outcomes of formula feeding ranged from 1 = *unlikely* to 7 = *likely*, with lower scores being more favorable of evidence-based infant feeding practices.

Average scale scores were produced for participants answering 75% of scale items.

^a Two participants were not included due to missing data. ^b One participant was not included due to missing data. ^c Three participants were not included due to missing data.

Infant feeding attitudes. Participants' overall attitudes toward breastfeeding and formula feeding did not significantly differ between the online (breastfeeding $M = 6.74$, $SD = 0.49$; formula feeding $M = 5.49$, $SD = 1.04$) and hybrid (breastfeeding $M = 6.78$, $SD = 0.34$; formula feeding $M = 5.33$, $SD = 1.22$) delivery formats post-intervention [breastfeeding $t(150) = 0.55$, $p = .583$; formula feeding $t(149) = 0.84$, $p = .403$]. One individual item was significant between the online and hybrid groups: To me, the idea of breastfeeding six months or more is convenient. A comparison of the online and hybrid posttest scores for the attitudes toward breastfeeding and attitudes toward formula feedings scales are presented in Tables 16 and 17.

Subjective norm. Participants' perception of how supportive the people they work with are regarding breastfeeding did not differ between the online and hybrid groups. The average posttest score for online and hybrid delivery formats (respectively) were 1.61 ($SD = 0.90$) and 1.81 ($SD = .095$) [$t(155) = 1.34$, $p = .184$], with lower scores indicating more favorable perceptions.

Perceived behavioral control. No significant differences in participants' average posttest WPBC Scale scores between online ($M = 1.73$, $SD = 0.48$) and hybrid ($M = 1.69$, $SD = 0.46$) groups were found [$t(155) = 0.52$, $p = .602$], indicating participants' beliefs about the presence of factors that may facilitate or impede evidence-based supportive breastfeeding practices (perceived self-efficacy) and the perceived control over the performance of these practices (perceived controllability) were similar (post-intervention) for both course delivery formats (Table 18). Posttest self-efficacy and controllability subscale scores did not differ between the two groups; participants'

perceptions about their ability to perform supportive behaviors (self-efficacy) and their ability to implement best breastfeeding practices in their workplace (controllability) were comparable. One controllability subscale item differed significantly between the two groups: I work with people who know a lot about breastfeeding. Participants of the online course had significantly lower scores on this item, indicating more favorable perceptions about their co-worker's breastfeeding knowledge.

Intention to act on knowledge acquired. Participants' intention to act on knowledge acquired during the *Lactation Educator* course did not differ between course delivery formats (post-intervention) [$M = 1.35, SD = 0.32$ (online); $M = 1.31, SD = 0.35$ (hybrid); $t(113) = 0.64, p = .526$]. None of the posttest intention scale items significantly differed between the online and hybrid groups. A comparison of online and hybrid study participants' posttest intention scores is presented in Table 19.

Table 16

Comparison of Online ($N = 85$) and Hybrid ($N = 75$) Group Posttest Scores on the Attitudes toward Breastfeeding Scale

Variables	Mean (<i>SD</i>)		<i>t</i>	<i>df</i>	<i>P</i>
	Online	Hybrid			
Attitudes Toward BF Scale	6.74 (0.49)	6.78 (0.34) ^a	0.55	150	.583
The idea of BF 6 months or more is:					
Unpleasant — Pleasant	6.79 (0.60) ^b	6.88 (0.40) ^c	1.20	145.45	.231
Embarrassing — Not embarrassing	6.88 (0.45) ^b	6.90 (0.39) ^d	0.23	150.00	.817
Unhealthy — Healthy	6.80 (0.97)	6.99 (0.12) ^e	1.74	87.07	.085
Repulsive — Attractive	6.66 (0.86) ^c	6.48 (0.99) ^a	1.17	132.01	.242
Inconvenient — Convenient	6.40 (1.04) ^b	6.72 (0.74) ^a	2.15	146.90	.033
Unnatural — Natural	6.88 (0.50)	6.94 (0.24) ^c	0.92	152.00	.361
The act of BF feeding 6 months or more is:					
Pleasant — Pleasant	6.80 (0.62) ^b	6.82 (0.57) ^d	0.27	150.00	.791
Not embarrassing — Not embarrassing	6.79 (0.76) ^b	6.64 (1.12) ^a	0.94	149.00	.351
Unhealthy — Healthy	6.94 (0.36)	6.99 (0.12) ^e	1.08	106.03	.283
Repulsive — Attractive	6.64 (0.86) ^b	6.42 (0.98) ^f	1.43	130.27	.154
Inconvenient — Convenient	6.42 (1.00) ^b	6.63 (0.81) ^a	1.40	149.00	.165
Unnatural — Natural	6.88 (0.50) ^e	6.94 (0.24) ^d	0.93	149.00	.355

Note. Missing values: 3 participants of the hybrid group did not complete the Attitudes Toward Breastfeeding Scale. Participants responded to adjective pairs that ranged from 1 = *unlikely* to 7 = *likely*, with higher scores being more favorable. Average scale scores were produced for participants answering 75% of scale items. BF = breastfeeding.

^a Five participants were not included due to missing data. ^b One participant was not included due to missing data. ^c Three participants were not included due to missing data. ^d Four participants were not included due to missing data. ^e Two participants were not included due to missing data. ^f Six participants were not included due to missing data.

Table 17

Comparison of Online (N = 85) and Hybrid (N = 75) Group Posttest Scores on the Attitudes toward Formula Feeding Scale

Variables	Mean (SD)		t	df	P
	Online	Hybrid			
Attitudes Toward Formula Feeding Scale	5.48 (1.04) ^a	5.33 (1.22) ^b	0.84	149.00	.403
The idea of formula feeding 6 months or more is:					
Pleasant — Unpleasant	6.09 (1.15)	6.04 (1.34) ^c	0.25	152.00	.802
Not embarrassing — Embarrassing	4.32 (1.94)	3.88 (2.16) ^b	1.31	150.00	.192
Healthy — Unhealthy	5.85 (1.49) ^a	5.99 (1.36) ^c	0.60	151.00	.548
Attractive — Unattractive	5.13 (1.14)	4.88 (1.42) ^b	1.20	150.00	.233
Convenient — Inconvenient	5.35 (1.78) ^a	4.99 (1.90) ^b	1.20	149.00	.233
Natural — Unnatural	6.28 (1.15) ^d	6.31 (1.48) ^e	0.15	149.00	.882
The act of formula feeding 6 months or more is:					
Pleasant — Unpleasant	5.71 (1.23)	5.91 (1.48) ^e	0.94	151.00	.350
Not embarrassing — Embarrassing	4.45 (1.87)	4.09 (2.17) ^e	1.10	151.00	.274
Healthy — Unhealthy	5.99 (1.43) ^c	5.94 (1.39) ^a	0.19	151.00	.847
Attractive — Repulsive	5.15 (1.28) ^a	4.88 (1.47) ^e	1.22	150.00	.224
Convenient — Inconvenient	5.20 (1.88) ^d	5.08 (1.95) ^f	0.41	147.00	.683
Natural — Unnatural	6.30 (1.12) ^a	6.13 (1.65) ^e	0.71	113.47	.481

Note. Missing values: 3 participants of the hybrid group did not complete the Attitudes Toward Breastfeeding Scale. Participants responded to adjective pairs that ranged from 1 = *unlikely* to 7 = *likely*, with higher scores being more favorable. Average scale scores were produced for participants answering 75% of scale items.^a One participant was not included due to missing data. ^b Five participants were not included due to missing data. ^c Three participants were not included due to missing data. ^d Two participants were not included due to missing data. ^e Four participants were not included due to missing data. ^f Six participants were not included due to missing data.

Table 18. Comparison of Online (N = 85) and Hybrid (N = 75) Group Posttest Scores on the Workplace Perceived Behavioral Scale with Self-efficacy and Controllability Subscales

Variables	Mean (SD)		t	df	p
	Online	Hybrid			
Self-efficacy subscale	1.69 (0.59)	1.57 (0.47) ^a	1.38	157.00	.170
Assist in positioning a baby at the breast	1.85 (0.92)	1.77 (0.77) ^a	0.57	157.00	.572
Recognize the signs of a good latch	1.64 (0.78)	1.46 (0.65) ^a	1.53	157.00	.128
Determine that a baby is getting enough breastmilk	1.74 (0.79)	1.64 (0.73) ^a	0.87	157.00	.384
Support BF without formula supplements	1.59 (0.64)	1.45 (0.64) ^a	1.39	157.00	.166
Manage the BF dyad to my satisfaction	1.86 (0.69)	1.77 (0.71) ^a	0.79	157.00	.429
Teach mother to keep baby awake at the breast	1.81 (0.82)	1.70 (0.77) ^a	0.86	157.00	.392
Motivate others to breastfeed their babies	1.53 (0.67)	1.35 (0.58) ^a	1.78	157.00	.077
Tell when a baby is finished BF	1.55 (0.81) ^a	1.47 (0.67) ^a	0.63	156.00	.075
Carry out activities to support BF women	1.62 (0.73) ^a	1.47 (0.65) ^a	1.33	156.00	.186
Make independent decisions about how to teach BF mothers	1.71 (0.72)	1.65 (0.67) ^a	0.52	157.00	.607
Controllability subscale	1.82 (0.71) ^b	1.94 (0.77) ^a	1.00	155.00	.317
Work with people who know a lot about BF	2.13 (1.09) ^b	2.77 (1.37) ^a	3.20	139.21	.002
Follow BF best practices in my work setting	1.72 (0.86) ^b	1.82 (0.97) ^a	0.70	155.00	.488
Implement what I learned in my work setting	1.46 (0.83) ^b	1.57 (0.85) ^a	0.82	155.00	.414
Influence BF policy in my work setting	1.94 (1.04) ^b	1.87 (1.02)	0.45	156.00	.656
Control best practices in my work setting	1.86 (0.98) ^b	1.65 (0.86)	1.37	156.00	.172
WPBC Scale	1.73 (0.48) ^b	1.69 (0.46) ^a	0.52	155.00	.602

Note. Participants' perceptions of their ability to perform supportive behaviors (self-efficacy) range from 1=very easily to 5=very difficult; participants' work place characteristics that affect breastfeeding best practices (controllability) range from 1=strongly agree to 5=strongly disagree; WPBC Scale is the combined average score for the self-efficacy and controllability subscales; lower scores are more favorable on all scales. Average scale/subscale scores were produced for participants answering 75% of scale items. BF=breastfeeding. WPBC Scale = Workplace Perceived Behavioral Control.

^aOne participant was not included in analysis due to missing data. ^bTwo participants were not included in the analysis due to missing data.

Table 19

Comparison of Online ($N = 84$) and Hybrid ($N = 37$) Group Posttest Scores on the Intention to Support Evidence-based Breastfeeding

Variables	Mean (<i>SD</i>)		<i>t</i>	<i>df</i>	<i>P</i>
	Online	Hybrid			
Intention Scale	1.35 (0.32) ^a	1.31 (0.35) ^b	0.64	113.00	.526
Be an advocate for an infant feeding policy with a state preference for BF	1.16 (0.37)	1.38 (0.79)	1.50	36.20	.143
Attend an annual BF workshop offered at no cost	1.17 (0.54)	1.42 (0.72) ^c	1.76	43.08	.085
Attend a BF workshop that your employer pays for	1.20 (0.58)	1.13 (0.35) ^b	0.64	111.00	.071
Present breast and bottle feeding as equally good alternatives for infant feeding	2.06 (1.45)	1.63 (1.13)	1.71	72.04	.093
Explain the benefits of BF to all patients	1.11 (0.35)	1.19 (0.47)	0.98	113.00	.328
Encourage BF to a mother who is planning to bottle-feed her baby	1.52 (0.72) ^c	1.53 (0.72)	.046	112.00	.964
Discuss hazards of formula with women who are bottle-feeding	2.07 (1.19)	1.75 (0.62)	1.89	102.65	.062
Encourage a mother to express her milk should she become separated from her infant	1.10 (0.34)	1.16 (0.37)	0.83	113.00	.406
Encourage a mother to discontinue BF if she should be separate from her infant	1.34 (0.95) ^c	1.31 (0.90)	0.15	112.00	.882
Encourage a mother to offer formula supplements if the infant seems hungry	1.29 (0.80)	1.21 (0.60)	0.50	113.00	.620
Advise a mother to BF her newborn on a schedule	1.38 (1.01)	1.18 (0.58)	1.30	99.13	.197
Provide a mother with information about who to contact if she has BF questions	1.08 (0.47)	1.06 (0.24)	0.27	113.00	.785
Refer a mother to a BF support group	1.07 (0.26)	1.06 (0.24)	0.22	113.00	.825

Note. Missing values: 1 online and 5 hybrid group participants did not answer the Intention to Support Evidence-based Breastfeeding questions. Participants' intentions to practice evidence-based breastfeeding support ranged from 1 = *strongly agree* to 5 = *strongly disagree*, with lower scores being more favorable. Average scale scores were produced for participants answering 75% of scale items. BF = breastfeeding.

^a Three participants were not included in analysis due to missing data. ^b Two participants were not included in analysis due to missing data. ^c One participant was not included in analysis due to missing data.

Chapter 5

DISCUSSION AND CONCLUSIONS

This study was able to expand the evidence-base about the effects of breastfeeding education on healthcare providers. Changes in healthcare providers' learning outcomes related to breastfeeding support and promotion were explored. The TPB provided a meaningful framework for exploring the psychological and behavioral outcomes (i.e., learning outcomes). This study was the first to use 7 of the 11 TPB variables to evaluate the effectiveness of an evidence- and theory-based breastfeeding educational intervention for healthcare providers. Consistency in educational format and study setting (of two class formats) allowed for more comparisons than has previously been possible.

The discussion section is comprised of four major subsections: Feasibility (research question 1), effectiveness (research questions 2 and 3), study limitations, and conclusions. This discussion includes implications of the findings, comparisons with the existing literature, and recommendations for future research.

Feasibility

Feasibility of the online *Lactation Educator* course was evaluated by quantitative and qualitative analysis of the feasibility questionnaire, as well as, examination of course completion rates. Participants' responded favorably to questions relating to the ease of use, self-pacing format, level of material, satisfaction, recommend course, and expectations; course completion rates were very high (94%). Content analysis of additional comments provided by participants highlighted programmatic and structural

considerations related to content quality, online environment, workload, audience relevance, enjoyability, and delivery. Findings support the use of online breastfeeding education programs for healthcare providers and contribute to the evidence base on how to affect practice through education.

Face-to-face (i.e., traditional classroom format) breastfeeding education has long been the established practice for meeting the continuing education needs of multidisciplinary healthcare providers, who have not had adequate preparation in supporting breastfeeding families. The proliferation of the Internet coupled with increasing training costs (e.g., travel, classroom space, etc.) and decreasing budgets, has driven many community and healthcare agencies to explore online learning opportunities. Considered a new frontier not so long ago, online learning has quickly become a significant pedagogical approach used in nearly all areas of academia and industry. Questions of whether online learning is here to stay have quickly subsided; the discourse now embodies discerning effective online pedagogical (“cybergogical”) strategies and understanding significant elements of students’ learning experiences (Killion, Reilly, & Gallagher-Lepak, 2011). This mode of learning is pervasive in nearly all disciplines irrespective of learners’ readiness.

Participants’ online learning experiences varied greatly. This was not unexpected and has been reported by others (Killion, Reilly, & Gallagher-Lepak, 2011). Some participants expressed dissatisfaction with the ‘online classroom’ experience. In comparing the findings with published literature on this subject, several factors likely contributed to participants’ satisfaction level: Previous online learning experience,

connectedness with others, and the degree of structural support (Angelino & Williams, 2007; Bryant, 2015; Killion, Reilly, & Gallagher-Lepak, 2011). A discussion of each of these, as they relate to the findings is described below.

Experience. Although the feasibility questionnaire did not contain questions that directly asked participants about their previous online experience, it was evident from participants' comments that experiences spanned the novice to expert spectrum. Whereas some participants struggled with using word processing programs and uploading documents, others demonstrated online skills mastery. This in part may explain why questionnaire items with the highest degree of disagreement pertained to technology and online delivery. Some participants indicated they did not prefer an online learning format, yet most said they would consider taking an online breastfeeding course again. This suggests other factors may be influencing their decision to engage in a learning modality that is discordant with their preferred learning style (e.g., convenience, monetary, and time considerations); participants were not asked about their motivations for taking the course. However, this may be an area for further exploration in the future. Moreover, how well adapted participants were to the online learning environment likely influenced their perceptions about the course and their openness to future online learning opportunities.

Adaptation to the online learning environment takes time. Participants new to online learning must develop additional learning strategies and alter the manner in which they learn (Killion, Reilly, & Gallagher-Lepak, 2011). Typically, younger students (i.e., circa 1983 and after) are thought to possess a greater aptitude for online learning due to

enculturation in an online milieu. Researchers have proposed age as a proxy for measuring aptitude, but this has not proved useful (Coldwell, Craig, Paterson, & Mustard, 2008). Indeed, conflicting results have been reported; researchers have suggested other mediating factors may influence students' aptitude for online learning including gender, learning style, and experience with online learning environments (Bryant, 2015; Killion, Reilly, & Gallagher-Lepak, 2011).

Connectedness with others. Despite the global reach of the Internet and the ability to connect with anyone at anytime, many people report feeling isolated or lonely during asynchronous online learning programs (Angelino & Williams, 2007). Although participants did not comment about feeling alienated, some participants desired more interaction (i.e., connectedness) with others. They reported a preference for traditional classrooms, where greater exchange could occur between students and instructors. Indeed, several students suggested discussion groups or 'chat rooms' be added to the curriculum to promote greater discourse.

In order to facilitate a social presence and sense of community, course participants were invited to participate in a 'Getting to Know you Blog' situated in the learning platform. This optional blog was a way for students to introduce themselves and network (if interested); it simulated the introductions that were made during the first in-person day of the hybrid class. Interestingly, not all students participated in the blog and only a handful commented on others' blogs, despite encouragement to do so from the instructor in the form of emails and course announcements. Perhaps participants were uncomfortable with writing about themselves or did not understand the technical aspects

of completing the task. It is also possible participants felt disconnected from others in this online community and chose not to take the requisite steps to engage. In the future, mandated discussion boards on carefully selected topics may be a useful strategy for creating a more collaborative learning environment where the exchange of ideas may occur. Pedagogical strategies aimed at increasing students' connectedness with others should be considered when developing and evaluating the structural supports of online programs (Kuo, Walker, Belland & Shroder, 2013).

Structural support. Structural supports include the pedagogical approaches used in the curriculum (i.e., course design) and the technical support provided by the administrators of the program. There is no question the degree and type of structural supports provided by online programs impact their acceptance by students (Wiesenmayer, Kupczynski & Ice, 2008). Several factors may have affected students' satisfaction with the course and were brought forward in the comments; a discussion of each follows.

Asynchronous online learning requires a student-centered approach; students must employ significant self-directed effort for success (Artino, 2007). Pedagogical strategies that facilitate these efforts are equally critical for student success. The course was designed to integrate these elements; a self-paced sequential educational format using firm beginning and ending dates was used to help navigate participants through the course. A few participants expressed frustration with having to complete the course modules in a specified order, indicating they would have preferred to know more about upcoming reading and assignments in order to plan their time accordingly. Trepidation

(or anxiety) of the unknown has been reported in the literature as an obstacle for people new to online learning (Killion, Reilly, & Gallagher-Lepak, 2011). Future programmatic considerations should include informing participants about course assignments in advance, whereas preserving the integrity of the sequential format.

Technical support is of utmost importance for an online learning program. The overwhelming majority of participants (>97%) indicated they were able to reach someone who could help them when they had a question; however, some participants reported they had difficulty accessing the online content. The reasons for this were not explicated; therefore, it is impossible to know whether this was a programmatic issue or a student related issue. However, it is deemed unlikely to be programmatic in nature due to the few comments related to accessing online content.

Overall, participants were very satisfied with the *Lactation Educator* course and their online experience. Programmatic and structural considerations related to content quality, online environment, workload, audience relevance, enjoyability, and delivery should assist program planners with enhancing course viability and inform the development of future online programs. Both learner experience and desire for connectedness with others should be considered. Findings demonstrate the feasibility of using this format; a discussion of the course effectiveness follows.

Effectiveness

This study was a theory-guided exploration of learning outcomes of a 45-hour breastfeeding educational program. The use of the TPB model for designing and measuring behavior change between two educational formats of the same program makes

this investigation stand apart from previous studies. Understanding the educational outcomes necessary for changing practice (behavior) is essential for knowing how to develop meaningful programs and moreover, how to evaluate their effectiveness. This study represented a significant step toward accomplishing this goal.

This section will synthesize the findings with the relevant literature on this topic. Research questions two and three (‘what are healthcare providers’ psychological and behavioral changes occurring after completion of an online course?’ and ‘How do the post-intervention psychological and behavioral outcomes of the online format compare with those of the previous format (hybrid) of this breastfeeding course?’) are threaded throughout the discussion, guided by the conceptual framework (see figure 2). Elements pertinent to the online educational format are discussed, as appropriate.

Antecedents. Participants’ demographic characteristics and breastfeeding knowledge may indirectly influence their intentions through the beliefs and attitudinal components of the TPB model (Ajzen, 1985; Ajzen & Cote, 2008). Information regarding each of these variables was collected and explored during this investigation; a discussion of the findings follows.

Demographics. Much like other multi-professional breastfeeding education programs, participants’ backgrounds varied. The typical professional participant was Caucasian, female, married (or living with her partner), and had previously breastfed an infant; paraprofessionals were more likely to be living alone and of an ethnic minority background. Most participants (regardless of professional status) took the course of their own accord (e.g., employer did not require it). The majority (over half) of participants

had taken a breastfeeding course or seminar before, and more than 9 in 10 participants with children reported having breastfed. This raises many questions about who is and who is not taking the breastfeeding course.

Noteworthy, participants were almost exclusively female. Why? Many of the various health professions represented in this course are predominantly female (e.g., nursing, nutrition, public health); nonetheless males are represented in higher proportions within these respective professions than were enrolled in the course (i.e., males comprise 10% of the nursing profession) (U.S. Census Bureau, 2013). For example, of the 127 students enrolled in the (online) course during the time of this study, only one was male; the same was true for the hybrid class. Of course, a case could be made that in-person classes may deter males from attending due to perceived awkwardness or embarrassment that may be encountered during the training. However, this barrier would not exist with the online course, making it unlikely to be a contributing factor.

It is more likely that social and cultural norms influence the motivation to attend professional breastfeeding educational programs. After all, breastfeeding is a natural act that is performed by women and has traditionally been taught and passed down throughout time from woman to woman. The perceived natural act of breastfeeding has contributed to lactation management being undervalued as an evidence-based discipline (Hausman, 2003). Gender may influence personal and professional motivation to seek out education for an act that is viewed by many healthcare providers as something that is natural.

Knowledge. It is not surprising that participants' average baseline knowledge scores were high. The majority of participants were mothers who had breastfed and had attended a previous breastfeeding course. Despite high baseline knowledge levels, participants' knowledge of breastfeeding was significantly improved after the course. Others have demonstrated similar results (Bernaix, Beaman, Schmidt, Harris, & Miller, 2010; Dodgson & Tarrant, 2007; Watkins, Dodgson, Schalaza, & Bloomfield, 2011). Knowledge was significantly improved for items specifically related to lactation management strategies (i.e., preparing nipples for breastfeeding, breastfeeding during infection, and the use of one or two breasts during feeding sessions). This compares favorably to other studies (Bernaix, Beaman, Schmidt, Harris, & Miller, 2010; Dodgson & Tarrant, 2007; Watkins, Dodgson, Schalaza, & Bloomfield, 2011), indicating educational courses may be effective in transferring knowledge.

It is not as clear why differences in posttest knowledge levels occurred between the hybrid and online formats. Although overall scores did not differ between the two formats, participants of the hybrid course demonstrated significantly higher scores on three items (e.g., preparing nipples, how to start baby nursing, and breastfeeding during infections). It is possible baseline knowledge differences existed between the two groups, which might have contributed to the posttest differences on these individual items; this was not evaluated. Alternatively, perhaps this stemmed directly from subtle differences that may have occurred during the delivery of the online curriculum, which were not feasible to measure. Although the content and instructors were the same, the dialogue and exchange between instructor and students was altered. Without an active

discussion board, questions had to be directed to the instructor via email; exchanges between students were minimal. It is plausible that common questions and ‘side discussions’ that often ensued in face-to-face learning placed an emphasis on certain topics, facilitating the knowledge that was acquired. Indeed, this distributed cognition (i.e., learning that emerges during the interaction between individuals in group-based learning formats) has been described as a dynamic learning system that should be cultivated in online learning programs (Salomon, 1993; Strijbos, 2004). The addition of an interactive discussion board that is moderated by an experienced lactation professional may strengthen the course and would employ group-based learning strategies; further research would be necessary to confirm the effectiveness of this pedagogy.

Both formats of the *Lactation Educator* course demonstrated significant increases in knowledge acquired during the course. Subtle and unintended differences in learning between the two formats may have occurred; future investigations are necessary to further understand the implications of this finding.

Beliefs. Although Ajzen & Fishbein (1980) purport behavior is ultimately determined by beliefs, it is not intended to imply there is a direct link between beliefs and behavior. Beliefs influence attitudes and subjective norms, which together influence intentions (Ajzen & Fishbein, 1980). In this study, beliefs about the outcomes of breastfeeding were significantly improved after the educational intervention, and did not differ overall between the two educational formats. Although beliefs about outcomes of breastfeeding in healthcare professionals have not been measured in educational interventions, as commonly as knowledge or attitudes, other researchers have reported

similar findings in other populations (Bernaix, Beaman, Schmidt, Harris, & Miller, 2010; Dodgson & Tarrant, 2007). This is an encouraging finding, suggesting that beliefs about breastfeeding may be modifiable with continuing education courses.

Paradoxically, participants' beliefs about the outcomes of formula feeding were adversely affected by the intervention; participants' beliefs about the outcomes of formula feeding were less favorable, and more concerning, less evidence-based after the educational intervention. Moreover, participants of the online course had significantly less evidence-based beliefs concerning formula feeding compared to hybrid course participants. It is difficult to understand why this would occur; however, other researchers have encountered difficulties with moving participants' beliefs about formula feeding to a place more in line with the evidence (Dodgson & Tarrant, 2007). Using the same beliefs about formula feeding scale with baccalaureate nursing students in Hong Kong, Dodgson and Tarrant (2007) did not find beliefs about formula feeding to significantly differ from a control group that did not receive the educational intervention. The researchers suggested societal and reference norms (the beliefs of people most important to the individual) were not measured in their study, and may have contributed to their findings. The study took place in Hong Kong, where formula feeding has been the predominant mode of infant feeding for several generations.

Indeed, the influence of a formula feeding society cannot be dismissed. Although breastfeeding rates in the United States have steadily increased since the 1970s, the majority of women provide formula to their infants within a few months of birth (CDC, 2015). Although the reasons for formula supplementation (and often the cessation of

breastfeeding) are multifactorial, return to work remains a common barrier (Shealy, Benton-Davis, & Grummer-Strawn, 2005; U.S. DHHS, 2011).

Historically, maternal employment outside the home has resulted in separation of mothers and babies, altering the way in which babies are fed (i.e., wet-nursing, mother's milk, or artificial baby milk) (Wolf, 1999). American culture encourages personal expression and free choice in how women balance their careers and infant feeding decisions, or so we are led to believe. Hausman (2003) argues that the representation and experience of motherhood is both "racialized and class-related" (p. 27). She expounded on the subject by writing:

The overall effect is a much higher rate of breastfeeding among those women who command greater social and material resources: choice is clearly related to social position and other structural constraints, even if it is articulated as the result of personal decision-making. (Hausman, 2013, p. 28)

The idea of personal decision-making is firmly rooted in American culture and is evident in how infant feeding is approached by healthcare providers, formula marketing personnel, and society. The confluence of these factors gives rise to strongly held beliefs; the resultant emotive discourses related to infant feeding and maternal employment are prevalent in our culture.

Of course, this may help explain why beliefs about the outcomes of formula feeding are difficult to change, but does it help to explain why these beliefs went further (and significantly) in the wrong direction? As counterintuitive as this may seem, there is precedent to believe it may contribute to the findings of this study. Ebert Wallace and

Taylor (2011) analyzed the use of “risks of formula language” versus the “benefits of breastfeeding language” in breastfeeding textbooks. Adults ($N = 434$) were instructed to evaluate breastfeeding textbooks and then asked about their infant feeding intentions. The authors found participants’ less favorably assessed textbooks that used risk-based language; further, they rated the texts as less trustworthy, accurate, and helpful as compared to those focused on the benefits of breastfeeding texts. Ebert Wallace and Taylor (2011) concluded, “that use of risk language may not be an advantageous health promotion strategy, but may be counter-productive to the goals of breastfeeding advocates” (p. 299).

In accordance with current professional standards, risk language was used to discuss formula feeding in the *Lactation Educator* course. In the hybrid format, side conversations and small group discussions were encouraged to sift through participants’ feelings and to practice related counseling skills. The online course used the same curriculum (i.e., PowerPoint presentation, instructor, and assignment) but conversations were unidirectional. It is plausible that participants of the hybrid course acquired knowledge through distributed cognition that mitigated the deleterious effects of the risk language instruction. Clearly understanding the implications of risk language usage is imperative, as it speaks to the importance of understanding both the effects of the pedagogical strategies employed in a learning program, as well as, the nuances of differing course delivery formats.

It is also possible that the survey tool itself contributed to the findings. The beliefs about the outcomes of formula scale was originally developed for use with

mothers, although it has been used in other populations (Dodgson & Tarrant, 2007; Watkins & Dodgson, 2014; Watkins, Dodgson, Szalacha, & Bloomfield, 2011). Some, but not all, items resemble the risk language they are exposed to in the course; participants are asked to respond to how likely the statement is to occur. For example, ‘baby will have few illnesses’, ‘baby will not become overweight later in life’, and ‘baby will have no (or mild) allergies’. Participants are expected to rate the likelihood of occurrence to be less likely if they are formula fed. Other items are related (arguably) to more subjective items and may call in to question parenting and cultural norms. Items include ‘mother will feel close to baby’, ‘mother will feel satisfied with the mothering role’, and ‘mother will save time with bottle-feeding’. Hence evidence-based practice and cultural norms are juxtaposed, asking healthcare providers to make judgments about mothers’ feeding choices. In a society where formula feeding is the norm despite high breastfeeding initiation rates, it is reasonable to hypothesize that female healthcare providers may not be comfortable making judgments that appear to fault the mother for culturally acceptable practices. A more thorough understanding of the scale’s validity should be considered when undertaking future investigations; the scale should be further evaluated to ensure construct validity and refined, as appropriate.

Attitudes. Beliefs about performing the behavior (of interest) determine the person’s attitude toward the behavior (Ajzen, 1985). Hence, attitude refers to the healthcare provider’s overall evaluation of performing the behavior (e.g., to me, the idea of breastfeeding 6 months or more is pleasant/unpleasant) (Ajzen, 1985). Participants’ attitudes toward breastfeeding did not change after the course. Participants’ baseline

attitudes were very high (scale mean was 6.69, with 7 as the high); in other words, participants' attitudes toward breastfeeding were very positive, leaving little room for significant improvement. Although one cannot assume all participants' breastfeeding experiences were positive, the fact so many women reported having breastfed and having taken a prior professional breastfeeding education course/seminar suggests a high level of interest in the subject. No defined relationship between interest and attitude is purported in the literature despite an apparent connection. It is plausible a high degree of interest in a subject may inform a greater affinity for performing the behavior.

Perhaps participants' strong interest in breastfeeding may explain, in part, the improvement demonstrated in formula feeding attitudes (i.e., more evidence-based). All formula feeding scale items were significantly improved after completion of the online course. This is an encouraging finding, as others have not shown consistent results in significantly changing formula feeding attitudes (Dodgson & Tarrant, 2007).

The attitudes toward breastfeeding and formula feeding scales were originally designed for use with mothers. The scales ask participants to evaluate the idea and act of breastfeeding and formula feeding, not about their evaluation of performing actions in accordance with evidence-based breastfeeding support and promotion. This poses an interesting conceptual dilemma; should scale items relate to participants' evaluation of a behavior the mother is to perform or the behavior the participant is to perform? Although participants' attitudes toward breastfeeding and formula feeding could certainly impact their intentions to provide evidence-based care, it is the healthcare providers' provision of

breastfeeding supportive care that is the targeted behavior. The construct validity of this scale may be jeopardized by its use with healthcare providers.

Scale refinement and/or revision may be necessary. The attitudes scales were developed for use with mothers nearly 20 years ago (Duckett, 1998); it may be useful to examine the scales carefully to evaluate current relevance of scale items, along with ensuring current language usage. Equally important, careful consideration of the conceptual model (e.g., construct validity) is warranted. Future work should include scale refinement (or development) and empirical testing of conceptually congruent scale items relevant to this population and the targeted behavior.

Subjective norm. Subjective norm can be described as an individual's perceived social pressure (Ajzen, 1985). Most often this has been measured by asking the mother's overall evaluation of the degree to which influential persons in her life approve of and support breastfeeding (as measured by 1-Likert item) (Ajzen, 2002; Dodgson et al., 2003; Duckett, 1998). In the current study, subjective norm was measured by asking healthcare providers how supportive their coworkers were of breastfeeding. In the context of the workplace, the subjective norm is the healthcare provider's perception of their coworker's approval (or disapproval) of supporting breastfeeding.

Participants' perception about their coworkers' support of breastfeeding was positive and remained unchanged after completion of the course; additionally, no difference in perceived social pressure was found between the two course formats. This was expected; after all, subjective norm in this context refers to the healthcare provider's perception about their colleagues' desired actions (or non-actions), which are supportive

of breastfeeding. Further investigation (i.e., statistical modeling) would be necessary to understand how healthcare providers' subjective norm may mediate (or moderate) intention (and subsequent actual behavior).

Daneault, Beaudry, and Godin (2004) found the main determinants of nurses' and dietitians' intentions to recommend breastfeeding were perceived professional norm (i.e., person evaluates the behavior in accordance with professional convictions) and perceived behavioral control. The researchers modified the TPB to include two variables (perceived personal norm and perceived professional norm) related to Triandis' Theory of Interpersonal Behaviour (Triandis', 1977). The addition of these variables is indeed intriguing. Triandis' theory is similar to the TPB; however, it includes the addition of explicit roles (e.g, perceived personal and professional norms) that may provide additional explanatory value over the TPB model. Although the variables included in Daneault, Beaudry, and Godin's (2004) analyses were significantly associated with intention, only perceived behavioral control and perceived professional norm were significant predictors of intention, accounting for 69% of the variance. This suggests that a closer examination of the perceived professional norm construct may be warranted.

The conceptual definition and use of perceived professional norm in Daneault, Beaudry, and Godin's (2004) study and the use of subjective norm in this study appear similar. Although the authors provided definitions of the constructs, they did not provide examples of the scale items; therefore, it is difficult to evaluate the conceptual congruence of these variables. Perhaps perceived professional norm should be evaluated as an additional construct for future work in this area. Alternatively, additional

subjective norm items could be considered for more fully capturing the nature of this construct; one (Likert-type) item may not be sufficient to measure the subtleties of subjective norm.

Perceived Behavioral Control. Perceived behavioral control is a key distinguishing feature of the TPB. Control over performance of a behavior depends upon the presence of internal and external factors that may serve to promote or hinder (i.e., control beliefs) (Ajzen, 2002). These control beliefs (i.e., self-efficacy and controllability) “are two separate components each assessed by means of different indicators. Yet, together they comprise the higher-order concept of perceived behavioral control” (Ajzen, 2002, p. 678). Ajzen (2002, p. 679) further asserts the objectives of a research study will drive whether the investigator computes a single overall index of perceived behavioral control or uses separate measures of self-efficacy and controllability. Due to the exploratory nature of this study, perceived behavioral control and control beliefs are discussed separately in this subsection.

The Workplace Perceived Behavioral Control Scale (WPBCS) is comprised of the Able to Perform (self-efficacy) and Able to Implement (controllability) scales (Dodgson, 2013). Participants’ perceived behavioral control was significantly improved after the breastfeeding course and did not differ between delivery formats. Others have also demonstrated positive changes in the perceived behavioral control of multidisciplinary healthcare providers after a 45-hour course in breastfeeding (Watkins & Dodgson, 2014).

Although participants’ perceived behavioral control was improved (from pre to posttest), conceptual ambiguities remain. Participants’ perceptions of their ability to

perform breastfeeding supportive behaviors (self-efficacy) were significantly improved after the course; however, participants' perceptions about their ability to implement what they learned and how to affect policy changes (controllability) remained unchanged from the pretest. Given the lack of change in participants' perceptions of controllability, it is somewhat surprising that the composite variable (i.e., perceived behavioral control) demonstrated significant positive changes. These findings have recently been reported in previous studies with similar populations (Khasawneh, Dodgson, Bond & Watkins, 2014; Watkins & Dodgson, 2014). Although it is consistent with the TPB that self-efficacy and controllability can be reliably distinguished, Ajzen (2002) contends the two components are nevertheless correlated. Ajzen (2002) suggests conceptual ambiguities related to perceived behavioral control and its two conceptual components are best explored with empirical testing. Future studies should consider not only the discriminant validity of self-efficacy and controllability, but should examine convergence, as well (Ajzen, 2002).

The findings of this study underscore the importance of evaluating both perceived behavioral control and its two conceptual components. Using perceived behavioral control as an overall index without examining the two types of control (i.e., self-efficacy and controllability) may limit the understanding of this construct (Ajzen, 2002). Further discussion of the components of control beliefs follows.

Self-efficacy. Self-efficacy is a concept found in numerous psychological theories (e.g., health belief model, model of interpersonal behavior, and social cognitive theory). Bandura's (1977, 1989, 1997) work on self-efficacy lends the strongest

conceptual congruence with perceived behavioral control (Ajzen, 2002). Interventions using self-efficacy as a modifiable variable have been employed in breastfeeding research. This has been done most often with mothers for the purpose of increasing duration of breastfeeding (Dennis & Faux, 1999; Wilhelm, Rodehorst, Stepan, Hertzog, & Berens, 2008) and less often with healthcare professionals to increase their confidence in performing breastfeeding best practices (Kronborg, Vaeth, Olsen, & Harder, 2008). Promising results have been demonstrated in both populations.

In this study, participants' perceptions of their ability to perform 10 breastfeeding supportive behaviors were significantly improved after the course. This improvement in perceived ability is a critical step in changing behavior; nevertheless, perceived ability to perform breastfeeding supportive behaviors may differ from actual behavior. Other external factors (both perceived and actual) may not be within their control.

Controllability. Controllability refers to the beliefs about the extent to which the participant is able to enact the behavior within their environment (Ajzen, 2002). Overall participants had negative perceptions about being able to implement what they learned or to affect policy changes. Healthcare organizations are hierarchical in nature; employees must follow institutional policies. Until a critical mass (e.g., the number of people required to bring about change from within the lower ranks of the institution) has acquired the requisite knowledge, skills, and influence to affect policy change, employees may not be in the position to fully act on their newly acquired skills and knowledge. This, of course, is disheartening; without the ability to implement what they have learned or to affect policy changes, actual practice changes appear less likely.

One must consider the possibility that perceptions and reality may differ. Perhaps it takes time for the full effects of the intervention to be realized. For instance, it may take a period of time for healthcare providers to discover how they will be able to apply newly acquired skills in their workplaces. The participant, demonstrating an increase in their perceived abilities to help breastfeeding dyads, may come to realize they have more opportunities to implement what they learned or to affect policy changes in their workplace. A longitudinal study design should be considered to explore these ideas.

Multidimensional levels of change at individual and structural (e.g., policy, procedures, and administrative support) levels are necessary to change institutional practices (Watkins & Dodgson, 2014). Participants of this continuing breastfeeding education course were multidisciplinary professional and paraprofessional healthcare providers. Differences in perceived ability to implement breastfeeding best practices and affect change were found to exist between these two groups in a previous study with a similar sample (Watkins & Dodgson, 2014). The authors reported:

...on measures of participants' ability to implement what was learned in class and ability to act independently to provide best practices, paraprofessionals scored much lower than professionals. Often paraprofessional participants perceived an inability to influence practice within their work environment and reported their work environments were not supportive of breastfeeding women. The perceived lack of agency reported by paraprofessional participants reflects their socioeconomic status, educational backgrounds and status within work setting, which were markedly differentiated in our sample. It is likely that these class and

power differentials are found frequently across the country between professionals and paraprofessionals (Watkins & Dodgson, 2014, para. 3).

Differences in controllability between professionals and paraprofessionals could not be explored in this study (i.e., inadequate sample size of paraprofessional participants). Although it was not an objective of this study to explore differences in learning outcomes between professional and paraprofessional participants, future studies should further investigate these differences. It is important to understand how these differences may affect the learning needs and learning outcomes when educational programs have such a mix of participants in order to develop meaningful and efficacious educational programs for all participants. It is essential that the specific skills required by each group be understood so that they may be better addressed in educational offerings. Future research should not only investigate the differences in learning outcomes between professional and paraprofessional participants, but also develop and test pedagogical strategies to address these differences.

Intention. Ideally, actual changes in practice would be measured as a behavioral outcome; however, this has been a critical barrier to conducting research designed to measure the efficacy of breastfeeding educational interventions. To address this methodological issue, healthcare providers' intention to perform breastfeeding supportive behaviors has often been measured (DiGirolamo, et al., 2005). In this study, healthcare providers' intention to provide evidence-based breastfeeding support was measured to demonstrate that knowledge had been internalized and motivation to act was present. Behavioral intention has been theorized to be the most direct determinant of one's

behavior and has demonstrated utility in predicting breastfeeding initiation and continuation in mothers, and healthcare providers' intentions on actual behavior (Ajzen & Fishbein, 1980; DiGirolamo et al., 2005; Eccles et al., 2006; Felman-Winter et al., 2010). It is important, as the next step in expanding the evidence-base on this topic, to measure healthcare providers' behavior change over time.

Breastfeeding education for healthcare providers and college students has engendered positive changes in healthcare providers' intention to care for women in accordance with best practices in some studies (Bernaix, Beaman, Harris, & Miller, 2010; Watkins & Dodgson, 2014) but not in others (Watkins, Dodgson, Szalacha, & Bloomfield, 2011). In the current study, participants' intention to provide evidence-based breastfeeding support was significantly improved after completion of the 45-hour breastfeeding course. Further, no differences in participants' posttest scores were found between the online and hybrid courses, suggesting post course intention to act in accordance with breastfeeding best practices were comparable for the two delivery formats. This is a promising result; confirmation of this construct's utility in predicting behavior should be sought in future studies (i.e., measure actual behavior).

Summary

The TPB provided a useful framework for exploring participants' psychological and behavioral outcomes of an evidence-based and theory-guided 45-hour online breastfeeding course developed for healthcare providers. Significant positive changes (pre to posttest) were demonstrated for participants' knowledge about breastfeeding best practices; beliefs about breastfeeding; attitudes toward formula feeding; perceived

behavioral control; perceptions of their ability to perform breastfeeding supportive behaviors (self-efficacy); and their intentions to perform actions that are consistent with the evidence-based breastfeeding supportive behaviors. Paradoxically, beliefs about formula feeding were not in the expected direction, indicating participants' beliefs about formula feeding were less evidence-based after completion of the course. Although societal norms likely contributed to this finding, further studies are needed to confirm this outcome and to develop (and test) pedagogies effective in bringing about positive changes in participants' beliefs about formula feeding. Further investigation is also necessary to clarify conceptual and empirical ambiguities related to the controllability and perceived behavioral control constructs. Participants' negative perceptions about being able to implement what they learned or to affect policy changes requires further study. Will participants' be able to enact positive changes in their workplaces? If not, is this a function of individual (e.g., perceived versus actual control) or external (e.g., institutional, policy, administrative) factors? This information is necessary to inform pedagogy and affect practice changes.

The post-intervention psychological and behavioral outcomes of the online format compared favorably with those of the previous format (hybrid) of this breastfeeding course; however, some differences were found. Online participants' overall beliefs about formula feeding were significantly less favorable of evidence-based infant feeding practices than hybrid course participants. Although participants' overall scale scores were not significantly different between the two course delivery formats, individual differences on several items occurred for knowledge, beliefs about the outcomes of

breastfeeding, attitudes toward breastfeeding, and workplace controllability (i.e., perception of ability to implement what was learned or affect policy changes). These findings suggest subtle differences in participants' learning may have occurred between the two course delivery formats; perhaps this difference was a result of unintended and nuanced differences in the curriculum delivery (e.g., no group discussion for online participants).

As aforementioned, the TPB proved useful as a framework for developing and evaluating this educational program. It also illuminated some conceptual ambiguities and (perhaps) incongruence with the measurement tools chosen for this study. Careful consideration (i.e., refinement/revision) should be given prior to using the beliefs about formula feeding and breastfeeding scales in future studies; items may be outdated and/or not conceptually congruent for use with this population. This is also true of the attitudes scales; should healthcare providers be questioned about their attitudes toward infant feeding or about their attitudes toward breastfeeding best practices? Clarifying these conceptual questions has the potential of greatly expanding the knowledge base on this topic.

Limitations

Although appropriately used to measure participants' psychological and behavioral outcomes for this investigation, non-experimental pre-posttest self-report survey designs have inherent limitations. Convenience sampling, lack of randomization, and the absence of a control group limits generalization of the results. Non-experimental designs are notorious and often faulted by researchers for proving difficult to evaluate

what would happen in the absence of an intervention (Campbell & Stanley, 1966). Further, it is not possible with pre-posttest study designs to know how the pretest may have impacted the results; therefore, the measured outcomes cannot be attributed entirely to the intervention (Polit & Beck, 2012). However, the evidence-base on this topic demonstrates that changes in healthcare providers' psychological and behavioral determinants of learning (i.e., outcomes) do not occur readily without intervention (Eccles, et al., 2005; Matthew-Maich, Ploeg, Jack, & Dobbins, 2012).

Of the 4 types of survey design errors (i.e., sampling, measurement, coverage, and non-response), measurement error is most likely to have affected the results of this investigation. Measurement error is always a concern in studies using survey tools (Trochim & Donnelly, 2008). As previously discussed, imperfections of the survey instruments were: Imprecise wording of questions guided (possibly) by faulty underlying assumptions, outdated scale items, and marginal test-retest reliability for the breastfeeding knowledge questionnaire. The use of an expert committee to review the survey tools and make revisions prior to its administration was an attempt to minimize these errors (i.e., content validity); the high reliability coefficients found for the scales suggest they were internally consistent.

Comparing the outcomes of the two educational formats (research question 3) provided unique challenges. Using convenience samples from different offerings of the hybrid delivery of the *Lactation Educator* course to compare to the online version was necessary, but not ideal. In doing so, valuable information was obtained and important comparisons were made. Unfortunately, both the internal and external validity of the

study was weakened; caution must be used when interpreting the findings and generalizations should not be made. However, the findings presented herein provide an important stepping-stone for future investigations, which should include stronger study designs that incorporate a control group, are longitudinal (e.g., time series), and include statistical modeling.

Conclusion

This study contributed to the evidence base of breastfeeding education for healthcare providers by providing meaningful information about the learning outcomes related to breastfeeding support and promotion. The feasibility and preliminary efficacy of an online course, as well as, the comparability of two course delivery formats were explored using operationalized measures of the TPB constructs (6 out of 9 constructs). Although many findings were not unexpected, others were and prompt serious conceptual and pedagogical consideration.

Participants' favorably assessed the feasibility (i.e., acceptability) of the 45-hour course; several factors contributed to participants' satisfaction level: Previous online learning experience, connectedness with others, and the degree of structural support. Significant positive changes occurring in participants were increases in their knowledge and beliefs about breastfeeding; attitudes toward formula feeding; perceived behavioral control; perceptions about being able to perform breastfeeding supportive behaviors; and intentions to perform actions that are consistent with evidence-based breastfeeding supportive behaviors. Significant changes in the beliefs about formula feeding were not in the expected direction raising conceptual and pedagogical issues. Participants had

negative perceptions about being able to implement what they learned in their workplaces or to affect policy. Findings support the use of online breastfeeding education programs for healthcare providers; changes at both individual and institutional levels are necessary to change provider practices.

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APPENDIX A
WHO'S WHO IN LACTATION IN THE USA? (USLCA, 2009)

Who's Who in Lactation in the USA?

	International Board Certified Lactation Consultant (IBCLC, RLC)	Certified Lactation Counselor (CLC)	Certified Lactation Educator (CLE or LE)	WIC Peer Counselor
 Program Prerequisites	Completion of one of the three pathways to exam eligibility. Pathway 1 is based upon non-the-job experience; Pathway 2 requires completion of an academic program; and Pathway 3 is a mentorship program.	None.	None.	Successfully breastfed their own child and WIC participation.
Educational Components	All candidates for the exam must have lactation specific clinical experience and education. The amount of education and experience required varies by pathway. Requires 1000 hours of practice or directly supervised practice, plus 45 to 90 hours of lactation education.	Five day workshop based on WHO/UNICEF Breastfeeding Counseling Training.	Five day workshop.	14 hours minimum breast-feeding curriculum which varies from state-to-state.
Completion Requirements	Successful completion of the designated pathway requirements within the 5 years immediately prior to exam application.	Program attendance at a CLC course by Healthy Children's Center for Breastfeeding, pass all required in-class competency verification and homework assignments and passing of final exam. Additional clinical work and written paper for 3 college credits (college credit optional).	Program attendance. Additional clinical/written assignments may vary.	Attendance in WIC sponsored class.
Certification Offered	Certified as "IBCLC" upon passing the International Board of Lactation Consultant Examiners (IBLCE) certification exam for lactation consultants. IBCLCE certification exam is accredited by the National Commission for Certifying Agencies (NCCA).	The Certified Lactation Counselor course is an AACC-accredited (Using Skills Competency Program Certified as CLC) upon passing the Academy of Lactation Policy and Practice (ALPP) certification exam and competency verification. Valid 3 years.	"Lactation Educator Certificate" from institute offering program.	"Peer Counselor Certificate"
Registration	International Board Certified Lactation Consultant (IBCLC) and Registered Lactation Consultant (RLC) are certification marks registered with the US Patent and Trademark Office. IBCLC is the primary certification mark. Use of the RLC designation is limited to individuals who hold the IBCLC credential.	None.	None.	None.
Re-certification Requirements	IBCLCs must re-certify every 5 years. Five years after last passing the exam, re-certification by continuing education is allowed. Re-certification by exam is required every 10 years.	18 hours of approved continuing education hours every 3 years.	None.	Continuing education hours required monthly.

Who We Are

- ★ USLCA is the national affiliate for the International Lactation Consultants Association (ILCA) which was formed in 1985.
- ★ USLCA's primary purpose is to advocate for the International Board Certified Lactation Consultant (IBCLC) in the United States.
- ★ USLCA has a Board of Directors, 501(c)(6) status, and holds annual general meetings for their membership.
- ★ USLCA advocates for IBCLC State Licensure, Third-Party Reimbursement for IBCLCs, and Legislative issues that pertain to the IBCLC profession.
- ★ USLCA fosters the communication, networking and mutual support amongst USLCA members through State Chapters, monthly eNews online newsletter, webinars, and conferences.
- ★ USLCA member benefits include discounted professional liability insurance for IBCLCs.
- ★ USLCA provides opportunities for involvement at the national level through committee participation.

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USLCA
United States Lactation
Consultant Association

Who's Who in Lactation in the USA?

**United we can make
a difference!**

USLCA – One Voice

2501 Aerial Center Parkway
Suite 103
Morrisville, NC 27560
Return Service Requested



USLCA
United States Lactation
Consultant Association

APPENDIX B
INFANT FEEDING SURVEY (PRETEST)

INFANT FEEDING SURVEY

ID Number _____

I am a strong breastfeeding advocate (slide the scale to the value that best describes you).

Not at all (0)

Always (100)

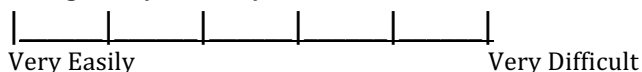
Have you ever attended a breastfeeding class or seminar before? Yes____ No____

INSTRUCTIONS:

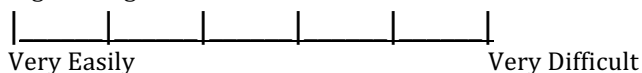
Place your response to each item somewhere on the scale from **1 =Very Easily** to **5 = Very Difficult**.

I am able to:

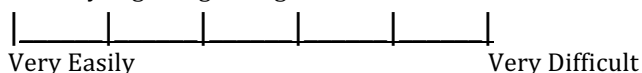
1. Assist in positioning a baby correctly at the breast.



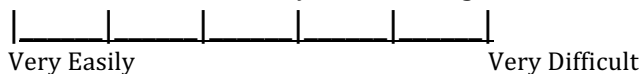
2. Recognize the signs of a good latch.



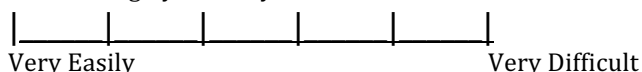
3. Determine that a baby is getting enough milk.



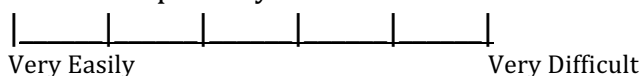
4. Support a mother to breastfeed her baby without using formula as a supplement.



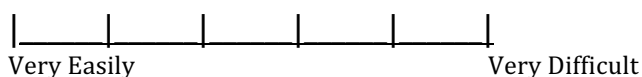
5. Manage the breastfeeding dyad to my satisfaction.



6. Teach a mother to keep a baby awake at the breast.



7. Motivate mothers to breastfeed their babies.



Dodgson, J., 2013: Used with permission

8. Tell when a baby is finished breastfeeding.

Very Easily			Very Difficult		

10. Make independent decisions about how to teach breastfeeding mothers.

Very Easily			Very Difficult		

INSTRUCTIONS:

Some feelings about breast-feeding and bottle-feeding are listed below. Please mark the spot on each scale that most closely represents how you feel. Mark between two lines rather than on one line.

To me, the **idea of breastfeeding** six months or more is:

Unpleasant	_ _ _ _ _ _ _ _ _	Pleasant
Embarrassing	_ _ _ _ _ _ _ _ _	Not Embarrassing
Healthy	_ _ _ _ _ _ _ _ _	Unhealthy
Repulsive	_ _ _ _ _ _ _ _ _	Attractive
Convenient	_ _ _ _ _ _ _ _ _	Inconvenient
Unnatural	_ _ _ _ _ _ _ _ _	Natural

To me, the **act of breastfeeding** six months or more is:

Unpleasant	_ _ _ _ _ _ _ _ _	Pleasant
Embarrassing	_ _ _ _ _ _ _ _ _	Not Embarrassing
Healthy	_ _ _ _ _ _ _ _ _	Unhealthy
Repulsive	_ _ _ _ _ _ _ _ _	Attractive
Convenient	_ _ _ _ _ _ _ _ _	Inconvenient
Unnatural	_ _ _ _ _ _ _ _ _	Natural

To me, the **idea of formula-feeding** six months or more is:

Unpleasant	_ _ _ _ _ _ _ _ _	Pleasant
Embarrassing	_ _ _ _ _ _ _ _ _	Not Embarrassing
Healthy	_ _ _ _ _ _ _ _ _	Unhealthy
Repulsive	_ _ _ _ _ _ _ _ _	Attractive
Convenient	_ _ _ _ _ _ _ _ _	Inconvenient
Unnatural	_ _ _ _ _ _ _ _ _	Natural

To me, the **act of formula-feeding** six months or more is:

Unpleasant	_ _ _ _ _ _ _ _ _	Pleasant
Embarrassing	_ _ _ _ _ _ _ _ _	Not Embarrassing
Healthy	_ _ _ _ _ _ _ _ _	Unhealthy
Repulsive	_ _ _ _ _ _ _ _ _	Attractive
Convenient	_ _ _ _ _ _ _ _ _	Inconvenient
Unnatural	_ _ _ _ _ _ _ _ _	Natural

Duckett, et al., 1998: Used with permission.

INSTRUCTIONS:

Place your response to each item somewhere on the scale from **1=Strongly agree to 5=Strongly disagree**.

About your work place:

1. I work with people who are very supportive of breastfeeding.

|_____|_____|_____|_____|_____|
Strongly agree Strongly disagree

2. I work with people who know a lot about breastfeeding.

|_____|_____|_____|_____|_____|
Strongly agree Strongly disagree

3. I am able to follow breastfeeding best practices in my work setting.

|_____|_____|_____|_____|_____|
Strongly agree Strongly disagree

4. I will be able to implement what I learned in this class in my work setting.

|_____|_____|_____|_____|_____|
Strongly agree Strongly disagree

5. I am able to influence breastfeeding policy in my work setting.

|_____|_____|_____|_____|_____|
Strongly agree Strongly disagree

6. I am able to control whether or not I follow breastfeeding best practices in my work setting.

|_____|_____|_____|_____|_____|
Strongly agree Strongly disagree

Dodgson, J., 2013: Used with permission

INSTRUCTIONS:

Below please indicate your personal beliefs about possible results that might occur if someone breastfeeds or formula-feeds an infant 5 months or more. Place your response to each item somewhere on the scale from **1 =Extremely unlikely to 7 = Extremely likely**.

If a woman **BREASTFEEDS** for **6 months** or more:

1. The baby will experience few illnesses, during the first year.

Unlikely |__|__|__|__|__|__|__|__| Likely

2. Any illnesses the baby experiences, during the first year will be mild.

Unlikely |__|__|__|__|__|__|__|__| Likely

3. The baby will have no allergies, or mild allergies.

Unlikely |__|__|__|__|__|__|__|__| Likely

4. The baby will have good jaw and facial development.

Unlikely |__|__|__|__|__|__|__|__| Likely

Adapted from Duckett, et al., 1998: Used with permission.

5. The baby will not be overweight in relation to height.
Unlikely |__|__|__|__|__|__|__|__| Likelv
6. The baby will not be underweight in relation to height.
Unlikely |__|__|__|__|__|__|__|__| Likelv
7. The baby will not become obese later in life.
Unlikely |__|__|__|__|__|__|__|__| Likelv
8. The baby will associate the smell of milk and feel of mother's skin with feelings of safety, warmth, and satisfaction of hunger.
Unlikely |__|__|__|__|__|__|__|__| Likelv
9. The mother and baby will experience a lot skin-to-skin contact.
Unlikely |__|__|__|__|__|__|__|__| Likelv
10. Feedings will be a rewarding time.
Unlikely |__|__|__|__|__|__|__|__| Likelv
11. The mother will feel very close to the baby 12 months after delivery.
Unlikely |__|__|__|__|__|__|__|__| Likelv
12. The mother will feel satisfaction with the mothering role.
Unlikely |__|__|__|__|__|__|__|__| Likelv
13. The mother will feel satisfied with her ability to feed the baby.
Unlikely |__|__|__|__|__|__|__|__| Likelv
14. The mother will feel satisfied that the baby is getting the best type of milk for his/her health.
Unlikely |__|__|__|__|__|__|__|__| Likelv
15. The mother will return to her pre-pregnant or ideal weight, within a year following the delivery.
Unlikely |__|__|__|__|__|__|__|__| Likelv
16. The mother will save time by breastfeeding.
Unlikely |__|__|__|__|__|__|__|__| Likelv
17. The mother will save money by breastfeeding.
Unlikely |__|__|__|__|__|__|__|__| Likelv
18. Breastfeeding will be convenient.
Unlikely |__|__|__|__|__|__|__|__| Likelv
19. The mother's interest in sex will return rapidly.
Unlikely |__|__|__|__|__|__|__|__| Likelv

If a woman **FORMULA** feeds for the first six months or more:

20. The baby will experience few illnesses, during the first year.
Unlikely |__|__|__|__|__|__|__|__| Likelv
21. Any illnesses the baby experiences, during the first year will be mild.
Unlikely |__|__|__|__|__|__|__|__| Likelv

Adapted from Duckett, et al., 1998: Used with permission.

22. The baby will have no allergies, or mild allergies.
Unlikely |__|__|__|__|__|__|__|__| Likely
23. The baby will have good jaw and facial development.
Unlikely |__|__|__|__|__|__|__|__| Likely
24. The baby will not be overweight in relation to height.
Unlikely |__|__|__|__|__|__|__|__| Likely
25. The baby will not be underweight in relation to height.
Unlikely |__|__|__|__|__|__|__|__| Likely
26. The baby will not become obese later in life.
Unlikely |__|__|__|__|__|__|__|__| Likely
27. The baby will associate the smell of milk and feel of mother's skin with feelings of safety, warmth, and satisfaction of hunger.
Unlikely |__|__|__|__|__|__|__|__| Likely
28. The mother and baby will experience a lot skin-to-skin contact.
Unlikely |__|__|__|__|__|__|__|__| Likely
29. Feedings will be a rewarding time.
Unlikely |__|__|__|__|__|__|__|__| Likely
30. The mother will feel very close to the baby 12 months after delivery.
Unlikely |__|__|__|__|__|__|__|__| Likely
31. The mother will feel satisfaction with the mothering role.
Unlikely |__|__|__|__|__|__|__|__| Likely
32. The mother will feel satisfied with her ability to feed the baby.
Unlikely |__|__|__|__|__|__|__|__| Likely
33. The mother will feel satisfied that the baby is getting the best type of milk for his/her health.
Unlikely |__|__|__|__|__|__|__|__| Likely
34. The mother will return to her pre-pregnant or ideal weight, within a year following the delivery.
Unlikely |__|__|__|__|__|__|__|__| Likely
35. The mother will save time by bottle-feeding.
Unlikely |__|__|__|__|__|__|__|__| Likely
36. The mother will save money by bottle-feeding.
Unlikely |__|__|__|__|__|__|__|__| Likely
37. Bottle-feeding will be convenient.
Unlikely |__|__|__|__|__|__|__|__| Likely
38. The mother's interest in sex will return rapidly.
Unlikely |__|__|__|__|__|__|__|__| Likely

Adapted from Duckett, et al., 1998: Used with permission.

INSTRUCTIONS:

Some professional nursing activities related to infant feeding are listed below. Consider each activity and decide how likely you would be to take each action if you were working with newborns. Please mark the spot on each scale that most closely represents how you feel. Mark between two lines rather than on one line.

1. Be an advocate for an infant feeding policy with a stated preference for breastfeeding.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

2. Attend an annual breastfeeding class offered at no cost.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

3. Attend a breastfeeding workshop that your employer pays for.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

4. Present breast and bottle-feeding as equally good alternatives for infant feeding.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

5. Explain the benefits of breastfeeding to all patients.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

6. Encourage breastfeeding to a mother who is planning to bottle feed her infant.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

7. Discuss hazards of formula with women who are bottle feeding.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

8. Encourage a mother to express her breastmilk if she should become separated from her infant.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

9. Encourage a mother to discontinue breastfeeding if she should be separated from her infant.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

10. Encourage a mother to offer a supplement (formula, glucose water or sterile water) if the infant seems hungry after breastfeeding.
|_____|
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

Adapted from Anderson, Chu, & Henly, 1999: Used with permission.

11. Advise a mother to breastfeed her newborn on a schedule.

_____ | _____ | _____ | _____ | _____ |
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

12. Provide a mother with information about who to contact if she has questions about breastfeeding.

_____ | _____ | _____ | _____ | _____ |
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

13. Refer a mother to a breastfeeding support group.

_____ | _____ | _____ | _____ | _____ |
Strongly Agree Agree Ambivalent Disagree Strongly Disagree

Adapted from Anderson, Chu, & Henly, 1999: Used with permission.

INSTRUCTIONS:

Tick the **best** response for each of the following statement.

1. Mothers should nurse from one breast only at each feeding.
True___ (1) False___ (0) Don' t Know ___ (2)
2. Mothers should breastfeed on a demand schedule.
True___ False___ Don' t Know ___ (2)
3. Mothers should use special cleaning agents on their nipples.
True___ False___ Don' t Know ___
4. Mothers should prepare the nipples before giving birth by expressing colostrum and by massage.
True___ False___ Don' t Know___
5. Mothers should use a supplementary bottle of formula until their milk supply is established.
True___ False___ Don' t Know___ (2)
6. Mothers should weigh their babies after each feeding to be sure they are getting enough milk.
True___ False___ Don' t Know___ (2)
7. Mothers should use both breasts at each feeding.
True___ False___ Don' t Know___ (2)
8. Mothers should breastfeed on a four hour schedule.
True___ False___ Don' t Know___ (2)
9. To start the baby nursing, the mother should push the babies head towards the nipple.
True___ False___ Don' t Know___ (2)
10. Solid food should be started in the newborn before three months of age.
True___ False___ Don' t Know___ (2)
11. Mothers should nurse from a breast even if the nipple is sore and/or cracked.
True___ False___ Don' t Know___ (2)
12. Mothers should avoid frequent nursing at first to protect the nipples.
True___ False___ Don' t Know___ (2)
13. If a breast infection develops, the mother should stop nursing on the affected side temporarily.
True___ False___ Don' t Know___ (2)
14. Breast milk takes as long to digest as formula.
True___ False___ Don' t Know___ (2)

Adapted from Dodgson & Tarrant, 2007: Used with permission.

Background Information

INSTRUCTIONS

Please complete the following:

1. What is your gender? Female _____(1) Male _____(0)
2. In what year were you born? _____
3. What is your marital status?
 Single, never married _____(1)
 Married _____(2)
 Widowed _____(3)
 Divorced _____(4)
 Living with a partner _____(5)
4. What is your racial/ethnic background?
 Latino/Hispanic ethnicity _____(1)
 Asian _____(2)
 American Indian/Alaskan Native _____(3)
 Black/African American _____(4)
 Native Hawaiian/Pacific Islander _____(5)
 White, Non-Hispanic _____(6)
 Mixed _____(7)
5. Do you have children? Yes _____(1) No _____(0)

 If yes, how many? _____
6. Did you breastfed? Yes _____(1) No _____(0)
7. What is your professional background?
 RN _____ RD _____ Nurse Practitioner _____ Midwife _____ Doula _____
 Community health lay worker (WIC CNW, HealthStart, etc.) _____ Peer Counselor _____
 Other (please specify) _____
8. What is your educational background?
 High School diploma or equivalent _____ Associate Degree (or 2 yrs college) _____
 Bachelor' s degree (or 4 years college) _____ Master' s Degree _____ Other _____
9. Does your employer require you to take this course as part of your employment?

 Yes _____(1) No _____(0) Don' t Know _____
10. Doe you reside in Arizona?

 Yes _____(1) No _____(0)
11. Do you reside in the United States?
 Yes _____(1) No _____(0)

 If not, which country? _____

APPENDIX C
FEASIBILITY QUESTIONNAIRE (POSTTEST)

Select the answer that most closely represents how you feel.

1. The speed and quality of my Internet connection was appropriate for accessing the course materials.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
2. I had little or no problems accessing the online content (e.g., PowerPoint presentations).
Strongly agree Agree Ambivalent Disagree Strongly Disagree
3. I was able to reach someone that could help me when I had a question.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
N/A
4. I would recommend this course to others.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
5. I was able to complete the course modules at my own pace.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
6. I would take an online course again.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
7. I prefer the online learning environment over that of traditional (in-person) classrooms.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
8. The level of material (i.e., degree of difficulty) was appropriate for my needs.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
9. The content is appropriate for an online course.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
10. This course will be helpful to me.
Strongly agree Agree Ambivalent Disagree Strongly Disagree
11. This course met my expectations.
Strongly agree Agree Ambivalent Disagree Strongly Disagree

Where did you complete the majority of the online modules?

- Home
- Work
- Public Wi-Fi
- Various

What was the average amount of time spent completing each module? _____

Please provide any additional comments you would like us to know.

APPENDIX D

INSTITUTIONAL REVIEW BOARD EXEMPTION STATUS

EXEMPTION GRANTED

Joan Dodgson
 CONHI - Research Faculty and Staff
 602/496-0823
 Joan.Dodgson@asu.edu

Dear Joan Dodgson:

On 2/5/2014 the ASU IRB reviewed the following protocol:

Type of Review:	Modification
Title:	The Infant Feeding Attitudes, Beliefs, and Knowledge of health Providers Taking a College-Based Breastfeeding and Human lactation Course
Investigator:	Joan Dodgson
IRB ID:	0907004133
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> • Consent Form - revised, Category: Consent Form; • Modified applicaton, Category: IRB Protocol; • Pretest Survey, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • Dodgson CITI certificate, Category: Other (to reflect anything not captured above); • Watkins CITI certificate, Category: Other (to reflect anything not captured above); • Consent , Category: Recruitment Materials; • Response to required clarifications, Category: Recruitment materials/advertisements /verbal scripts/phone scripts;

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 2/5/2014.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc:

APPENDIX E
STUDY INFORMATION LETTER

INFANT FEEDING SURVEY

You are being asked to participate in a research study conducted by Amanda Watkins, MS, RD, IBCLC and Joan Dodgson, PhD, MPH, RN, from the College of Nursing & Health Innovation at Arizona State University. The purpose of this study is to better understand the learning needs of our participants.

This study consists of an online questionnaire that will be administered to students enrolled in the *Lactation Educator* course. You will be asked to provide answers to a series of questions related to your infant feeding knowledge, attitudes, and beliefs. You will be provided a link to the online survey to be completed prior to the start of the course and at the end of the course. It is estimated that completing each questionnaire will take 10-15 minutes of your time.

This is a *confidential* survey; all data is stored in a password protected electronic format and will not contain information that will personally identify you. Your participation is entirely voluntary. You are free to choose not to participate. Your course grade will not be affected by either participating or not participating in this study. The results of this study may be used in reports, presentations, or publications but your name will not be known; results will only be shared in the aggregate form.

There are no foreseeable risks or discomforts to your participation. The benefit of your participation will be contributing to our understanding of the effectiveness of this course and potentially to making course improvements.

Completion of this survey will constitute your consent to participate in this study. If you have questions or concerns during the time of your participation in this study, or after its completion, or if you would like to receive a copy of the final aggregate results of this study, please contact:

Joan E. Dodgson, PhD, MPH, RN
Associate Professor
College of Nursing & Health Innovation
Arizona State University
Joan.Dodgson@asu.edu
602-496-0885

Amanda L. Watkins, MS, RD, IBCLC
PhD Student
College of Nursing & Health Innovation
Arizona State University
Amanda.L.Watkins@asu.edu

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

Thank you, your consideration is appreciated