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Primary Care Interventions to Support Breastfeeding: Updated Systematic Review for the U.S. Preventive Services Task Force

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Structured Abstract

Objective: We conducted this systematic review to support the U.S. Preventive Services Task Force (USPSTF) in updating its 2008 recommendation on counseling to promote and support breastfeeding. Our review addressed three questions: 1) What are the effects of prenatal, peripartum, and postpartum individual- and health care system-level interventions to promote and support breastfeeding on child and maternal health outcomes? 2) What are the effects of interventions on the initiation, duration, and exclusivity of breastfeeding? 3) Are there adverse events associated with interventions to promote and support breastfeeding?

Data Sources: We performed a search of MEDLINE, PubMed Publisher-Supplied, Cumulative Index for Nursing and Allied Health Literature, Cochrane Central Register of Controlled Trials, and PsycInfo for studies published between January 1, 2008, and September 25, 2015. Studies included in the original USPSTF review were re-evaluated for inclusion. We supplemented searches by examining bibliographies from retrieved articles and consulting outside experts. We searched federal and international trial registries for ongoing trials.

Study Selection: Two researchers reviewed 2,769 abstracts and 211 articles against the prespecified inclusion criteria. Eligible studies included English-language studies conducted in a developed country that evaluated the effectiveness of an individual- or system-level breastfeeding intervention among pregnant women or mothers of full- or near-term infants. We included randomized or cluster randomized, controlled trials for individual-level interventions and controlled before-after or prospective cohort studies for health system or policy interventions that reported health or breastfeeding outcomes. We conducted dual, independent critical appraisal of all provisionally included studies and abstracted all important study details and results from fair- and good-quality studies. Data were independently abstracted by one reviewer and confirmed by another.

Data Analysis: We narratively synthesized the results for health outcomes and adverse events. For breastfeeding outcomes, we synthesized the results by population (adults separately from adolescents or young adults) and intervention focus (individual- vs. system-level approaches). Because of the small number of system-level interventions, we report those results narratively and do not pool the data. For individual-level interventions, we conducted random effects meta-analyses using the DerSimonian and Laird method and calculated pooled risk ratios (RRs) for breastfeeding initiation and for any or exclusive breastfeeding at postpartum time points of less than 3 months, 3 to less than 6 months, and 6 months. We explored potential effect modification by various population and intervention characteristics, such as intention to breastfeed and intervention type, and timing through stratified analyses and meta-regression. We generated funnel plots and conducted tests for small-study effects for all pooled analyses.

Results: We included 52 studies that were reported in 57 publications. Thirty one studies were newly identified while 21 studies were carried forward from the previous review. The included studies were highly variable in terms of the country, study population, intervention and control conditions, specific outcome measures, and timing of measurements.

Infant and maternal health outcomes. Six trials reported inconsistent effects of the interventions on a range of infant health outcomes, such as gastrointestinal illness, otitis media, respiratory tract illness, and health care use. None of the studies reported maternal health outcomes.

Breastfeeding outcomes. On the basis of 43 trials, breastfeeding support and education interventions targeting individuals were associated with a statistically significant higher likelihood of any and exclusive breastfeeding for less than 3 months and at 3 to less than 6 months compared with usual care among adults. Pooled estimates indicated beneficial associations for any breastfeeding for less than 3 months (RR, 1.07 [95% confidence interval (CI), 1.03 to 1.11]; k=26; n=11,588) and at 3 to less than 6 months (RR, 1.11 [95% CI, 1.04 to 1.18]; k=23; n=8,942) and for exclusive breastfeeding for less than 3 months (RR, 1.21 [95% CI, 1.11 to 1.33]; k=22; n=8,246) and at 3 to less than 6 months (RR, 1.20 [95% CI, 1.05 to 1.38]; k=18; n=7,027). At 6 months, individual-level interventions among adults were associated with a 16 percent higher likelihood of exclusive breastfeeding (RR, 1.16 [95% CI, 1.02 to 1.32]; k=17; n=7,690) but not any breastfeeding. Absolute differences in the rates of any breastfeeding ranged from 14.1 percent in favor of the control group to 18.4 percent in favor of the intervention group. The association between individual-level interventions and breastfeeding initiation was not statistically significant based on the pooled point estimate, but the CI did not rule out potential benefit (RR, 1.00 [95% CI, 0.99 to 1.02]; k=14; n=9,428). There was some suggestion that interventions that took place during a combination of prenatal, peripartum, or postpartum time periods were more effective than those that took place only during one time period. There was no indication of effect modification by other intervention characteristics or by population subgroups. All four trials of individual-level interventions among adolescents or young adults reported higher rates of breastfeeding among intervention versus control group participants. There was limited, mixed evidence from well-controlled studies of an association between system-level interventions and rates of breastfeeding.

Adverse events. Two trials among adults reported on adverse events related to a breastfeeding support intervention. One trial found no significant differences between groups in maternal anxiety at 2 weeks. The other reported that a few mothers expressed feelings of anxiety and decreased confidence in their breastfeeding abilities despite breastfeeding going well and therefore discontinued their participation in the peer counseling intervention.

Limitations: There were a number of threats to internal validity within the included studies. Details regarding the measurement of breastfeeding outcomes, sociodemographic and breastfeeding-related population characteristics, and intervention and usual care characteristics were lacking. Our pooled analyses relied on unadjusted breastfeeding rates and did not control for potential confounding.

Conclusions: The body of fair- to good-quality evidence related to primary care interventions to support breastfeeding has nearly doubled since the release of the 2009 USPSTF review and recommendation. The updated evidence confirms that breastfeeding support and education provided by professionals and peers to individual women, regardless of the mother's age, is associated with an increase in the duration of any and exclusive breastfeeding. There are limited well-controlled studies examining the effectiveness of system-level policies and practices on rates of breastfeeding, as well as on child health, and none for maternal health.

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Chapter 1. Introduction

Purpose

The Agency for Healthcare Research and Quality (AHRQ) requested an updated evidence report on counseling interventions in primary care to promote and support breastfeeding. This report will be used by the U.S. Preventive Services Task Force (USPSTF) to update its 2008 recommendation on breastfeeding counseling and support interventions.[1]

Condition Definition

Breastfeeding is typically described based on the exclusivity of breastfeeding (breastfeeding without supplementation) and on how long the infant is fed breast milk. Supplementation typically refers to giving the infant formula or other breast milk substitutes. Various sources define exclusive breastfeeding differently, sometimes allowing vitamins, medicines, or ritualistic feedings as part of the definition.[2,3] Infants may consume breast milk by direct breastfeeding (baby-to-breast), bottle- or cup-feeding breast milk expressed by the mother or obtained through formal or informal breast milk donation, or both. In this review, we use the term "breastfeeding" to refer to both direct breastfeeding and feeding expressed breast milk unless specifically noted. Various definitions of breastfeeding are further described in the Methods section.

Recommendations for Breastfeeding and Breastfeeding Support

Multiple national and international organizations, including the American Academy of Pediatrics (AAP) (2012),[4] the American Academy of Family Physicians (2012),[5] the American Congress of Obstetrics and Gynecology (2007),[6] and the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) (2003),[3] recommend exclusive breastfeeding up to or around 6 months, followed by continued breastfeeding for at least 1 year as mutually desired by mother and infant while complementary foods are introduced. As part of its recommendation, the AAP suggests peripartum policies and practices that support breastfeeding initiation and maintenance. Specifically, the AAP recommends direct skin-to-skin contact between the infant and the mother immediately after delivery until the first feeding is accomplished and contact throughout the postpartum period, delaying routine procedures such as weighing and bathing and the administration of intramuscular vitamin K until after the first feeding is completed (but within 6 hours in the case of vitamin K), ensuring eight to 12 feedings at the breast every 24 hours, ensuring formal evaluation and documentation of breastfeeding by trained providers (including position, latch, milk transfer, and examination) for at least each nursing shift, giving no supplements (i.e., water, glucose water, commercial infant formula, or other fluids) to the breastfeeding infant unless medically indicated, beginning daily oral vitamin D drops at hospital discharge, and avoiding routine pacifier use for the first 3 or 4 weeks of the postpartum period. Furthermore, the AAP recommends that a pediatrician see a breastfeeding infant at 3 to 5 days

old (which is within 48 to 72 hours of discharge from the hospital) to evaluate the child for hydration and body weight gain, observe breastfeeding, and discuss maternal and infant issues with the family.[4]

These same organizations also endorse the Baby-Friendly Hospital Initiative (BFHI). The BFHI is a global program sponsored by the WHO and UNICEF to encourage and recognize hospitals and birth centers that offer an optimal level of care for breastfeeding. The initiative was launched in 1991 and is based on the WHO/UNICEF "10 Steps to Successful Breastfeeding for Hospitals" (**Table 1**).[7] In the United States, Baby-Friendly accreditation is awarded by Baby-Friendly USA, Inc., to birthing facilities that successfully implement the 10 Steps to Successful Breastfeeding and the International Code of Marketing of Breast-Milk Substitutes and pass an intensive site visit.[8] Designations expire after 5 years, at which time facilities must go through a redesignation process. As of August 2015, 286 hospitals and birthing centers in 47 states and the District of Columbia held the BFHI designation and 14.1 percent of U.S. births occurred in BFHI-accredited facilities.[9]

Healthy People 2020 targets for initiating breastfeeding, breastfeeding to 6 months, and breastfeeding to 12 months are 81.9, 60.6, and 34.1 percent, respectively (**Table 2**).[10] Targets for exclusive breastfeeding are 46 percent at 3 months and 25 percent at 6 months. Other Healthy People 2020 objectives related to breastfeeding include increasing the proportion of employers who have worksite lactation support programs, reducing the proportion of breastfed newborns who receive formula supplementation within the first 2 days of life, and increasing the proportion of live births that occur in facilities that provide recommended care for lactating mothers and their babies. In addition, the Surgeon General's 2011 "Call to Action to Support Breastfeeding" outlines 20 specific actions and related implementation strategies to improve rates of breastfeeding in the United States.[11] Actions specific to the health care sector include: ensuring that maternity care practices throughout the United States are fully supportive of breastfeeding; developing systems to guarantee the continuity of skilled support for lactation between hospitals and health care settings in the community; providing education and training in breastfeeding for all health professionals who care for women and children; including basic support for breastfeeding as a standard of care for midwives, obstetricians, family physicians, nurse practitioners, and pediatricians; ensuring access to services provided by International Board-Certified Lactation Consultants (IBCLCs); and identifying and addressing obstacles to greater availability of safe banked donor milk for fragile infants.

Association Between Breastfeeding and Breast Milk and Child and Maternal Outcomes

To date, the most comprehensive and widely cited systematic review on the relationship between breastfeeding and infant and maternal health outcomes is a 2007 report prepared by Ip and colleagues for the AHRQ Effective Health Care Program.[12,13] This report, which synthesized both primary studies and existing systematic reviews, was evaluated by the USPSTF as part of its deliberations in making its 2009 recommendation. A number of more recent systematic reviews have been published that present findings consistent with those from the 2007 report and provide additional data for outcomes with previously limited or otherwise insufficient data.[14-25] The

synthesized evidence for child and maternal outcomes are summarized in **Table 3** and **Table 4**, respectively, and narrated below.

Infant and Child Outcomes

A history of being breastfed has been found to be associated with a reduced risk of a variety of health outcomes in infancy and childhood, including acute otitis media,[12, 17] asthma and atopic dermatitis,[12,24,26] gastrointestinal infection[27,28] and the incidence of diarrhea,[23] hospitalizations due to lower respiratory tract infection,[29] sudden infant death syndrome,[12,14] childhood leukemia,[12,15] type 1 diabetes,[18,30] type 2 diabetes,[21,31] and obesity.[21,32] In addition, a 2015 review reported a statistically significant benefit of being breastfed (vs. never being breastfed) on systolic blood pressure in childhood but no association between a history of breastfeeding and diastolic blood pressure or total cholesterol.[21] Another recent review reported a 1.8- to 3.9-fold higher risk (depending on infant age) of all-cause mortality in children who were never breastfed compared with those who were ever breastfed, although the number of studies available for these analyses were limited (two to six studies).[25] Several recently published systematic reviews have also reported positive child health benefits of being breastfed that were not part of the earlier AHRQ review. These benefits include reduced risk of pneumonia morbidity and mortality,[33] celiac disease,[34] *Helicobacter pylori* infection,[35] dental caries,[36] and malocclusions.[37] The breastfeeding comparisons used to estimate the relative associations with health outcomes were highly variable (e.g., ever breastfed vs. never breastfed, exclusively breastfed for ≥3 months vs. exclusively breastfed for <3 months) but generally suggest that a history of any breastfeeding is more beneficial than no breastfeeding and that a longer duration, particularly for exclusive breastfeeding, confers greater benefits than a shorter duration (**Table 3**).

Maternal Outcomes

In terms of maternal health outcomes, a history of breastfeeding has been found to be associated with a reduced risk for maternal breast and ovarian cancer[12,19,38,39] and type 2 diabetes (**Table 4**).[16] In contrast, no clear relationship between a history of breastfeeding and the risk of osteoporosis has been found to date, and the associations between breastfeeding and the mother's return to prepregnancy weight, postpartum weight loss, and prevalence of postpartum depression have been negligible or unclear.[12,19,20]

Limitations of Body of Evidence Linking Breastfeeding and Health Outcomes

The evidence regarding the relationship between breastfeeding and health outcomes is almost exclusively based on observational research given that it is unethical to randomize women to breastfeed or not breastfeed. This observational research has well-recognized sources of potential bias, including possible selection bias, misclassification, unmeasured or uncontrolled confounding, reverse causality, and publication bias. In addition, exposure to breastfeeding is measured and reported differently across these studies, including the comparisons made (e.g., ever vs. never breastfeeding, or breastfeeding for 6 vs. 3 months), the definition of breastfeeding (including not distinguishing between any vs. exclusive breastfeeding), and the age at which

infant and child outcomes were measured. The studies also differ in their measurement and operationalization of the infant and maternal outcomes, the study setting, and the adjustment for potential confounders. While Ip and colleagues[12] limited their review to studies conducted in developed countries, much of the updated evidence also included studies in developing and middle-income countries, which may represent a larger set of confounding factors and may not be generalizable to the United States. A few studies have used sibling comparisons to more accurately estimate the impact of breastfeeding on long-term childhood health (mostly childhood obesity), but they have shown generally inconsistent findings.[40-44]

Lastly, there is little evidence regarding differences in the health benefits of breastfeeding directly and feeding expressed breast milk. None of the studies in the 2007 AHRQ review explicitly examined the differential association between baby-to-breast breastfeeding versus bottle-feeding breast milk on health outcomes. The majority of the health benefits of breastfeeding are thought to be conferred via specific biological aspects of breast milk (e.g., antibodies and beneficial bacteria in the breast milk, nutritive values of breast milk, or effects of breast milk on energy metabolism or insulin response) that are absent from infant formula. However, breastfeeding directly from the breast may confer additional benefits. For example, it may help reduce the risk of malocclusions because the process of sucking at a breast is different than the process used to suck from a bottle.[37] Likewise, the strong negative pressure generated by breastfeeding, as opposed to bottle-feeding, may help reduce the risk of acute otitis media.[17] There is also some evidence that direct breastfeeding during early infancy is associated with greater appetite regulation later in childhood, which has implications for childhood obesity.[45]

Prevalence of Breastfeeding

The estimates for any breastfeeding for infants born in 2012 in the United States were 80.0 percent for initiation, 51.4 percent for infants breastfed at 6 months, and 29.2 percent for infants breastfed at 12 months. The rates of exclusive breastfeeding through 3 and 6 months were 43.3 and 21.9 percent, respectively (**Table 2**).[46] There is generally a steady decline in any and exclusive breastfeeding with increasing child age (**Figure 1**).

A number of sociodemographic factors are associated with an increased likelihood of breastfeeding initiation and continuation. These factors include older maternal age, being married, Asian or white race, Hispanic ethnicity, higher maternal education, higher socioeconomic status, access to private insurance, and geography.[11,46-49] For instance, the rate of any breastfeeding at 6 months for non-Hispanic black infants is only 35.3 percent but is 51.4 percent for Hispanic or Latino infants, 55.8 percent for white infants, and 65.6 for Asian infants.[46] With regard to education, women who have a high school education are almost half as likely (38.2%) to breastfeed at 6 months than women with a college education (70.3%). Further, women who are part of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) are less likely to breastfeed at 6 months than women who are ineligible for the program (39.1% and 68.4%, respectively). Married women are more likely to breastfeed at 6 months than those who are unmarried (62.3% vs. 33.1%). Finally, women younger than age 20 years are far less likely to breastfeed at 6 months than those ages 20 to 29 years or 30 years and older (17.4% vs. 40.6% and 60.2%).[46]

There are also large variations in the rates of breastfeeding initiation and continuation around the world, although the specific indicators and dates in which the data were collected differ.[50,51] In a recent systematic review, the highest prevalence of exclusive breastfeeding initiation was observed in Norway (99%), Denmark (99%), and Japan (98%) and the lowest initiation rates were observed in the United Kingdom (70%), the United States (70%), and France (63%). With regard to any breastfeeding, New Zealand (81%), Canada (71%), and Italy (66%) had the highest rates of breastfeeding maintenance at 3 to 4 months and the United Kingdom (43%) and France (16%) had the lowest rates.[51]

Facilitators and Barriers to Breastfeeding

According to the Surgeon General's Call to Action to Support Breastfeeding, the primary barriers to breastfeeding include the lack of maternal knowledge about the benefits and management of breastfeeding, social norms supporting bottle-feeding infant formula versus breastfeeding, poor family and social support, embarrassment about breastfeeding in public, lactation problems, issues related to returning to work and child care, and deficits in hospital policies and clinical practices related to supporting breastfeeding.[11] Among women who initiate breastfeeding, early discontinuation is often accompanied with a higher prevalence of self-reported problems, such as painful nipples, concerns about the adequacy of milk supply, and concern about the baby's behavior or weight. Factors reported to be associated with lower breastfeeding initiation and duration among ethnic minorities and those of low socioeconomic status include ambivalence about breastfeeding, the availability of free formula from WIC, a high level of comfort with the idea of formula feeding, and limited availability and lower intensity of breastfeeding support.[52] Other factors that have been linked with lower rates of breastfeeding initiation and continuation include multiparity, body mass index (underweight, overweight, or obese), and a history of depression or anxiety during pregnancy.[53-57] Conversely, nonsmokers, women who initiate prenatal care earlier in their pregnancy, and women who complete a higher number of prenatal visits are more likely to breastfeed.[58] There is also a growing recognition that inequity in access to breastfeeding support, including maternity care practices[59] and credentialing of lactation care providers,[60,61] based on factors such as race, ethnicity, class, sexual or gender identity, and income level is an important contributor to disparities in rates of breastfeeding and should be addressed.[62,63]

Breastfeeding Interventions

Health care interventions to encourage and support breastfeeding can include individual-level interventions delivered directly to women and their support persons and also system-level policies or maternity care practices aimed at creating an environment supportive of breastfeeding (**Table 5**). Interventions can occur over the course of pregnancy (prenatal), the time around and shortly after delivery (peripartum), and/or after birth (postpartum).

Individual-level interventions can include professional or peer support or structured education. Breastfeeding support can include psychological and social support (encouraging the mother, providing reassurance, discussing the mother's questions and problems) and direct support

during breastfeeding observations (helping with the positioning of the infant, observing latching) and is typically offered in addition to general education. This type of support usually begins shortly after birth in the hospital setting or other birthing facility and may continue after the hospital stay. Breastfeeding education, on the other hand, typically includes a formalized program aimed at conveying nontailored breastfeeding knowledge and most often occurs in the prenatal period. Education is usually offered in group sessions and may involve telephone support, electronic interventions, and print materials. Individual-level interventions may be conducted by medical, nursing, or allied professionals (such as lactation care providers) or lay people (such as peer supporters).[64-66]

System-level interventions include policies or maternity care practices such as implementation of the BFHI or all or some of the 10 Steps to Successful Breastfeeding (**Table 1**). These interventions may include a written breastfeeding policy for the facility, provider or staff training in breastfeeding support, policies for implementing breastfeeding support groups, encouragement of rooming-in, restricted or delayed pacifier use, maintenance of skin-to-skin contact between the mother and baby after birth, and encouragement of early breastfeeding initiation (**Table 5**).

Nonhealth care breastfeeding support interventions may include community breastfeeding promotion or support; worksite policies and programs; child care policies and practices; and legislation, including family leave policies.[67]

Current Clinical Practice in the United States

Clinicians providing care to pregnant and postpartum women play a potentially critical role in influencing decisions regarding breastfeeding initiation and continuation. Despite current recommendations encouraging primary care providers to promote and support breastfeeding, a recent study with a nationally representative sample of mothers of infants ages 2 to 6 months (n=1,031) found that many women either did not receive any advice on breastfeeding or were receiving advice that was inconsistent with recommendations from the AAP.[68] When the doctor or nurse was the source of advice, 21.8 and 13.3 percent of mothers, respectively, did not receive any guidance on breastfeeding, while 15.4 and 14.9 percent, respectively, were given advice that was inconsistent with recommendations. Black and Hispanic mothers were more likely than white mothers to report receiving breastfeeding advice consistent with recommendations from doctors or nurses.

This low rate of provider counseling could be due to a variety of barriers encountered by the health care team. A prospective cohort study comprised of mother-newborn pairs and a cross-sectional study of their health care providers in Boston reported on barriers identified by providers in their ability to support breastfeeding.[69,70] The most common barriers identified as very important by physicians were a limited amount of time during preventive visits to address breastfeeding problems (56%) and a lack of time to give routine advice on feeding (45%). A recent cross-sectional survey of practicing primary care physicians in Nebraska (n=262) found that physicians felt that they lacked adequate education regarding assisting patients in solving breastfeeding-related problems, which hindered their ability to provide counseling.[71] In this sample of physicians, only 9 percent felt their education regarding breastfeeding support was

adequate. These identified barriers provide insights into provider behavior and suggest opportunities for improvement at the level of the individual as well as the health system.

Health Policy Context

Under the 2010 Patient Protection and Affordable Care Act, women's preventive health care—including breastfeeding support, supplies, and counseling—are covered by Health Insurance Marketplace plans and private nongrandfathered health plans (plans created or sold after March 2010 or older plans that have been updated).[72,73] Specifically, health insurance plans must cover the costs associated with providing breast milk to infants, including costs for renting breastfeeding equipment (a breast pump) and comprehensive lactation support and counseling by a trained provider during the pregnancy and/or postpartum period.[72,73] The Affordable Care Act also amended section 7 of the Fair Labor Standards Act to require employers to provide reasonable break time and a private space (not a bathroom) for breastfeeding employees to express breast milk for her nursing child for 1 year after the child's birth.[74] Currently, the reasonable break time provision only applies to nonexempt employees under the Fair Labor Standards Act, but advocacy groups are working to expand this provision to exempt employees as well.[72,74]

Previous USPSTF Recommendations

In 2006, the AHRQ Effective Health Care Program commissioned a review to evaluate the impact of breastfeeding on infant and maternal health outcomes.[12] Shortly after the publication of this evidence report, AHRQ requested a related systematic review on the effectiveness of interventions to promote breastfeeding so that the USPSTF could update its 2003 recommendation. Thus, in 2008, an updated review was conducted by Chung and colleagues[64,65] that addressed the effects of primary care–initiated interventions to support or promote breastfeeding on child and maternal health outcomes and breastfeeding rates.

Based on the 2008 review, the USPSTF concluded that there was adequate evidence that primary care interventions to promote and support breastfeeding during pregnancy and after birth increased the rates of initiation, duration, and exclusivity of breastfeeding. No harms associated with the interventions were reported in the included studies. Thus, in 2008 the USPSTF recommended interventions during pregnancy and after birth to promote and support breastfeeding (B recommendation).[1]

Chapter 2. Methods

Review Scope

The current review is an update of the 2008 review[64,65] that supported the previous USPSTF recommendation. Our update focuses on the effectiveness of breastfeeding support interventions on breastfeeding initiation, duration, and exclusivity; child health outcomes; and maternal health outcomes. Our update included all studies from the previous USPSTF review that met our current inclusion criteria as well as newly identified studies. The USPSTF will use this review to update its 2008 recommendation. We did not systematically update the evidence on the association between breastfeeding and child and maternal health outcomes as this was reviewed in 2007 by the AHRQ Effective Health Care Program.[12]

Key Questions and Analytic Framework

With input from the USPSTF, we developed an Analytic Framework (**Figure 2**) and three key questions (KQs) to guide the literature search, data abstraction, and data synthesis.

KQs

1. What are the effects of prenatal, peripartum, and postpartum individual- and health care system-level interventions to promote and support breastfeeding on short- and long-term child and maternal health outcomes?
    a. Does the effectiveness of breastfeeding interventions differ by the population subgroups based on age, race/ethnicity, and socioeconomic status?
    b. Are there intervention characteristics that influence the effectiveness of breastfeeding interventions?
2. What are the effects of prenatal, peripartum, and postpartum individual- and health care system-level interventions to promote and support breastfeeding on initiation, duration, and exclusivity of breastfeeding?
    a. Does the effectiveness of breastfeeding interventions differ by the population subgroups based on age, race/ethnicity, and socioeconomic status?
    b. Are there intervention characteristics that influence the effectiveness of breastfeeding interventions?
3. Are there adverse events associated with interventions to promote and support breastfeeding?

Data Sources and Searches

In addition to re-evaluating the 41 studies (in 42 articles) included in the 2008 review, we also searched the following databases for relevant English-language literature published between January 1, 2008, and September 25, 2015: MEDLINE, PubMED (for publisher-supplied records only), PsycINFO, Cumulative Index for Nursing and Allied Health Literature, and the Cochrane

Central Register of Controlled Trials. We worked with a medical librarian to develop our search strategy (**Appendix A**). We also examined the reference lists of all of our included studies and previously published reviews to identify other studies for inclusion. We supplemented our searches with suggestions from experts and articles identified through news and table-of-contents alerts. We also searched ClinicalTrials.gov (https://ClinicalTrials.gov/) and the WHO International Clinical Trials Registry Platform (www.who.int/ictrp) for ongoing trials. We imported the literature from these sources directly into EndNote® X7 (Thomson Reuters, New York, NY).

Study Selection

We developed criteria for including or excluding studies based on the original review[64,65] and our understanding of the literature (**Appendix A Table 1**). We included randomized, controlled trials (RCTs) and cluster RCTs for individual-level interventions and before-after studies with concurrent controls and prospective cohort studies for health system or policy interventions. The population of interest included mothers of full- or near-term infants as well as members of the mother-infant support system (e.g., partners, grandparents, or friends). Included studies targeted the effects of prenatal, peripartum, or postpartum breastfeeding interventions that were initiated in, feasible for, or referable from primary care settings. Infant health outcomes included, but were not limited to, gastrointestinal illness, otitis media, respiratory illness, asthma, atopic dermatitis, and infant health care utilization. Maternal health outcomes were those such as postpartum weight loss and the incidence of breast cancer. Breastfeeding outcomes included self-reported or observed initiation of breastfeeding, the prevalence and duration of any breastfeeding, and the prevalence and duration of exclusive breastfeeding. Definitions of these outcomes are provided below. For adverse events, we specifically looked for harms that could be related to a breastfeeding intervention (e.g., feeling criticized by the interventionist, guilt related to not starting breastfeeding or stopping breastfeeding, increased anxiety about breastfeeding) rather than harms related to breastfeeding itself (e.g., cases of mastitis, nipple pain). We required that studies take place in developed countries as defined as "very high" on the 2014 Human Development Index of the United Nations (http://hdr.undp.org/en/statistics) to ensure that the evidence was applicable to a U.S. setting.[75] We limited included studies to those that were deemed good or fair quality by the USPSTF quality rating standards (described below).[76] Studies of poor quality were excluded.

Two independent reviewers independently screened all records in the updated searches on the basis of their titles and abstracts, using the inclusion and exclusion criteria as a guide. Subsequently, at least two reviewers assessed the full text of potentially relevant studies, including all of the previously included studies, using a standard form that outlined the eligibility criteria. Disagreements were resolved through discussion and consensus. We kept detailed records of all included and excluded studies, including the reason for their exclusion.

Quality Assessment and Data Abstraction

Two reviewers independently assessed the methodological quality of all eligible studies,

including the original studies, by using USPSTF criteria.[76] We assigned each study a quality rating of "good," "fair," or "poor" according to study design–specific criteria (**Appendix A Table 2**). Good-quality RCTs had adequate randomization procedures and allocation concealment, similar groups at baseline, well-defined interventions, reliable outcome measures, blinded outcome assessment, and low attrition (≥90% of participants had followup data, with a <10 percentage-point difference in loss to followup between groups), and they used conservative data substitution methods for missing data. Trials were given a quality rating of fair if they were unable to meet the majority of the good-quality criteria but were not of poor quality. Trials were rated as poor quality if attrition was greater than 40 percent or differed between groups by 20 percentage points, or if there was any other flaw that seriously affected internal validity, as agreed upon by two independent reviewers.

Good-quality observational studies included a representative exposed cohort and comparable groups on the basis of the design or analysis, adequate ascertainment of the exposure, and no other important threats to internal validity. Observational studies were downgraded to fair if they were unable to meet the majority of these criteria. Poor-quality studies had multiple threats to validity. Discordant quality ratings were reviewed and discussed by two independent reviewers and a third reviewer adjudicated as necessary. Studies rated as poor quality and those that presented incomplete data were excluded from the review.

We abstracted descriptive and outcomes data from each included study (both the original and update studies) into detailed abstraction forms using Microsoft Access® 2010 (Microsoft, Redmond, WA). One reviewer completed primary data abstraction and a secondary reviewer checked all data for accuracy and completeness. Data collection included general characteristics of the study (e.g., author, year, and study design), characteristics of the sample (e.g., age and clinical characteristics of a population, setting, or country), description of the intervention (type, provider, frequency, and duration), definitions of outcomes (initiation and exclusivity), analytic methods, and results. We contacted authors when data reporting was incomplete or particular data points required clarification.

Breastfeeding Definitions Used in the Report

We noted the specific definition of breastfeeding initiation, any breastfeeding, and exclusive breastfeeding as described by each individual study. We considered breastfeeding initiation to include any breastfeeding reported around the time of delivery up to 1 week postpartum. There are three main definitions of exclusive breastfeeding used in the literature: "exclusive breastfeeding" according to Labbok and Krasovec (breast milk only, without any other food, fluids, water, juice, or other liquids, including vitamins or medicines);[2] "exclusive breastfeeding" according to the WHO (breast milk only, without any food, water, juice, or other liquids but including vitamins, minerals, and medicines);[77] and "full breastfeeding," as defined by Labbok and Krasovec, which includes both predominant breastfeeding (infant may consume water, water-based drinks, fruit juice, or ritualistic fluids but no infant formula) and exclusive breastfeeding (**Figure 3**).[2] Within each study, we preferred measures of exclusive breastfeeding over predominant or full breastfeeding when more than one measure was reported. In many cases, the studies did not describe what they considered as exclusive breastfeeding and we

assumed they generally meant that the infant did not receive any supplementary feeding with infant formula or with complementary solid foods if before 6 months of life. We considered the prevalence of any breastfeeding to include the infant receiving any breast milk, with or without supplemental feeding with infant formula or complementary feeding with solid foods. Where provided, we noted whether the measure of breastfeeding was based on the previous 24 hours or since birth.

Data Synthesis and Analysis

We synthesized data separately for each KQ. The data on health outcomes (KQ1) and adverse events (KQ3) did not allow for quantitative analyses, so we summarized those data qualitatively. For breastfeeding outcomes (KQ2), we synthesized the results of studies with adolescents or young adults (i.e., women age ≤21 years) and those with adults separately. We organized the results for adults by the level of intervention (individual vs. system) and, due to the clinical heterogeneity between them, did not pool the results across these intervention types. Because of the small number of studies available for system-level interventions, we report those results narratively and without pooling the data.

For individual-level interventions with breastfeeding outcomes, we entered the raw number of events (prevalence of breastfeeding initiation, any breastfeeding, or exclusive breastfeeding) in each treatment group and the total number of participants randomized for each group into random effects meta-analyses using the DerSimonian and Laird method[78] to calculate a pooled risk ratio (RR). We grouped the breastfeeding results into five distinct cross-sectional time points to correspond with U.S. Healthy People 2020 objectives:[10] breastfeeding initiation (at birth up through 1 week postpartum) and breastfeeding at less than 3 months (2 through 11 weeks), 3 to less than 6 months (12 through 23 weeks), 6 months (24 through 26 weeks), and 12 months (52 weeks).[10] Each study could be included within more than one meta-analysis if it reported corresponding data. Within each study, however, we chose data from the longest time point within a given time category if more than one time point was reported (e.g., if a study reported both 12- and 20-week outcomes, we pooled the 20-week results); with this approach, an individual trial never contributed to more than one data point for a given pooled estimate. In addition, if a trial had more than one active intervention arm, we plotted the most intensive arm (based on the number and duration of the sessions) or the arm that was the most similar with other interventions included in the analysis. We compared our estimated RR for each study with the study-reported crude or adjusted between-group relative risks. We adjusted for the cluster randomization of six trials[79-84] by applying a design effect to the number of events, which was based on an estimated average cluster size (the total number of participants analyzed at baseline divided by the total number of clusters) and an estimated intraclass correlation. When not reported, we estimated the intraclass correlation to be 0.035, based on published literature.[85] We were unable to pool data on continuous measures of absolute breastfeeding duration given the variability in the reported measures (means or medians), followup durations, and direction of the time-to-event data (risk of cessation of breastfeeding vs. risk of still breastfeeding); therefore, we synthesized these data in a table and narratively.

We examined statistical heterogeneity among the pooled studies using standard chi-squared tests

and estimated the proportion of total variability in point estimates using the I^2 statistic.[86] We applied the Cochrane Collaboration's rules of thumb for interpreting heterogeneity: less than 40 percent likely represents unimportant heterogeneity, 30 to 65 percent moderate heterogeneity, 50 to 90 percent substantial heterogeneity, and greater than 75 percent considerable heterogeneity.[87] We ran sensitivity analyses for all of our meta-analyses that resulted in substantial heterogeneity (I^2>50%) using a restricted maximum likelihood model with the Knapp-Hartung modification (using the metareg command in Stata), which is more conservative when there is substantial heterogeneity or a small number of studies.[88] All statistically significant results remained within the restricted maximum likelihood model, so we show results using the DerSimonian and Laird method.[78] In addition, we generated funnel plots to evaluate small-study effects (a possible indication of publication bias) and ran the Peters' test to assess statistical significance of imbalance in study size and findings that suggest a pattern.[89]

We calculated the number needed to treat (NNT) for selected results by first estimating the absolute risk reduction based on the pooled RR and three levels of "baseline" rates of breastfeeding (i.e., absolute risk reduction = [RR−1]*baseline risk). Because there was a wide range of control group rates for some of the time points, we chose baseline levels empirically using the included studies and roughly corresponding to the 25th, 50th, and 75th percentiles of control group rates at each time point for any and exclusive breastfeeding. NNT was calculated as the inverse of the absolute RR.[87]

We investigated whether the heterogeneity among the results was associated with any prespecified population or intervention characteristics of the studies first qualitatively, using visual displays and tables grouped or sorted by these potentially important characteristics. Specifically, we examined country (United States vs. others), breastfeeding status at baseline, intention to breastfeed, previous breastfeeding experience, intervention type (education, professional support, peer support), intervention timing (prenatal, peripartum, postpartum, or a combination), intervention duration, number of intervention sessions, whether the intervention included any in-person contact with the provider or telephone support, and the breastfeeding rate in the control group at baseline as they related to the effect estimates. Based on this initial assessment, we used meta-regression and subgroup analyses to examine whether the effects were different in specific subgroups, namely current breastfeeding at study inclusion, intervention type (professional support, peer support, and education), intervention timing (multiple time periods [e.g., prenatal and postpartum] vs. one time period [e.g., prenatal only]), and face-to-face contact. Due to the general lack of statistically significant meta-regression results, we present overall results for all individual-level interventions at each time point. We grouped the studies within forest plots based on the timing of the intervention (multiple time points vs. one time point) and sorted studies within these groups by intervention timing and number of sessions. We used Stata version 13.1 (StataCorp, College Station, TX) for all quantitative analyses. All significance testing was two-sided and results were considered statistically significant if the p-value was 0.05 or less.

Expert Review and Public Comment

A draft of the Analytic Framework, KQs, and inclusion and exclusion criteria was posted on the

USPSTF Web site for public comment from October 9, 2014, through November 5, 2014. The majority of comments, while informative, pertained to details and considerations for background information and data abstraction and analysis. There were no changes made to the research plan that changed the scope of the review or our approach to synthesizing the evidence. A final research plan was posted on the USPSTF Web site on December 18, 2014. The full draft report was reviewed by invited experts from September 18, 2015 through October 12, 2015. We compiled and addressed (where appropriate) the comments received from invited experts. Additionally, a draft of the full report was posted on the USPSTF Web site from April 26, 2016 through May 23, 2016. A few comments were received during this public comment period; no changes were made to the report based on these comments.

USPSTF Involvement

We worked with four USPSTF members at key points throughout this review, particularly when determining the scope and methods for this review and developing the Analytic Framework and KQs. The USPSTF members approved the final Analytic Framework, KQs, and inclusion and exclusion criteria after revisions reflecting the public comment period. AHRQ funded this review under a contract to support the work of the USPSTF. An AHRQ Medical Officer provided project oversight, reviewed the draft report, and assisted in the external review of the report.

Chapter 3. Results

Description of Included Studies

Our literature search yielded 2,769 unique citations. From these, we provisionally accepted 211 articles for review based on titles and abstracts (**Appendix A Figure 1**). After reviewing the full-text articles, we determined that 52 studies (reported in 57 articles) met the inclusion criteria.[79-84, 90-140] Only 21 studies (in 22 articles[79,81,91,93,94,96,99,101,103,104,106,109,112,117,119,120,122,126,128, 132,135,136]) were carried forward from the previous review and were synthesized with the new evidence. Thirty-one studies were identified as part of the update. Two independent studies were reported within one publication: the Best Infant Nutrition for Good Outcomes (BINGO) study is referred to as Bonuck, 2014a and the Provider Approaches to Improved Rates of Infant Nutrition & Growth Study (PAIRINGS) study is referred to as Bonuck, 2014b.[92] Fifty of the 52 included studies were individual- or cluster-based RCTs (n=39,416). The remaining two studies were controlled before-after studies that examined rates of breastfeeding before and after receipt of BFHI accreditation among hospitals receiving accreditation versus matched control hospitals.[107,108]

For the 211 full-text articles that were reviewed, the most common reasons for exclusion were study design (i.e., not an RCT or a controlled before-after design for system-level interventions; k=51), poor quality (k=33), and not reporting any relevant outcomes (k=22). **Appendix B** contains a list of all excluded studies and their main reason for exclusion, including those excluded for poor quality.

We found clinical and methodological heterogeneity across the included studies in terms of the country setting, study population, intervention and control conditions, specific outcome measures, and timing of those measures. Nineteen of the 52 included studies took place in the United States; the remaining studies occurred in Canada (k=6), Australia (k=6), the United Kingdom (k=7), other European countries (k=9), Hong Kong or Singapore (k=4), and Argentina (k=1) (**Table 6**). Sample sizes for the RCTs ranged from 36 to 17,482 mothers and the median sample size was 376. In the controlled before-after studies, the sample size ranged from 2,014 to more than 25,000 mothers within five U.S. states for a study comparing rates of breastfeeding before and after BFHI accreditation. Five studies had a primary aim other than promoting breastfeeding (e.g., the effect of early skin-to-skin contact on infant temperature or the effect of postpartum education on postpartum depression),[105,114,129,130,132] but because their interventions also targeted breastfeeding and breastfeeding outcomes were reported, we included them in our review.

Included Populations

The inclusion criteria for women allowed in the studies was highly variable across individual studies, and the demographic characteristics of the included samples were often sparsely reported (**Table 6**). Four studies were limited to adolescents (age <18 years)[132,137] or young adults (age <21 years).[100,102] Among the 38 studies that reported the age of included women, the average age

ranged from 16 to 34 years and the median of the average age was 29 years. Fifteen trials were limited to primiparous mothers,[82,90,95,99,103,109,118,124,128,131,134,136,137,139,140] one trial was limited to multiparous women scheduled for a repeat Cesarean delivery,[129] and the remaining trials that reported parity represented both primiparous and multiparous mothers (23.5% to 88.7% primiparous). Where reported, the percentage of women who had reported any previous breastfeeding within the full sample (not only among multiparous women) ranged from 9 to 64.4 percent.

Fourteen of the 52 trials restricted inclusion to women who were currently breastfeeding at the time of recruitment or at the beginning of the intervention.[80,90,97,99,100,104,109,111,115,119,120,130,131] Two of these 14 trials limited inclusion to women who had been breastfeeding for at least 2 weeks[115] or 8 weeks[80] at the time of recruitment. Thirty-one of the 52 trials included only women who intended to breastfeed[79,82,90,91,95-98,101,109,112,115,117,123,124,128,130,131,135,136,140] or resulted in samples where 75 percent or more of the women intended to breastfeed at baseline.[83,84,92,93,99,103,104,106,122] The remaining 21 studies did not report breastfeeding intentions among the expectant mothers or reported that less than 75 percent intended to breastfeed. Almost all of the studies explicitly stated the exclusion of women or infants with conditions that would preclude or complicate breastfeeding, such as an infant congenital abnormality.

Two trials were limited to overweight or obese women[97,98] and one trial to women who had a family history of asthma.[84] One study was limited to women who had a male partner who could participate in the study because the focus of the intervention was effective coparenting.[90] Two studies that evaluated the effect of skin-to-skin contact interventions on maternal and infant outcomes were limited to women scheduled for a Cesarean delivery.[105,129] One study specifically excluded women who delivered by Cesarean section.[104] Of the remaining studies that reported the percentage of women who delivered by Cesarean section, the rate ranged from 2.8 to 46.0 percent within treatment arms.

Among the studies that took place in the United States (k=19), most of them included predominantly Hispanic or black low-income women (e.g., the majority of participants received Medicaid or were enrolled in WIC). Within the Canadian trials (k=6), most women were well educated (i.e., ≥70% with at least a college education) but the race/ethnicity of participating women was rarely reported. Very little demographic detail was provided on women participating in the studies that took place in Europe or Australia: two studies in the United Kingdom described the samples as drawn from "deprived urban areas," with one predominantly including women of Asian or Middle Eastern origin,[79,83] and one Australian trial used a sample of high-risk, predominantly low socioeconomic status adolescents, of whom nearly a quarter were indigenous.

Included Interventions and Usual Care Control Groups

The included interventions were also highly variable, including the timing of the intervention (i.e., prenatal, peripartum, and/or postpartum); combination of intervention components; frequency, length, and duration of intervention sessions; providers; content; and implementation (**Table 7; Appendix C Table 1**). Given the variability in the interventions, we categorized each intervention arm into five groups based on the level of the intervention (i.e., individual- or

system-level), type of intervention, and type of provider (i.e., professional or peer). The 52 studies included 58 different intervention arms, as shown in **Table 8**. We describe the detailed results for breastfeeding outcomes according to the level of the intervention (individual vs. system) and by the specific type of intervention where appropriate.

Appendix C Figure 1 shows an illustration of the dose of each intervention in terms of the timing, duration, and number of sessions within these five groups. For interventions that had components extending into the postpartum period, only women who continued breastfeeding continued to receive the intervention. This is in contrast to other health behavior interventions (e.g., physical activity interventions), in which participants receive the intervention regardless of their subsequent change in behavior.

Individual-Level Breastfeeding Support and Education

Professional Support

Twenty-nine intervention arms within 26 trials provided individual-level breastfeeding support by a clinician such as a physician, midwife, or lactation care provider (**Appendix C Figure 1**).[80-82,84,92,93,95,97,101,102,104,109,111,114,120,122-124,130-132,135,136,139,140] All but three of the interventions had components that took place during the peripartum and/or postpartum periods. Only 11 of the 29 arms included prenatal contact. The intensity of the interventions ranged from one 30-minute in-hospital support session[109] to an intervention where women received 20 weeks of support from both a physician or midwife and an IBCLC during seven in-person prenatal sessions, up to 12 postpartum phone calls, an optional postpartum home visit, and a nursing bra and breast pump.[92] Most interventions were delivered by a physician, midwife, nurse, or lactation care provider. Three studies explicitly stated that the lactation care providers were IBCLCs[92,97,137] and five studies did not report any licensing of the lactation care providers who had provided the intervention.[81,90,93,122,135]

Peer Support

Nine treatment arms were individual-level breastfeeding support interventions provided by peer counselors.[83,91,98-100,106,126,133,137] Six of these interventions took place in the prenatal and postpartum periods, three of which also involved in-hospital sessions with peer counselors (**Appendix C Figure 1**);[83,91,98,126,133,137] the other three studies were limited to one prenatal clinic visit,[106] at least one postpartum home visit,[99] and seven postpartum telephone calls.[100] Two of the interventions were strictly limited to telephone support[100,133] whereas the remaining seven included face-to-face contact with peer counselors. Five of the studies included planned or optional home visits by peer counselors, including one relatively intense study in the United States that included three prenatal home visits, daily in-hospital visits, and nine postpartum home visits.[91] In all cases, peer counselors were recruited specifically for the study: they were chosen to represent the sample population (e.g., adolescents,[100] WIC recipients[133]) and had previous breastfeeding experience. All but one study[99] explicitly mentioned specialized training for peer counselors on breastfeeding and/or counseling techniques. Most of the training appeared to be relatively intense. For example, one study reported 8 weeks of peer counselor training using the WHO/UNICEF Breastfeeding Counseling Training Course. One study of adolescents used both a

peer counselor (a trained teen mother) and a certified lactation care provider.[137]

Formal or Structured Education

We categorized as formal breastfeeding education 11 intervention arms within 10 trials.[79,90,103,116,118,119,122,128,134,135] All but one[116] of the interventions took place outside the United States. Six of the arms included group education and the others provided one-on-one education, with or without a support person. Eight of the 11 interventions took place during the prenatal period only, whereas the others took place only during the peripartum stay or spanned prenatal and postpartum periods (**Appendix C Figure 1**). All but two interventions were a single educational session ranging from 15 minutes to 3 hours. The remaining two interventions consisted of two 60-minute prenatal group sessions[103] and three 3-hour prenatal group sessions, of which only one focused on breastfeeding.[118] Education sessions were provided by midwives, lactation care providers, or community educators. The content of most of the educational interventions centered on the benefits of breastfeeding, practical breastfeeding skills (e.g., attachment), and the management of common breastfeeding complications, and most of the interventions encouraged a support person to attend with the expectant mother. One intervention was a "coparenting" intervention in which elements were designed to help couples work cooperatively toward meeting their mutually-desired child health outcomes, including breastfeeding.[90] Two interventions did not include face-to-face contact with an interventionist and instead consisted of educational videos that introduced the benefits of breastfeeding, demonstrated correct positioning, and explained breast care.[116,122]

System-Level Policies and Practices

Policies, Programs, and Staff Training

Three good-quality studies evaluated system-level policies on rates of breastfeeding.[107,108,110] Two studies by the same research group compared the rates of breastfeeding before and after BFHI accreditation between mothers who gave birth in hospitals that became accredited during the study period and mothers who gave birth in matched non-BFHI facilities in the United States.[107,108] The studies gathered information on the month and year of BFHI accreditation directly from Baby-Friendly USA, the accrediting body for the BFHI in the United States. The third study, in Scotland, implemented a local policy to standardize and increase the availability of breastfeeding support groups provided to pregnant women and mothers.[110]

Other Maternity Care Practices

The six remaining studies focused on system-level maternity care practices that included three trials focused on maintaining mother and baby contact (including skin-to-skin contact following delivery[96,105,129]) and three trials focused on delaying or restricting pacifier use.[112,115,117] In the studies that evaluated skin-to-skin contact, babies were place naked against the mother's skin as soon as possible after birth or upon returning to their room following Cesarean delivery and continued until the baby showed signs of readiness to feed or the mother chose to end the contact. In the control groups for these studies, mother-infant contact was interrupted for bathing, weighing, and other newborn procedures, and the infant was wrapped in a towel and handed to a

parent. Similar individual-level breastfeeding support was offered to both treatment groups. In the restricted pacifier studies, families were encouraged to avoid pacifier use until the infant's fifth week of life[112] or until breastfeeding was well established[115,117] and were instructed about alternative methods for soothing infants. In two of these studies, women in the control groups were given pacifiers and were instructed to use the pacifier as soon as possible or according to their preference.[112,115] In the other study, women were not given pacifiers but no mention was made to avoid pacifier use.

Usual Care Control Groups

All of the studies included usual care control groups, although what constituted usual care was not fully described or was highly variable given the various settings, countries, and time frames in which the interventions took place (**Appendix C Table 1**). Five of the studies[91,98,103,115,134] explicitly mentioned that the studies took place in BFHI-accredited facilities, two described their facilities as adopting most of the 10 steps but not yet accredited,[118,123] and one described its facility as holding an "active certificate of intent to become baby-friendly."[112] Other studies simply stated that, given the study population's diversity, it was too difficult to describe a usual care "standard" regarding breastfeeding education and support.

A number of studies mentioned routine or mandatory prenatal education but none described the extent to which breastfeeding was covered as part of that education. Others explicitly stated that there was no routine prenatal education within the study facilities. For studies that described usual postpartum care, most included routine peripartum and/or postpartum contact with lactation care providers. This support, which was provided face to face or by telephone, was part of the routine services of the health system or was provided as an option for the mother (who had to initiate contact through a "warm-line" to the lactation care provider). Many of the non-U.S. studies included routine postpartum home visits as part of usual care.[81,83,103,118,123,126,132,139] A few studies mentioned discharge materials routinely given to families, including videos or print materials on infant care and breastfeeding, manual breast pumps, lanolin cream, and a water bottle. Only one study[95] explicitly stated that the hospital discharge bag included infant formula.

In all cases, mothers in both the intervention and control groups received usual care. The intervention components were either in addition to those usual care services or replaced specific pieces. For example, in the U.S. study by Chapman and colleagues,[98] the peer counseling intervention replaced the optional peer counseling program that was available to control subjects.

Quality of Included Studies

We rated 20 out of the 52 included studies as good quality and the remaining 32 as fair quality (**Table 6**). In general, the limitations for trials rated as fair quality included a lack of reporting details about randomization methods, including allocation concealment; small differences in baseline characteristics between intervention arms on variables that may relate to breastfeeding outcomes and were not accounted for in the analyses (such as intentions to breastfeed, parity, previous breastfeeding experience, percent delivering by Cesarean section, marital status, income level); a lack of blinding of outcome assessors; attrition greater than 10 percent but less than 35 percent; differential attrition between study arms; a lack of reporting on how missing data were

handled or having completers-only analyses accompanied with high attrition; and problematic intervention fidelity and/or adherence to the intervention. In addition, while all studies relied on self-reported measures of breastfeeding and breastfeeding duration with or without verification from clinical records, the studies we rated as fair quality rarely noted the specific instruments, questions, or definitions used to measure breastfeeding, including whether the measure was based on a 24-hour recall or since birth. Studies that measured breastfeeding duration or time to weaning were especially prone to recall bias, and very few fair-quality studies described how observations were censored in the analyses.

KQ 1. What Are the Effects of Prenatal, Peripartum, and Postpartum Individual- and Health Care System-Level Interventions to Promote and Support Breastfeeding on Short- and Long-Term Child and Maternal Health Outcomes?

Overall Results

Six of the 52 included studies reported the effects of an individual-level breastfeeding intervention on infant health outcomes (the majority focusing on health care utilization as a proxy).[91,93,95,98,104,111] In general, there was mixed evidence on the effectiveness of the interventions on gastrointestinal outcomes (two trials) and no evidence of a benefit on otitis media (one trial) or the number of health care visits for respiratory tract illnesses (one trial). Three out of four trials that reported rates of infant health care utilization found higher use among those in the usual care control groups than those who received intervention. None of these three trials, however, reported an effect of the intervention on the rates of breastfeeding. We did not identify any studies that reported the effects of a breastfeeding intervention on maternal health outcomes, such as postpartum weight loss and incidence of breast cancer.

Detailed Results

Of the six trials that reported infant health outcomes, five were rated as fair quality and one[111] as good quality. One trial was conducted in Canada[104] and the remaining in the United States; all of the U.S. studies were among predominantly low-income Hispanic women. Four of the six trials assessed individual-level breastfeeding support interventions provided by clinicians.[93,95,104,111] The other two trials assessed interventions provided by peer counselors (**Table 7**).[91,98]

Two studies of fair quality reported on infant gastrointestinal outcomes, with conflicting results.[91,93] Anderson and colleagues reported that the risk of infants experiencing one or more diarrheal episodes during the 3-month followup period was more than 2-fold higher in the usual care group than in a peer counseling intervention group (RR, 2.15 [95% confidence interval (CI), 1.16 to 3.97]; n=182); this study also found lower rates of exclusive breastfeeding at both 2 and 3 months in the control group compared with the intervention group.[91] Bonuck and colleagues (n=338), however, reported no significant differences in gastrointestinal illnesses in infants of women who attended a prenatal and postpartum support intervention (22.7%) and in infants in the usual care group (25.7%) at 52 weeks despite the intervention group breastfeeding for a

statistically significant longer duration than the women in the control group.[93,94]

Bonuck and colleagues (2006) also reported infant outcomes for otitis media and respiratory tract illnesses for up to 52 weeks.[93,94] In a priori analyses, infants in the usual care group who did not receive Medicaid had significantly more cases of otitis media ($p \leq 0.03$) than infants in the intervention group; there was no effect among infants who did receive Medicaid. Within this study, however, there was no statistically significant difference in the percent of otitis media cases (43.6% vs. 54.9%) or the number of health care visits for respiratory tract illnesses (76.7% vs. 83.4%) for intervention versus control participants.

Four studies reported outcomes on infant health care utilization, including pediatric visits, emergency room visits, and hospitalizations.[95,98,104,111] Despite finding a statistically significantly higher rate of exclusive breastfeeding at 4 weeks between groups, the good-quality study by Hopkinson and colleagues found no significant difference in the number of infant visits to the pediatrician or emergency room at 4 weeks postpartum between women randomized to a lactation care provider-led postpartum breastfeeding support intervention (76.3% visited pediatrician, 8.9% visited emergency room; n=255) and those receiving usual care (82.1% visited pediatrician, 9.2% visited emergency room; n=267).[111] Bunik reported that infants born to mothers assigned to a nurse-delivered brief telephone postpartum support intervention were less likely to have a sick visit by 4 weeks postpartum than were infants born to mothers in the usual care group (25% vs. 36%, respectively; p=0.05); however, there were no significant differences between treatment groups with respect to well-baby and sick care visits at 3 and 6 months postpartum or between any or exclusive breastfeeding at 1, 3, and 6 months.[95] Gagnon observed that infant hospital admission for multiple conditions (including fever/viral episodes, jaundice, ear infection, and lethargy) during the first 8 weeks postpartum was more than 2-fold higher in the usual care group (7/254 [2.8%]) than in the intervention group receiving a postpartum in-home nursing visit and optional phone support (3/259 [1.2%]); however, there was no significant difference in the rate of any breastfeeding between groups at 2 weeks.[104] Likewise, Chapman and colleagues reported that infants of mothers who received a breastfeeding peer counseling intervention were significantly less likely to be hospitalized during the first 3 and 6 months after birth after adjustment for maternal age, delivery mode, infant birth, previous breastfeeding experience, maternal pregnancy body mass index, and infant sex (6-month adjusted odds ratio [aOR], 0.24 [95% CI, 0.01 to 0.86]). There were no statistically significant differences, however, in the prevalence of otitis media, diarrhea, or emergency department visits between groups at 3 or 6 months. This study also did not find an effect on rates of any or exclusive breastfeeding beyond 2 weeks.[98]

KQ 2. What Are the Effects of Prenatal, Peripartum, and Postpartum Individual- and Health Care System-Level Interventions to Promote and Support Breastfeeding on Initiation, Duration, and Exclusivity of Breastfeeding?

Overall Results

All 52 included studies (N=66,757) reported a breastfeeding outcome. Individual-level support and education interventions provided by professionals or peers (43 trials; n=21,973) were associated with a statistically significant higher likelihood of any and exclusive breastfeeding for less than 3 months and at 3 to less than 6 months and for exclusive (but not any) breastfeeding at 6 months in pooled analyses (**Table 9**). There was no evidence of a relationship between individual-level support and education interventions and breastfeeding initiation. In addition, none of the three trials that reported breastfeeding rates at 1 year found a statistically significant difference between treatment groups. Results appeared consistent across various adult subgroups and specific intervention characteristics. The four trials that were limited to adolescents or young adults found higher rates of any or exclusive breastfeeding or a longer duration of breastfeeding among mothers receiving professional or peer support compared with those receiving usual care.

There was no consistent effect on the rate of any or exclusive breastfeeding from nine studies of system-level policy or maternity care practices. Among the three studies that evaluated the effect of a system-level policy on rates of breastfeeding, none found a statistically significant benefit of the policy on the rate of any or exclusive breastfeeding up to 4 to 8 weeks among all women. One large observational study (n=25,327) found a statistically significantly higher rate of breastfeeding initiation and exclusive breastfeeding at 1 month among women with a lower education but not among women overall or among those with higher education after implementation of the BFHI. Likewise, there was no clear benefit from establishing and maintaining mother and baby contact following delivery or restricted pacifier use on the rate of breastfeeding initiation or the continuation of any or exclusive breastfeeding based on six trials. These six trials had limited applicability to U.S. health care practices, and breastfeeding was a secondary outcome within many of these trials.

Detailed Results Among Adults

Individual-Level Breastfeeding Education and Support

Breastfeeding Initiation

Fourteen trials reported the effects of a breastfeeding education or support intervention on the rate of breastfeeding initiation.[79,81,83,91,92,98,103,106,116,118,126,139,140] All of the interventions had a prenatal component that was intended to increase the proportion of women starting to breastfeed compared with usual care. The breastfeeding initiation rate among women in the usual care control groups ranged from 53.1 percent in a trial conducted among women in Scotland[126]—among whom only slightly more than half (51.6%) intended to breastfeed—to 98.7 percent

among a sample of women in the United States who intended to breastfeed (**Table 10**).[98] Despite nearly all of the trials generally showing improved rates of breastfeeding initiation among mothers receiving the intervention compared with mothers receiving usual care, none of the individual trials found a statistically significant benefit. When all 14 trials were pooled, the results showed no association between receiving an individual-level breastfeeding prenatal intervention and breastfeeding initiation (RR, 1.00 [95% CI, 0.99 to 1.02]; I^2=22.8%; n=9,428) (**Figure 4**). Although power could be an issue, the relatively high control group initiation rates and the small overall benefit suggested by the pooled results are consistent with ceiling effects for breastfeeding initiation in women similar to those selected for these interventions. In all but four of these trials,[81,116,118,126] more than 80 percent of enrolled women intended to initiate breastfeeding (range, 51.6% to 100%).

Breastfeeding for Less Than 3 Months

Our meta-analysis combining the 26 trials that reported the prevalence of any breastfeeding for less than 3 months (i.e., from 2 weeks through 11 weeks) among adults found a statistically significant pooled relative risk for mothers assigned to a breastfeeding support or education intervention compared with women in the usual care control groups (1.07 [95% CI, 1.03 to 1.11]; I^2=72.0%; n=11,588) (**Figure 5**). The range in the absolute difference in rates of any breastfeeding was 6.4 percent in favor of the control group to 17.5 percent in favor of the intervention group. Examined individually, only five of the 26 trials showed a statistically significant effect on the prevalence of any breastfeeding for less than 3 months, with an increased likelihood of breastfeeding in favor of the intervention groups (**Appendix C Table 2**).[92,93,133,135] Nineteen of these 26 trials plus an additional three studies[91,104,134] also reported the proportion of mothers exclusively breastfeeding for less than 3 months. All but two of these 22 trials suggested a greater benefit of the intervention over usual care on exclusive breastfeeding up to 3 months, but statistical significance was not reached in all trials. The pooled RR demonstrated a slightly stronger relationship between individual-level support interventions versus usual care in the rate of exclusive breastfeeding for less than 3 months (RR, 1.21 [95% CI, 1.11 to 1.33]; I^2=52.4%; k=22; n=8,246) (**Figure 6**) than that seen for any breastfeeding; however, the same set of trials was not represented in both outcomes. Among these trials, the absolute difference in the rate of exclusive breastfeeding between groups ranged from -2.5 percentage points (in favor of the control group)[83] to 22.4 percentage points in favor of the intervention group.[91]

The funnel plot for exclusive breastfeeding for less than 3 months revealed asymmetric patterns and the results of the Peter's test for small study effects was statistically significant (p=0.047), so we cannot exclude potential publication bias. A sensitivity analysis excluding the five studies that had total sample sizes of less than 200[91,98,124,128,134] resulted in a slightly attenuated effect with greater precision while reducing statistical heterogeneity (RR, 1.17 [95% CI, 1.08 to 1.26]; I^2=36.6%; k=17; n=7,508). Thus, the effect size for exclusive breastfeeding at 3 months may be slightly overestimated due to small study effects, including potential publication bias.

Due to a lack of reporting of within-group event rates, we did not include one study in our meta-analysis of exclusive breastfeeding for less than 3 months or 3 to less than 6 months (see paragraph below).[97] However, the results of this trial were generally consistent with the pooled

results, although with higher point estimates. The fair-quality study by Carlsen and colleagues in Denmark randomized 226 obese women who were already breastfeeding at the start of the intervention to a 6-month postpartum telephone support intervention provided by an IBCLC or to usual postpartum care. Obese women were the target of the intervention given the difficulties they often experience in initiating and continuing breastfeeding. The intervention resulted in statistically significantly higher odds of exclusive breastfeeding at 1, 2, 4, and 12 weeks after birth after adjustment for prepregnancy body mass index, gestational weight gain, parity, birth weight, gestational age, and infant sex (**Appendix C Table 2**). For instance, at 4 weeks, the odds of exclusive breastfeeding was 3 times higher among women receiving postpartum telephone support than among women in the control group (aOR, 2.99 [95% CI, 1.61 to 5.50]).

Breastfeeding at 3 to Less Than 6 Months

Slightly fewer studies reported the proportion of adult women performing any (k=23) or exclusive (k=18) breastfeeding at 3 to less than 6 months (12 weeks through 23 weeks) (**Appendix C Table 2**). Overall, individual-level breastfeeding support and education interventions were statistically significantly related to both any and exclusive breastfeeding at 3 to less than 6 months in pooled analyses (**Figure 7** and **Figure 8**, respectively). Among 23 trials with 8,942 women reporting any breastfeeding at 3 to less than 6 months, the pooled RR was 1.11 (95% CI, 1.04 to 1.18), with evidence of moderate heterogeneity (I^2=46.5%). The control group breastfeeding rate was highly variable (17.7% to 88.6%), as was the intervention group rate (23.2% to 96.2%). The range in absolute difference was -5.8 to 18.4 percent. These findings appear to be partly due to the breastfeeding rates at 12 weeks usually being higher than those reported at 16 weeks, with a few exceptions. The study by Elliott-Rudder in Australia that reported 88.6 percent of women in the usual care control group still breastfeeding at 16 weeks (4 months) was unique in that only women who were successfully breastfeeding at 8 weeks postpartum were included; intervention participants took part in one structured conversation with a primary care nurse when they brought their infant in for scheduled immunizations at ages 2, 4, or 6 months (**Appendix C Figure 1**).[80] Likewise, the study by Abbass-Dick in Canada included only women who were exclusively breastfeeding in the hospital and intended to breastfeed for more than 12 weeks. This study reported any and exclusive breastfeeding rates among the control group participants to be 87.6 and 60.0 percent, respectively.[90]

The pooled point estimate for exclusive breastfeeding between 3 and less than 6 months also suggested a statistically significant benefit of the intervention compared with usual care (RR, 1.20 [95% CI, 1.05 to 1.38]; I^2=44.6%; k=18; n=7,027; range in absolute difference, -4.6% to 19.2%) (**Figure 8**). When examined individually, one good-quality study in the United States (Bonuck, 2014b [PAIRINGS])[92] and four fair-quality studies (including two conducted in Singapore) demonstrated a statistically significant effect of individual-level professional or peer support interventions on exclusive breastfeeding at 12 weeks. Funnel plots for any or exclusive breastfeeding at 3 to less than 6 months did not suggest the presence of small study effects.

Breastfeeding at 6 Months

Among adults, 20 trials (n=9,715) reported the proportion of women performing any breastfeeding at 6 months (24 or 26 weeks). When pooled, the association was not statistically

significant but the CI did not rule out potential benefit (RR, 1.07 [95% CI, 0.98 to 1.16]; I^2=57.5%) (**Figure 9**). The forest plot shows a lack of consistent effects across the individual trials but some suggestion of a benefit of up to a 2-fold increase in any breastfeeding among women exposed to a professional support intervention compared with usual care (e.g., Bonuck, 2014b [PAIRINGS][92] and Labarere, 2005[120]) and others suggesting a decreased probability of any breastfeeding, although not ruling out benefit (e.g., Chapman, 2013).[98]

In contrast, the pooled RR demonstrated a positive association between individual-level support or education interventions and exclusive breastfeeding at 6 months, although the CI only narrowly excluded 1.0 (RR, 1.16 [95% CI, 1.02 to 1.32]; I^2=14.3%; k=17; n=7,690) (**Figure 10**). Absolute differences in the rates of exclusive breastfeeding at 6 months ranged from 2.9 percentage points in favor of the control group (5.2% vs. 8.1%) to 21.0 percentage points (47.7% vs. 26.1%). The range of exclusive breastfeeding rates at 6 months among control group participants was 0 percent[98] to 42.5 percent,[103] the latter in a sample of women from Australia. The funnel plot for exclusive breastfeeding at 6 months presented asymmetric patterns and the results of the Peter's test for small study effects was statistically significant (p=0.015). After three studies with fewer than 100 women per arm[84,98,131] were removed from the meta-analysis, the pooled RR was slightly attenuated and the CI included 1.0 (RR, 1.09 [95% CI, 0.99 to 1.21]; I^2=0%; k=14; n=7,409). Wide CIs suggested power was an issue and indicated the potential for benefit was not eliminated.

Only four of the trials that reported 6-month outcomes had intervention components that extended up to 6 months postpartum.[80,93,99,139] There did not seem to be a pattern, however, between the duration of the intervention and the effects seen at 6 months. For instance, the good-quality trial by Labarere and colleagues in France consisted of one lactation-focused outpatient visit with the infant's primary care physician at 2 weeks postpartum, yet reported 39.3 and 26.3 percent of mothers in the intervention versus usual care groups, respectively, still breastfeeding at 6 months (RR, 1.49 [95% CI, 1.02 to 2.19]).[120]

Breastfeeding at 12 Months

Only three of the trials reported the prevalence of any breastfeeding among intervention and control group participants at 12 months (**Appendix C Table 2**).[79,93,139] None found a statistically significant effect of the intervention at 12 months, and the data were too sparse and heterogeneous to pool. The reported breastfeeding rates at 12 months within these studies were quite low (9.3% to 21.0%) and clearly below the U.S. national average of 29.2 percent.[46] Thus, these populations may represent particularly challenging groups for achieving long-term breastfeeding continuation. Among the 52 included studies, the two studies with the longest interventions were conducted by Bonuck and colleagues[93] and Wen and colleagues,[139] who reported breastfeeding at 12 months (**Appendix C Figure 1**). The lactation support intervention by Bonuck and colleagues in the United States spanned approximately 68 weeks; it began in the second trimester of pregnancy and provided optional telephone support to breastfeeding mothers for up to 1 year.[93,94] In that study of predominantly low-income Hispanic and black women, 18.3 percent of intervention mothers and 15.2 percent of control mothers reported still breastfeeding their infants at 1 year (RR, 1.21 [95% CI, 0.63 to 2.32]). Similarly, the good-quality study by Wen and colleagues in Australia found no significant effect on the rates of any breastfeeding at 1

year among mothers receiving a home visit intervention versus usual care (21.0% vs. 14.9%, respectively; RR, 1.39 [95% CI, 0.96 to 2.01]) despite receiving up to five postpartum home visits lasting 1 to 2 hours for up to a year after birth.[139] Very wide CIs associated within the individual studies may reflect power issues and cannot rule out potential benefits that could be clinically meaningful. On the other hand, one of the least intense studies by Lavender and colleagues in the United Kingdom (n=1,249) also found no effect of one 2.5-hour prenatal group education session compared with usual care on rates of any breastfeeding at 1 year (9.3% vs. 10.1%); in that study, power was less likely to be an issue.[79]

Absolute Duration of Breastfeeding

Twelve individual-level intervention trials among adults reported continuous measures of the duration of any and/or exclusive breastfeeding or time-to-event data (**Table 11**).[84,97,103,106,114,118,119,126,128,131,139,140] In these studies, breastfeeding duration was equal to the infant age when the mother completely stopped breastfeeding or stopped exclusively breastfeeding. All 12 studies reported that the intervention group participants breastfed longer or exclusively breastfed longer than those in the control groups; however, the results were only statistically significant in four trials.[84,97,119,139]

Differences in Population Subgroups

We explored potential differences in the effects of the interventions as they related to specific settings and population characteristics. Specifically, we examined possible effect modification by country (United States vs. other), breastfeeding status at baseline (whether the trial only included women who had already attempted or established breastfeeding), intention to breastfeed, and previous breastfeeding experience. Our subgroup analyses and meta-regression models did not reveal any clear differences in the rates of any or exclusive breastfeeding at any time point by these study characteristics. Demographic variables such as race/ethnicity and socioeconomic status were too sparsely reported to examine possible differential effects. We report the results of four trials among adolescents and young adults below, which generally revealed effects consistent with those among adults.

We included seven trials that provided direct comparisons of the effect of the interventions among different population subgroups.[81,94,95,126,130,133,136] Within these seven trials, differences in the following subgroups as they related to the mother were examined: age, education, insurance status, country of origin (foreign-born or U.S. born), primary language spoken (Spanish or English), delivery type, parity, prior breastfeeding experience, and breastfeeding intentions. The only significant differences in the intervention effect by subgroup were for maternal country of origin and primary language spoken, both in studies conducted in the United States.[94,133] In the study by Bonuck and colleagues, U.S.-born control group participants had the lowest breastfeeding intensity compared with U.S.-born intervention participants or all foreign-born women at 13 and 52 weeks.[94] Reeder and colleagues found a significant effect of the intervention on any breastfeeding among Spanish-speaking women at 4, 12, and 26 weeks but among English-speaking women only at 4 weeks. This study, however, did not report a formal test of interaction by language group.[133] Two studies examined differential effects of the intervention by breastfeeding intention and found conflicting results.[81,95] Bunik found that women who intended

to exclusively breastfeed in the intervention group were more likely to breastfeed at 1, 3, and 6 months than women who planned to offer formula and breast milk. No significant differences were seen in the control group due to breastfeeding intention.[95] Kools reported no interaction of the effects of the intervention by maternal age, maternal education, previous breastfeeding experience, or breastfeeding intentions.[81] Thus, within-study examination of effect modification by subpopulation was inconclusive.

Common Elements of Efficacious Interventions

We also examined a number of specific intervention characteristics to see if they appeared to be associated with effect size, including intervention type (education, professional support, or peer support), intervention timing (prenatal, peripartum, postpartum, or a combination), intervention duration, number of intervention sessions, and whether the intervention included any in-person contact with the provider or telephone support. On the basis of our preliminary assessment, we used stratified analyses and meta-regression to formally examine possible effect modification by intervention characteristics.

We found some evidence of a differential effect of individual-level interventions on the rates of any breastfeeding (but not exclusive breastfeeding) based on the time periods in which the interventions were delivered and the total duration of the intervention. Interventions delivered over a combination of time points (e.g., prenatal and postpartum [shown as "1, 3" within the "Intervention Timing" column in the forest plots]) showed higher relative effects on any breastfeeding than those delivered at one time point only (e.g., postpartum [shown as "3" within the "Intervention Timing" column in the forest plots]). For instance, the pooled RR for interventions delivered at more than one time point showed a statistically significantly association with any breastfeeding for less than 3 months (RR, 1.14 [95% CI, 1.08 to 1.19]), whereas those delivered at one time point only (e.g., postpartum) did not show a statistically significant relationship (RR, 1.02 [95% CI, 0.99 to 1.06]; test for subgroup difference, p=0.001) (**Figure 5**). Likewise, interventions that were longer in duration (≥4 weeks) were statistically significantly related to any breastfeeding for less than 3 months and 3 to less than 6 months in pooled analyses, whereas interventions that were less than 4 weeks in duration were not related ($p<0.05$). These two intervention characteristics—timing of the intervention and total duration of the intervention—were closely related. In most, but not all cases, interventions that were delivered for 4 or more weeks also spanned more than one time period (e.g., prenatal and postpartum or prenatal, peripartum, and postpartum), so it is difficult to disentangle which concept (longer duration or multiple time periods) is driving the difference.

There was no evidence of effect modification based on the specific type of intervention (professional support, peer support, or education), number of sessions, presence of face-to-face contact, or presence of telephone support.

We included five studies that had more than one active intervention arm that provided direct comparisons between the arms.[82,92,103,122,135] There were no statistically significant differences in the rates of any or exclusive breastfeeding between the active intervention arms when comparing in-hospital support versus postpartum telephone counseling,[82] one prenatal education session with a lactation care provider versus a prenatal video and booklet,[122] or group education focused

on attitude modification versus group education focused on practical skills training.[103] All of these comparisons, while direct, could have been limited by a lack of power. Bonuck and colleagues found some evidence of stronger effects on the prevalence and intensity of breastfeeding at 3 months among women receiving brief prenatal education plus peripartum and postpartum lactation counseling compared with women receiving only brief education or lactation counseling. For instance, there was a statistically significant difference between the four groups, with 56.2, 50.7, 44.5, and 37.8 percent of the lactation support plus brief education, lactation support only, brief education only, and usual care groups, respectively, reporting any breastfeeding at 3 months (p=0.02). There were no other differences by group at other time points within this study.[92] The study by Su and colleague in Singapore similarly reported an increased relative effect of an intervention consisting of peripartum and postpartum lactation support versus a brief prenatal intervention for any breastfeeding at 6 weeks (RR, 1.16 [95% CI, 1.02 to 1.31]) but found no other differences between the two intervention arms for any or exclusive breastfeeding at any other time points.[135] The indirect and direct evidence, while not conclusive, suggests that multiple time points may be important for short-term breastfeeding outcomes.

System-Level Policies and Practices

Policies, Programs, and Staff Training

We included three good-quality studies that evaluated the impact of system-level changes on rates of breastfeeding (**Table 6; Table 12**).[107,108,110] Two studies by the same Hawkins group compared the rates of breastfeeding initiation and continuation of any or exclusive breastfeeding for 4 or more weeks before and after BFHI accreditation between mothers who gave birth in hospitals that became accredited during the study period and mothers who gave birth in matched non-BFHI facilities in the United States.[107,108] First, Hawkins and colleagues (2014a) included 11,723 mothers who gave birth within 13 hospitals that received accreditation prior to 1999 or became BFHI accredited during 1999 through 2009 and 13,604 mothers from 19 matched non-BFHI birth facilities across five states.[107] Difference-of-differences analysis found that BFHI accreditation did not increase rates of breastfeeding initiation or any or exclusive breastfeeding among all women but benefited mothers with lower education (≤12 years of education) in a priori subgroup analyses (**Table 12**). Breastfeeding initiation increased by 3.8 percentage points among mothers with lower education who delivered in BFHI facilities (adjusted coefficient, 0.038 [95% CI, 0.00 to 0.08]; p=0.05) but not among all mothers or mothers with higher education. BFHI accreditation was also associated with increased rates of exclusive breastfeeding for 4 or more weeks by 4.5 percentage points among mothers with lower education who delivered in BFHI facilities (adjusted coefficient, 0.045 [95% CI, 0.01 to 0.08]), but there was no effect on exclusive breastfeeding overall or among those with higher education. There was no difference in the rates of any breastfeeding between groups by education subgroup or overall. [107]

Similarly, the second good-quality study by Hawkins and colleagues (2014b) compared rates of breastfeeding among 915 mothers who gave birth in four hospitals that were BFHI accredited or became accredited and 1,099 mothers from six matched non-BFHI–accredited facilities in Maine.[108] Results showed that there was no effect of BFHI status on the rates of breastfeeding

initiation, any breastfeeding, or exclusive breastfeeding, either overall or stratified by maternal education (**Table 12**). In this study, mothers giving birth within BFHI-accredited facilities were more likely to report experiencing seven of the 10 BFHI practices than were women delivering at a non-BFHI–accredited facility (34.6% vs. 27.1%); however, compliance with the individual steps was relatively low in general (ranging from 57.2% to 96.0%) within the accredited facilities, and only one step (step 3: hospital staff gave information about breastfeeding) significantly increased after BFHI accreditation (p=0.01). The authors speculated that the lack of effect by accreditation status suggests that it may be the number of or specific hospital practices supporting breastfeeding rather than BFHI accreditation itself that impacts rates of breastfeeding.[108]

The third good-quality study, conducted in Scotland, used a cluster RCT to compare the rates of breastfeeding at 6 to 8 weeks postpartum before and after implementation of a policy for providing breastfeeding support groups for pregnant women (prenatal) and breastfeeding mothers (postpartum) among seven intervention health localities (n=8,991) and seven control localities (n=8,491) implementing usual care.[110] As part of the policy, intervention localities were asked to at least double their number of breastfeeding support groups, set up a minimum of two new groups, and ensure that all main population centers had access to a breastfeeding group. The format and content of the support groups were intended to be standardized across groups and include weekly group meetings, women only, a health professional group facilitator, and pregnant or breastfeeding women; allow at least half of the meeting time to be social and interactive; and create a woman-centered approach to the structure and content of the group sessions based on the women's needs. Implementation of the policy was high; intervention localities increased the number of breastfeeding groups from 10 to 27 groups after 2 years, whereas the number of breastfeeding groups in control localities was the same. The effect of the policy on rates of breastfeeding was not notable, however. After adjustment for preintervention breastfeeding rates, there was no statistically significant difference in rates of any or exclusive breastfeeding between groups at birth, at 5 to 7 days, or at 6 to 8 weeks (**Table 12**).[110]

Other Maternity Care Practices

We included six trials focused on other system-level maternity care practices, including three fair-quality trials focused on maintaining mother and baby contact following delivery[96,105,129] and three good-quality trials focused on delayed or restricted pacifier use (**Table 7; Appendix C Table 1**).[112,115,117] The first three trials reported mixed results (**Appendix C Table 2**). In the fair-quality U.S. study by Nolan and colleagues, 50 women scheduled for a Cesarean delivery were randomly allocated to receive a new protocol for minimizing maternal-infant separation following birth or usual peripartum care whereby infants were removed promptly from the operating room and transferred to the obstetric recovery room with brief or no physical contact with their mothers. This study found higher rates of any breastfeeding at hospital discharge (76.0% vs. 52.0%) and at 4 weeks (72.7% vs. 33.3%) among those receiving the intervention versus those receiving usual care. The relative effect of the intervention versus control on any breastfeeding at 4 weeks was statistically significant for the full sample of randomized women (unadjusted RR, 2.18 [95% CI, 1.17 to 4.06]) but not for only women who initiated breastfeeding at birth ($p<0.05$).[129] Neither of the other two trials on maintaining mother and baby contact following delivery found statistically significant differences in the prevalence of any or exclusive

breastfeeding or the absolute duration of breastfeeding between treatment arms.[96,105]

There was no evidence from the three good-quality trials that the rate of breastfeeding differed between mothers asked to avoid or delay pacifier use versus those given no such instructions or who were deliberately given pacifiers (**Table 11**; **Appendix C Table 2**).[112,115,117] We judged these trials to have very limited applicability to U.S. primary care, however. For instance, in the U.S. trial by Howard and colleagues, as part of their discharge packet, mothers in the control group were given pacifiers and instructed to use the pacifier as soon as possible as a means of comforting their babies in addition to any other comforting mechanisms they chose.[112] The trial by Jenik and colleagues, which evaluated the effects of recommendations to offer or not offer pacifiers once lactation was well established, was designed as a noninferiority trial among mothers in Argentina who were highly motivated to breastfeed. In that study, both treatment groups had extremely high rates of any and exclusive breastfeeding, with nearly 100 percent of mothers still breastfeeding at 4 months postpartum.[115]

Detailed Results Among Adolescents and Young Adults

All four of the trials that were limited to adolescents or young adults found higher rates of any or exclusive breastfeeding or a longer duration of breastfeeding among mothers in the intervention groups than among those assigned to usual care (**Appendix C Table 2**).[100,102,132,137] The benefit was statistically significant in all three U.S. trials[100,102,137] but did not reach statistical significance in the Australian trial.[132] In the most recent trial by Edwards and colleagues, 248 low-income black mothers (mean age, 18.3 years) were randomized to a 26-week intervention that consisted of 10 weekly prenatal home visits, in-hospital support, 12 postpartum home visits, and optional phone support provided by a community doula with specialized lactation support training; the other mothers were assigned to usual care (control group). Mothers in the intervention group were statistically significantly more likely to initiate breastfeeding than the mothers in the usual care group (63.9% vs. 49.6%; p=0.02) and to breastfeed for at least 6 weeks (28.7% vs. 16.8%; p=0.04). There was no statistically significant difference, however, in the proportion of mothers still breastfeeding at 16 weeks (8.3% vs. 4.4% in the intervention and control groups, respectively).[102] In another fairly intense intervention, Wambach and colleagues randomized 289 predominantly low-income black girls (mean age, 17 years) to usual care or to a breastfeeding support intervention that spanned from the second trimester of pregnancy through 4 weeks postpartum. The intervention mothers received group prenatal education classes in which support persons were encouraged to attend, in-hospital face-to-face support sessions, and at least five postpartum telephone calls. Intervention participants were also given an electric breast pump at no charge on an as-needed basis. The intervention was provided by an IBCLC and peer counselors. Girls in the intervention group reported a higher rate of breastfeeding initiation (79%) versus those in the usual care group (63%), but this difference was not statistically significant after adjustment for breastfeeding knowledge, breastfeeding intention, timing of feeding decision, positive breastfeeding sentiment, and social and professional support. However, the duration of any breastfeeding was statistically significantly longer in the intervention group (median, 177 days [range, 1 to 213]) than in the usual care group (median, 61 days [range, 1 to 195]) after adjustment for positive breastfeeding sentiment and social and professional support.[137] In a 5-week postpartum telephone peer support intervention, Di Meglio and colleagues found a statistically significant difference in the duration of exclusive

breastfeeding but not for any breastfeeding among predominantly low-income young women in the United States (n=78). Mothers in the peer support group breastfed their infants exclusively for a median of 35 days, whereas mothers in the usual care control group exclusively breastfed for a median of 10 days (p=0.004).[100] Finally, the trial that took place in Australia among 136 adolescent mothers (mean age, 16 years) found that mothers in the intervention group breastfed for a median of 12 weeks compared with 8 weeks in the control group, a nonstatistically significant difference (p=0.73). Breastfeeding duration was a secondary aim in this trial; the primary aim was reducing adverse infant outcomes and improving the adolescent mothers' knowledge regarding contraception, breastfeeding, and vaccination schedules.[132]

KQ 3. Are There Adverse Events Associated With Interventions to Promote and Support Breastfeeding?

We identified only two trials[99,104] that reported adverse events related to a breastfeeding intervention. Both trials were of fair quality and were conducted in Canada. Gagnon and colleagues compared an intervention involving a single postpartum home visit by a nurse with usual care and found no significant difference between the groups in maternal state anxiety scores, as measured by the State-Trait Anxiety Inventory, at 2 weeks postpartum (mean difference, 0.3 [95% CI, -0.5 to 1.1]).[104] Dennis and colleagues compared a peer support intervention with usual care and reported that a few mothers in the intervention group expressed feelings of anxiety, decreased confidence, or concerns about confidentiality. For example, one mother requested to discontinue her participation in the intervention, stating that the peer volunteer frightened her about the potential hazards of not breastfeeding and diminished her feelings of confidence, despite the fact that breastfeeding was going well for her. The study did not report any such adverse events among mothers in the control group. Another mother felt her right to confidentiality was violated after her peer volunteer contacted the public health department to request professional assistance without her knowledge.[99]

Chapter 4. Discussion

Summary of Evidence

We included 52 studies that examined the effectiveness of breastfeeding interventions on rates of breastfeeding. A summary of evidence for all KQs is presented in **Table 13**. All of the studies varied widely in terms of their methodological quality, included populations and sample sizes, and the types and timing of the interventions tested.

Infant and Maternal Health Outcomes

Only six studies reported results related to infant health outcomes, with mixed effects of the interventions on gastrointestinal outcomes, cases of otitis media, respiratory tract illnesses, and infant health care use (KQ1) (**Table 13**). None of the included studies reported the intervention effect on short- or long-term maternal health outcomes, such as postpartum weight loss or the incidence of breast cancer. Despite this limited evidence on the direct effect on health outcomes from our included studies, observational evidence (as described in Chapter 1) supports the link between ever breastfeeding and the duration of any or exclusive breastfeeding and positive infant and maternal health outcomes.

We excluded one study that was included in the original review that reported infant health outcomes. To date, the Promotion of Breastfeeding Intervention Trial (PROBIT) in Belarus is the largest randomized trial (n=17,046) to have evaluated the effects of a system-level breastfeeding promotion intervention on the duration and exclusivity of breastfeeding as well as infant and child outcomes.[141] This study was not included in our review because of its limited applicability to U.S. health care given the country of origin. At the conception of this trial (1996–1997), Belarus was chosen rather than a North American or Western European country because maternity practices there reflected those in North America and Western Europe 30 to 40 years ago and therefore would provide greater potential contrast between intervention and control conditions. Participating sites were randomly assigned to an intervention (16 sites) modeled after the BFHI or a usual care control intervention (15 sites). Results from the primary trial data showed that infants born to mothers at the intervention sites were significantly more likely than control infants to be breastfed at 12 months (aOR for weaning at 12 months for intervention vs. control, 0.47 [95% CI, 0.32 to 0.69]) and to be exclusively breastfed at both 3 months (43.3% vs. 6.4%; p<0.001) and 6 months (7.9% vs. 0.6%; p=0.01).[141] The intervention also resulted in a significant reduction in the risk of gastrointestinal tract infection (aOR, 0.06 [95% CI, 0.40 to 0.91]) and the incidence of rashes, including atopic eczema (aOR, 0.54 [95% CI, 0.31 to 0.95]), but resulted in no significant differences in the risk of respiratory tract infections or otitis media in the first year of life.[141] At the 6.5-year followup, there was no significant intervention effect among children on body mass index, waist or hip circumference, body fat, risk of overweight or obesity, or systolic or diastolic blood pressure;[142] asthma, allergic symptoms, or allergy diagnoses;[143] dental caries;[144] or children's behavior.[145] Children in the intervention arm, however, had statistically significantly higher scores on cognitive ability tests as well as higher teacher-reported reading and writing abilities than children in the control group at 6.5 years.[146]

Breastfeeding Outcomes

Individual-Level Breastfeeding Support

Our updated review found that individual-level breastfeeding support and education interventions increase the relative likelihood of women breastfeeding up to 6 months and exclusively breastfeeding up to and at 6 months relative to those receiving usual care (**Table 13**). Our review failed to find a statistically significant relationship between individual-level breastfeeding interventions and initiation of breastfeeding or any breastfeeding at 6 months. Three trials reported breastfeeding rates at 12 months and none found a significant benefit from the intervention.

The size of the treatment effects varied in their magnitude and precision in different trials, and average treatment effects may not be applicable in different settings. The pooled estimates from more than 20 trials suggested an increase in any breastfeeding up to 6 months from 4 to 18 percent and an increase in exclusive breastfeeding up to 6 months from 5 to 38 percent in 18 trials. The average treatment effect for exclusive breastfeeding at 6 months suggested that individual-level interventions can increase the likelihood of exclusive breastfeeding by an average of 16 percent compared with usual care (RR, 1.16 [95% CI, 1.02 to 1.32]).

The NNTs for any and exclusive breastfeeding at each time point calculated from a range of "baseline" breastfeeding rates generally indicated that fewer than 30 women would need to be treated to get one more woman breastfeeding in the short term (<6 months) and more than 30 women for 6 months (**Appendix C Table 3**). Among groups of women with higher rates of breastfeeding, the NNT to get one more women breastfeeding is lower. For example, among populations of women where approximately 55 percent of them breastfed from 3 to less than 6 months, the NNT is only 17. On the other hand, in situations where there are fewer women exclusively breastfeeding at "baseline" (e.g., 5% exclusively breastfeeding at 3 to <6 months or 6 months), more than 100 women would need to receive an intervention to see one more woman exclusively breastfeeding at this time point. In general, the NNTs varied more widely for exclusive breastfeeding than for any breastfeeding.

The relatively modest effect seen within and across trials may be a result of the breastfeeding support provided as part of standard or usual care within many of these countries and specific clinical settings, and the magnitude of effect should be interpreted as an incremental benefit above usual care. Most studies indicated that there was a good level of breastfeeding support within the birthing facility at or around the time of delivery from hospital staff, including the provision of lactation care providers, but failed to fully describe the minimal support for breastfeeding during the prenatal and postpartum time periods.

Despite high clinical, methodological, and, in some cases, statistical heterogeneity, there was little evidence that the effects of individual-level interventions varied across different populations or intervention characteristics. The high variability in the interventions' approaches, however, may have masked important relationships. All three types of individual-level interventions (support provided by professionals, support provided by peers, and formal education) were associated with greater rates of any and exclusive breastfeeding compared with

usual care. Interventions delivered over more than one time point (provided during the prenatal, and/or peripartum, and/or postpartum periods) may have a larger effect than interventions provided within one time period (e.g., prenatal or postpartum only), but this differential effect was only seen for any breastfeeding for less than 3 months and 3 to less than 6 months and was not evident for the effects on exclusive breastfeeding. Therefore, this moderation effect should be viewed as exploratory and worth pursuing further, but only if the outcome is clinically meaningful. To help explore whether intervention effects vary by these characteristics, future research should include clear descriptions of the time period or periods that an intervention takes place, the total duration of the intervention, and the number of sessions during each time period.

System-Level Policies and Practices

We included three studies that evaluated the influence of a system-level policy on the prevalence or duration of breastfeeding and six trials that focused on other system-level maternity care practices (mother and baby contact and delayed pacifier use). Two recent good-quality studies found no difference in breastfeeding initiation or breastfeeding at 1 month before or after BFHI accreditation among women who gave birth in accredited facilities versus women who gave birth in matched nonaccredited facilities. There was some evidence of an effect on initiation and exclusive breastfeeding at 1 month among women with low education (≤12 years of education) but not among all women or women with more than 12 years of education.[107] A number of studies, including one of our included studies, have shown that the actual implementation of the individual steps (or mothers' perception of experiencing these steps) within the BFHI, rather than BFHI accreditation itself, influences rates of breastfeeding. The study by Hawkins and colleagues in Maine found that while mothers giving birth within BFHI-accredited facilities were more likely to report experiencing seven of the 10 BFHI practices (34.6%) than women delivering at a non-BFHI–accredited facility (27.1%), compliance with the practices was relatively low within the accredited facilities in general. Only one practice (step 3: hospital staff gave information about breastfeeding) significantly increased after BFHI accreditation. Other practice rates were not optimal, with only 57 to 87 percent of women giving birth in BFHI facilities reporting these variables. Overall, each additional breastfeeding practice was associated with an average increase in breastfeeding initiation of 14.6 percentage points.[108] Our review found no evidence of a consistent effect of maintaining mother and baby contact following delivery (k=3) or delayed pacifier use (k=3) on the prevalence of breastfeeding initiation or the duration of any or exclusive breastfeeding.

There are a number of other longitudinal evaluations of the BFHI and other system-level policies and practices in the United States and other applicable countries, but they are limited to before-after comparisons within single hospitals or retrospective study designs and were not included in our review.[147-151] For example, Philipp and colleagues were among the first to evaluate rates of breastfeeding before and after implementation of Baby-Friendly policies at the Boston Medical Center. They found that rates of breastfeeding initiation and exclusive breastfeeding increased significantly following implementation of Baby-Friendly policies. Breastfeeding initiation increased from 58 percent before implementation to 77.5 percent during implementation and 86.5 percent following implementation ($p<0.001$), and the increase was seen across all racial/ethnic and socioeconomic groups. For instance, breastfeeding initiation rose from 34 percent prior to implementation to 74 percent after implementation among U.S.-born black

mothers.[148] These higher rates of initiation and exclusive breastfeeding were maintained in the 2 years following implementation of the policies.[147] Likewise, in a retrospective before-after design, Corriveau and colleagues found statistically significantly higher rates of initiating exclusive breastfeeding as well as exclusive breastfeeding at 1 week and 2, 4, and 6 months after implementation of a pediatric primary care protocol that included staff training, written policies, onsite lactation consultant support, and community outreach related to breastfeeding support.[150] A retrospective cohort study in Australia found that after adjustment for significant maternal, infant, clinical, and hospital variables, women who gave birth in BFHI-accredited hospitals had significantly lower odds of breastfeeding at 1 month compared with women who gave birth in nonaccredited facilities. However, women who reported experiencing four in-hospital practices in alignment with the BFHI (early skin-to-skin contact, attempted breastfeeding within the first hour, rooming-in, and no in-hospital supplementation) had higher odds of breastfeeding at 1 and 4 months than women who reported experiencing fewer than four of these practices.[149] Feldman-Winter and colleagues compared the mean duration of breastfeeding before and after industry-sponsored formula sample packs were no longer distributed to new mothers in one U.S. hospital.[151] Despite finding a longer duration of any breastfeeding among mothers who did not received industry-sponsored formula sample packs than those who did (49% vs. 45% of intervention vs. control groups were still breastfeeding at 2.5 months), there was no significant difference in the duration of exclusive breastfeeding up to 10 weeks postpartum. This study highlighted difficulties in implementing systemwide changes, as 36 percent of mothers in the intervention group reported receiving infant formula in their discharge bags despite the instructions for staff to remove formula completely.

Adverse Events

We systematically reviewed the literature for a variety of potential adverse events associated with breastfeeding interventions, including mothers reporting feeling criticized by the interventionist, guilt related to not breastfeeding, increased anxiety about breastfeeding, and increased postpartum depression. Only two of our included studies reported adverse events that mothers experienced related to the intervention and included reports of increased anxiety, feelings of inadequacy, and concerns regarding their family's confidentiality. Although the goals of these interventions focused on initiating and continuing breastfeeding and empowering women to do so, it is important that interventionists respect family's individual decisions.

We did not examine common problems related to the act of breastfeeding itself that may be important determinants of continued breastfeeding, such as cases of mastitis or sore nipples. Interventions to support breastfeeding could either increase these problems (through the increased prevalence of breastfeeding among the population) or decrease these issues (through active management and suggestions for prevention). Given that these breastfeeding-related problems are often the impetus for stopping breastfeeding,[11] it is clear that part of the goal of any intervention should be to help breastfeeding mothers actively prevent and manage these common issues.

Applicability to U.S. Health Care

Only 19 of the 52 included studies took place in the United States. The remaining studies took place in Canada, Australia, Europe, Asia, or South America, where we presume the standard of care for breastfeeding support within the health care system to be quite different from that of the United States. Only five of the studies explicitly said that the intervention was offered in a BFHI-accredited facility; the other studies reported varying levels of breastfeeding support within usual care. However, most U.S. birth facilities have some policies and practices that support breastfeeding.[152] In 2013, more than 85 percent of hospitals responding to the Centers for Disease Control and Prevention's National Survey of Maternity Practices in Infant Nutrition and Care reported adopting three to eight of the 10 Baby-Friendly recommended policies or practices. Approximately 90 percent of U.S. hospitals reported offering prenatal breastfeeding education, teaching breastfeeding techniques, and/or teaching feeding cues. Postdischarge support, having a model policy, and limiting nonbreast milk feedings were less commonly implemented practices (approximately 25% of hospitals reported these practices). Nationally, the percentage of hospitals reporting implementing more than half of the 10 Steps increased from 28.7 percent in 2007 to 53.9 percent in 2013, and this increase was reported across all states.[153] Thus, it is likely that non-BFHI facilities are adopting practices similar to those of BFHI facilities and that usual care in some of the included studies could be equivalent to, if not more intense than, the interventions that were offered.

The interventions offered were diverse (such as group prenatal education sessions, one individual session in the hospital, telephone support, home visits, and multiple one-on-one sessions spanning the prenatal and postpartum periods), as were the provisions of usual care.

The rates of any and exclusive breastfeeding with increasing infant age among both intervention and control group participants declined steadily, as was expected. Although the U.S. rate of breastfeeding initiation among these samples was high (70% to 99%), far fewer mothers in these studies continued breastfeeding compared with the national average. In 2012, 51.4 percent of U.S. women reported breastfeeding their 6-month-olds. The rate was identical for Hispanic women only (51.4%) but higher and lower for non-Hispanic white (55.8%) and non-Hispanic black (35.3%) mothers, respectively.[46] Within the included U.S. trials, only one study among a predominantly white, well-educated sample reported that almost half of the women in both the intervention group (49.7%) and usual care group (48.8%) were breastfeeding at 6 months.[130] The other U.S. trials, which were almost all among predominantly Hispanic and/or non-Hispanic black women intending to breastfeed, reported lower rates of breastfeeding at 6 months. The proportion of women in the control groups reporting breastfeeding at 6 months ranged from 25 to 38 percent. There was no pattern in the relative effects of interventions over time. Some trials affected the breastfeeding rate across time points as infants aged, and some interventions effectively increased the number of women starting to breastfed and in the early weeks but not as infants aged; others demonstrated increasing effectiveness as infants aged (e.g., the intervention was effective at 6 but not 3 months). Likewise, there was no clear pattern indicating that the trials affected any but not exclusive breastfeeding and vice versa. These differences may reflect the variety of aims and the intensity of the respective interventions.

The variations in breastfeeding rates emphasize that the act of breastfeeding is not simply a

physiologic transfer of nutrients from mother to baby but rather a behavior deeply rooted within a woman's specific social and cultural circumstances. Decisions regarding feeding are likely influenced by a host of factors, including family and social circumstances, the health of the baby as well as other children in the family, the mother's own health needs, previous breastfeeding experiences, plans for returning to work or school, and the culture in which she lives. Qualitative data have highlighted the need for clinical encounters around breastfeeding to be "family centered" rather than idealistic or goal-oriented and aim to enhance the mother's self-efficacy and minimize feelings of guilt and failure.[154-156]

Comparison With Other Systematic Reviews

The results of our current review are consistent with previously published reviews suggesting a small increased relative likelihood of breastfeeding, including exclusive breastfeeding, up to 6 months related to structured individual-level support, including professional or peer support.[52,66,157-162] For example, the 2013 review by Haroon and colleagues found that both individual and group counseling interventions resulted in higher rates of exclusive breastfeeding relative to control groups at 1 to 6 months (RR, 1.90 [95% CI, 1.54 to 2.34]) within developed and developing countries.[157] Two reviews[160,163] suggested improved rates of breastfeeding initiation and continuation following system-level breastfeeding interventions such as the BFHI but noted major limitations to the bodies of evidence and their approach to systematic review. All of these reviews cite similar challenges to this literature base, including the high risk of bias of the included studies, the lack of standardization of breastfeeding outcomes and timing of the assessment, and a dearth of well-conducted trials examining system-level interventions. Four recent Cochrane Collaboration reviews for telephone support,[164] prenatal education,[159] restricted pacifier use,[165] and rooming-in[166] all concluded that there was insufficient good-quality studies from which to draw definitive conclusions regarding the influence of these interventions on breastfeeding outcomes.

Limitations of Included Studies

Several limitations of the included body of evidence deserve special attention. First, most of the studies included a number of threats to internal validity, including possible selection bias, reporting bias, and relatively high attrition. There are unique issues in the design of these trials that relate to recruiting and randomizing pregnant women who may or may not be eligible for the study after giving birth. Some studies reported as much as 25 percent of the randomized sample not being eligible for the in-hospital peripartum or postpartum intervention after delivery because of factors such as infant low birth weight, admission to a neonatal intensive care unit, or breastfeeding contraindications. The baseline characteristics were often presented for the full randomized sample, so it is not clear how comparable the groups were according to the eligible samples. In addition, while most trials did not explicitly state exclusions based on breastfeeding status, it was clear from examining trials' participant flow diagrams that women who reported stopping breastfeeding or never started breastfeeding were not included in the intervention from that point forward. More explicit information regarding participant flow, by treatment arm, through such studies is warranted.

Second, despite several calls over the last three decades for standardizing breastfeeding definitions and indicators for both surveillance and program evaluation,[2,77,167-173] there was no uniform reporting of breastfeeding outcomes across the included studies regarding definitions of breastfeeding and timing of assessments. Most of the studies followed the WHO definition for exclusive breastfeeding,[77] but others used less robust definitions or did not report what counted as exclusive breastfeeding. Few studies specified whether recall was based on the previous 24 hours versus having been exclusively breastfeed since birth. Using 24-hour recall overestimates the proportion of exclusively breastfed infants, as some infants who are given formula irregularly may not have received them the day before the interview. This was evident in one of our included studies that reported rates of exclusive breastfeeding based on three different recall periods. Chapman et al reported that at 3 months, 25.9, 24.1, and 5.0 percent of women reported exclusive breastfeeding based on the recall periods of the past 24 hours, past week, and since birth, respectively.[98]

In addition, there was a lack of clarity concerning the boundary point for many of the prevalence time points. That is, it was unclear if exclusive breastfeeding reported for 6 months was exclusive breastfeeding *at* 6 months or exclusive breastfeeding *to* 6 months, which is technically the recommendation (the introduction of something other than breast milk at or after 6 months among otherwise exclusively breastfed infants). We pooled the results for exclusive breastfeeding *at* 6 months as was reported in the individual trials but suspect this technically means the infant was exclusively breastfed *up to* 6 months (i.e., did not receive any milk substitutes but may have received solids). Also, very few of the studies noted whether their definition of breastfeeding included feeding the infant expressed breast milk in addition to baby-to-breast breastfeeding. We encourage investigators of future studies to note the specific instrument that was used to capture breastfeeding behavior; describe verbatim the questions that were posed to mothers; and note the specific definitions (in terms of content and feeding method), recall period, and time point related to the measure. Likewise, while most of the studies (31 of 52) stated that they only included women who intended to breastfeed, it was unclear how this was measured and, in most cases, how strong these intentions were.

Finally, as mentioned earlier, the comparator in most studies was “usual” or “routine” care. The support given for breastfeeding in these usual care groups, however, was rarely well described, making it difficult to fully interpret the reasons for differences between trials and in interpreting the overall effect. In an instance where “usual care” is very supportive, the numbers needed to detect a statistical difference would need to be inflated. We did note whether the trial setting indicated BFHI accreditation as an indicator of the usual level of breastfeeding support provided to mothers and infants, but very few studies reported this indicator. The wide range of breastfeeding rates within the control groups across studies illuminates the differences that likely exist in the content of usual care within these settings as well as underlying population and cultural differences.

Limitations of Our Approach

There are also limitations to our methods that should be noted. We restricted our review to fair- and good-quality RCTs and before-after designs with concurrent control groups to reduce the

potential for confounding and other sources of bias. Even with somewhat liberal standards for judging the risk of bias for this complex literature base, we excluded 33 trials for poor quality, several of which were included in the original USPSTF review.[174-188] The studies excluded for poor quality were fraught with issues related to confounding, selective recall bias, differential loss to followup, and handling of missing data as well as for poor or incomplete reporting of results. Given the quantity of these studies, we did not contrast their findings with our included studies.

To calculate within-study RRs and in our pooled meta-analyses, we chose to use the raw event rates and total number of women randomized. Therefore, our analyses did not control for potential confounding factors such as socioeconomic status, employment status, education level, parity, or previous breastfeeding experience. We compared our crude relative estimates with any study-reported unadjusted and adjusted estimates and noted any differences within the narrative of our results.

Two of our funnel plots presented asymmetry and the tests for small-study effects were significant. There are a number of possible explanations for these results, including publication bias, poor methodological quality leading to spuriously inflated effects in the smaller studies, true heterogeneity in the size of the effects, and chance.

We did not systematically review the relationship between ever versus never breastfeeding or the duration of any or exclusive breastfeeding and short- and long-term child or maternal health outcomes. Thus, we did not complete the entire chain of evidence. We instead focused only on the direct evidence related to interventions to increase breastfeeding and health outcomes. The evidence on the associations between breastfeeding and health outcomes was previously systematically reviewed[12] and was found to adequately support the USPSTF recommendation. We informally reviewed more recent evidence from existing systematic reviews as part of our introduction; however, a systematic update might have revealed more data than we found.

Our review was limited to studies taking place in countries listed as "very high" on the 2014 United Nations Human Development Index to ensure that the evidence was applicable to a U.S. setting.[75] This index is based on three key indicators—life expectancy, education, and standard of living—rather than on economic growth alone. Relying on alternative lists for country level of development (e.g., Organization for Economic Cooperation and Development member countries, World Bank classifications by gross national income) may have resulted in a slightly different list of included countries and, therefore, slightly different included studies. We also limited the review to studies conducted within, in conjunction with, or referable from a health care setting. We did not include interventions taking place within worksites or other community settings. We acknowledge, however, that other nonhealth care settings may play very important roles in a woman's decision to start breastfeeding her child and her ability to continue.

Future Research Needs

Several areas warrant further research in light of the results of this review. In general, future research on breastfeeding interventions in the clinical setting should be more rigorously

conducted, with adequate sample sizes and clear descriptions of the included populations, including women's breastfeeding status at the time of recruitment, intentions to breastfeed, previous experience breastfeeding, and sociodemographic characteristics. Future trials should also describe in detail the characteristics of both the intervention and control arms, including the extent to which usual care is supportive of breastfeeding (e.g., BFHI accreditation or not, staff trained in breastfeeding or not). In order to compare breastfeeding outcomes between various studies, it would be helpful to standardize the reporting of breastfeeding rates at critical time points. Given the recommendations for exclusive breastfeeding up to 6 months and any breastfeeding for at least 1 year, rates of exclusive breastfeeding and any breastfeeding should be measured at these points, at a minimum. In addition, studies should include a detailed description of how breastfeeding was measured (e.g., via self-report or based on clinical records, definition of any and exclusive breastfeeding used, and recall period). Only one of our included trials included a measure of partial breastfeeding or breastfeeding "intensity" based on the proportion of feedings that were breast milk; future research should consider this more nuanced breastfeeding indicator to further distinguish the effects of breastfeeding interventions.[2] Trials should also include reliable and valid measures of infant and maternal health outcomes and be powered to detect potential effects on these outcomes. Likewise, studies should further explore maternal satisfaction with the intervention and any potential negative feelings or feelings of inadequacy that could result from the intervention if mothers choose not to or are unable to breastfeed.

More research is also needed to better understand the root causes of breastfeeding disparities and how they can be addressed through health care and community interventions. We did not identify any trials evaluating interventions targeting Native Americans and found only a few that specifically targeted non-Hispanic black women. These women show marked differences in their rates of breastfeeding initiation and continuation, particularly for exclusive breastfeeding, for which only a third of black women and a quarter of American Indian/Alaska Native women reported exclusively breastfeeding through 3 months. It is evident that effective interventions tailored to the unique barriers for these women deserve increased attention.

There is also a need for more adequately controlled studies that evaluate the impact of system-level changes on rates of breastfeeding, including comparing birth facilities that are BFHI-accredited or are implementing the full suite (or majority) of policies required of BFHI accreditation versus those that are not adopting any or very few of the 10 steps required for accreditation.

Our review included no fair- or good-quality trials that used Internet- or other computer-based interventions to increase the proportion of new mothers initiating breastfeeding or continuing to breastfeed. There is a wealth of Web-based resources for parents regarding infant health and development, including breastfeeding. However, the effectiveness of these resources as a forum for educating new families and supporting those who have started breastfeeding remains understudied.[189] These resources have the potential to reach large numbers of women at low cost and at the mother's convenience. Numerous informational Web sites, Web-based videos, and Web-based applications related to tracking breastfeeding sessions, establishing proper breastfeeding techniques, managing common breastfeeding-related issues, preparing for return to work or school, and connecting with other mothers and lactation care providers through

discussion forums are available, such as latchME, Breastfeeding Central, and Kellymom. These sites could be widely promoted or disseminated through health care providers if they were found to influence the duration or exclusivity of breastfeeding.

We identified 10 ongoing studies that may be relevant for updates of this review, including three trials taking place in the United States (**Appendix D**).

Conclusion

The body of fair- to good-quality evidence on the effectiveness of individual- and system-level interventions to support breastfeeding has nearly doubled since the previous USPSTF recommendation in 2009. Although there was substantial variation between the settings, participants, and interventions among the included studies, there is consistent evidence that individual-level support and education interventions that take place during the prenatal, peripartum, and/or postpartum periods can increase the prevalence of breastfeeding, including exclusive breastfeeding, for up to 6 months. Interventions provided by both professionals and peers were effective. There is limited evidence from well-controlled studies of the effect of system-level policies and maternity care practices on rates of breastfeeding. Finally, there is a large need for more research on these system-level interventions as well as interventions among population subgroups for which breastfeeding rates lag behind national goals.

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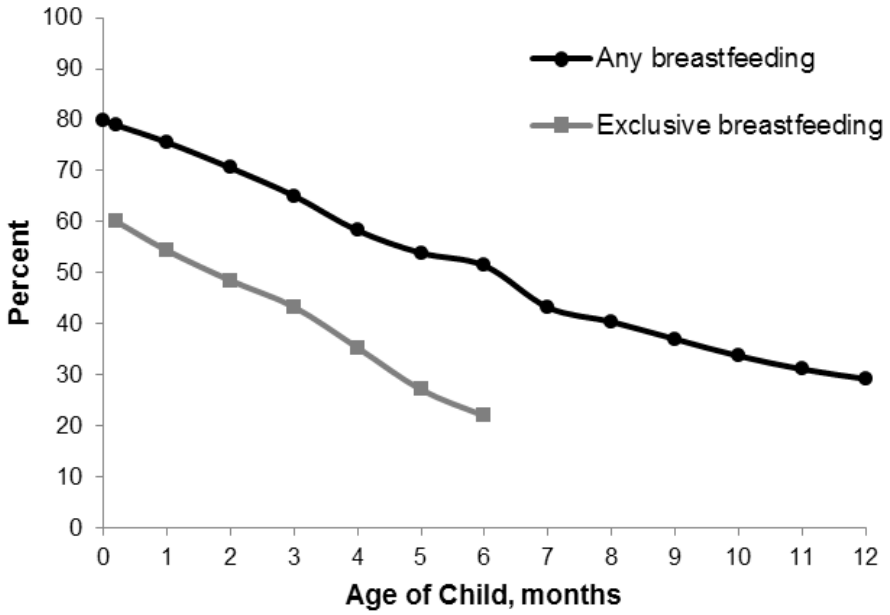
Figure 1. Rates of Any and Exclusive Breastfeeding by Age Among Children Born in the United States in 2012[46]



Source: http://www.cdc.gov/breastfeeding/data/nis_data/index.htm.

Figure 2. Analytic Framework

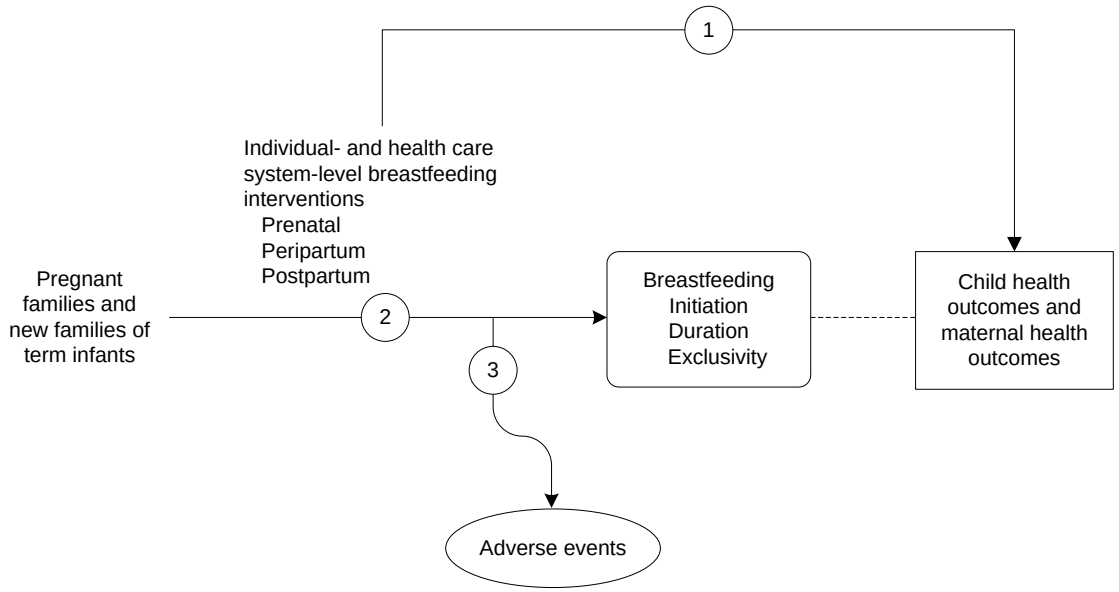
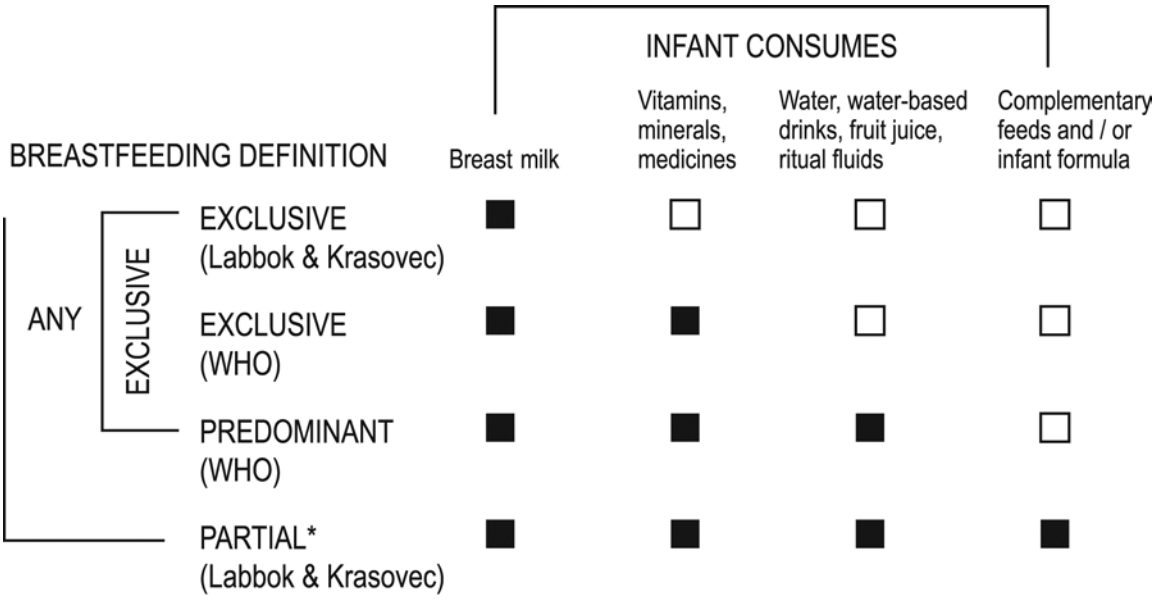
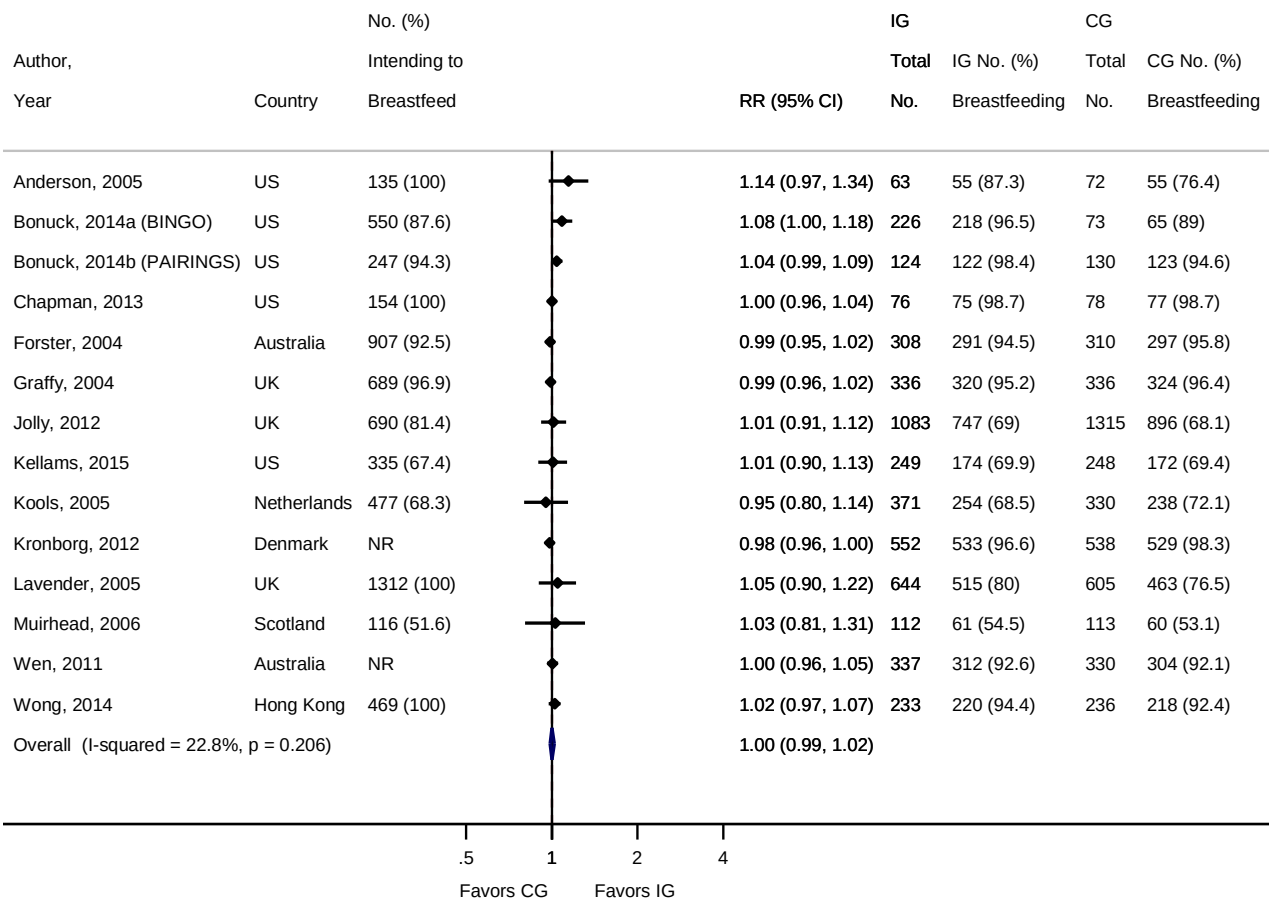


Figure 3. Definitions of Breastfeeding[2,77]



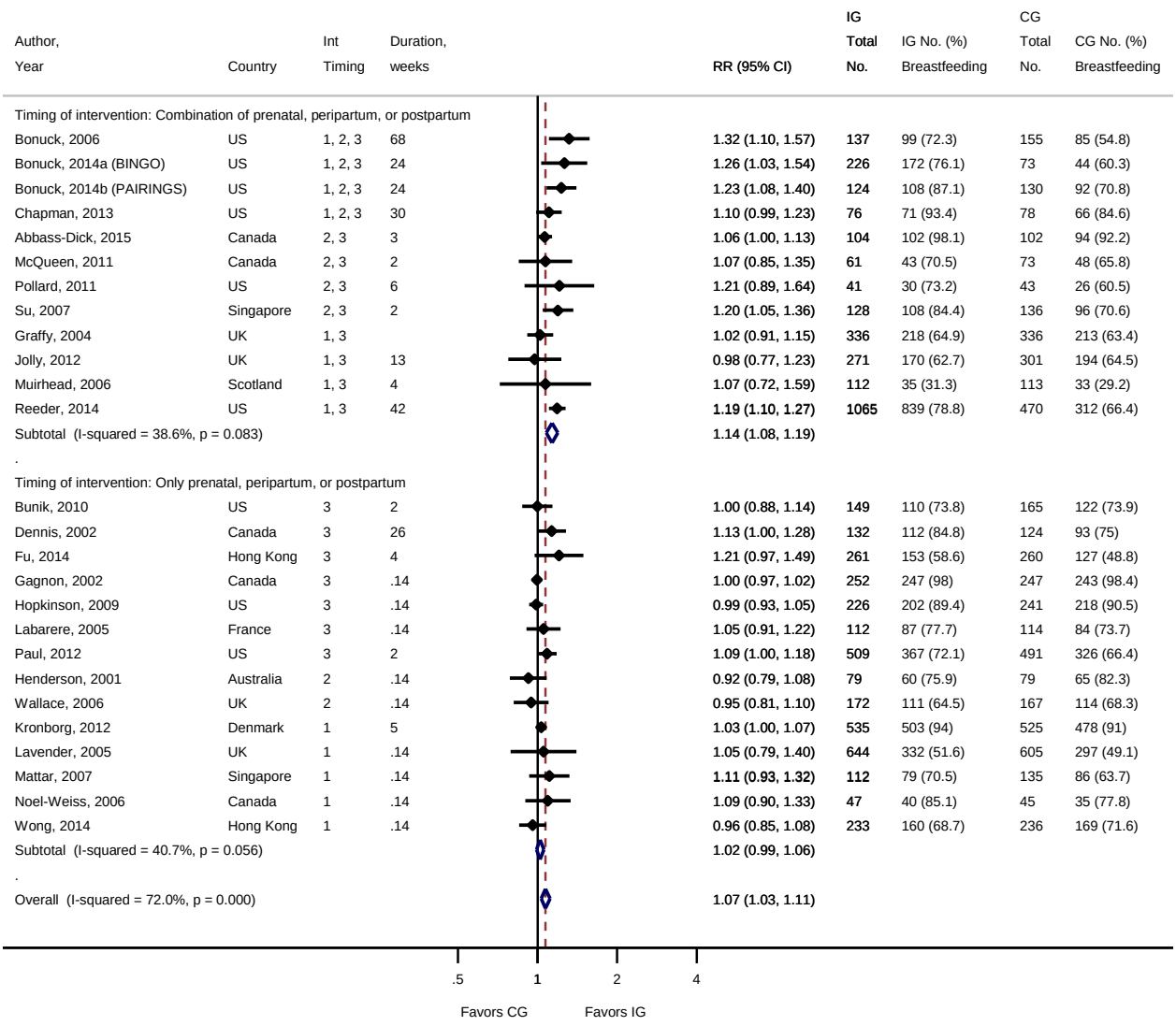
*Partial breastfeeding includes high intensity (>80% of feeds are breastfeeds), medium intensity (20-80% of feeds are breastfeeds), low intensity (<20% of feeds are breastfeeds), and token breastfeeding (i.e., minimal, occasional, irregular breastfeeds)

Figure 4. Pooled Analysis of Randomized, Controlled Trials for Any Breastfeeding Initiation



Abbreviations: BINGO=Best Infant Nutrition for Good Outcomes; BF=breastfeeding; CG=control group; Ed=education; IG=intervention group; n=number; N=number analyzed; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; NR=not reported; Peer=peer support; Prof=professional support; RR=risk ratio; UK=United Kingdom; US=United States.

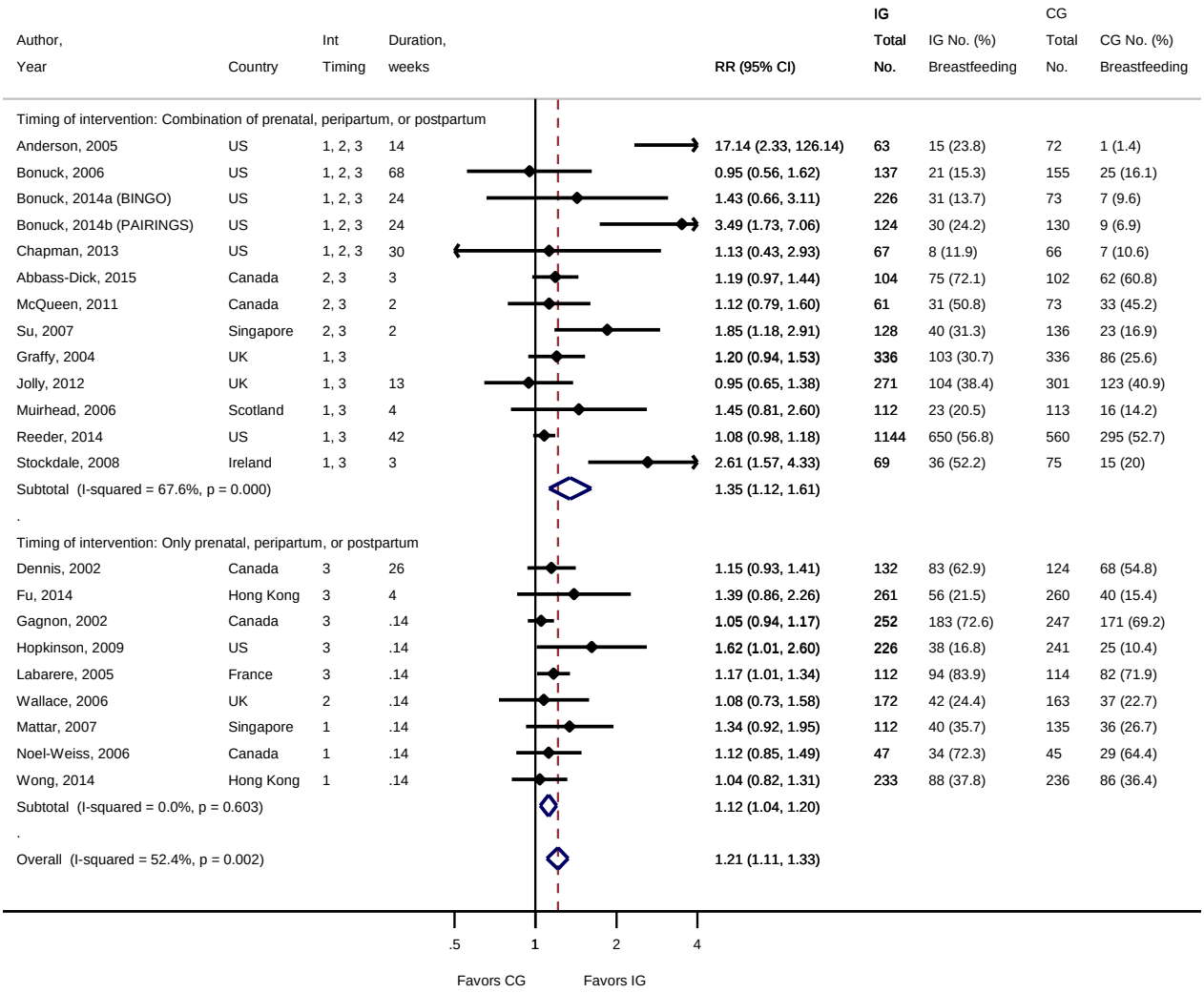
Figure 5. Pooled Analysis of Randomized, Controlled Trials for Any Breastfeeding at Less Than 3 Months



Significant difference in risk ratios between groups (b=1.11, SE=0.03, p=0.001 [95% CI, 1.05 to 1.17]). Intervention timing: 1=prenatal, 2=peripartum, 3=postpartum; duration is presented in weeks.

Abbreviations: BINGO=Best Infant Nutrition for Good Outcomes; CG=control group; Ed=education; IG=intervention group; int=intervention; n=number; N=number analyzed; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; Peer=peer support; Prof=professional support; RR=risk ratio; SE=standard error; UK=United Kingdom; US=United States.

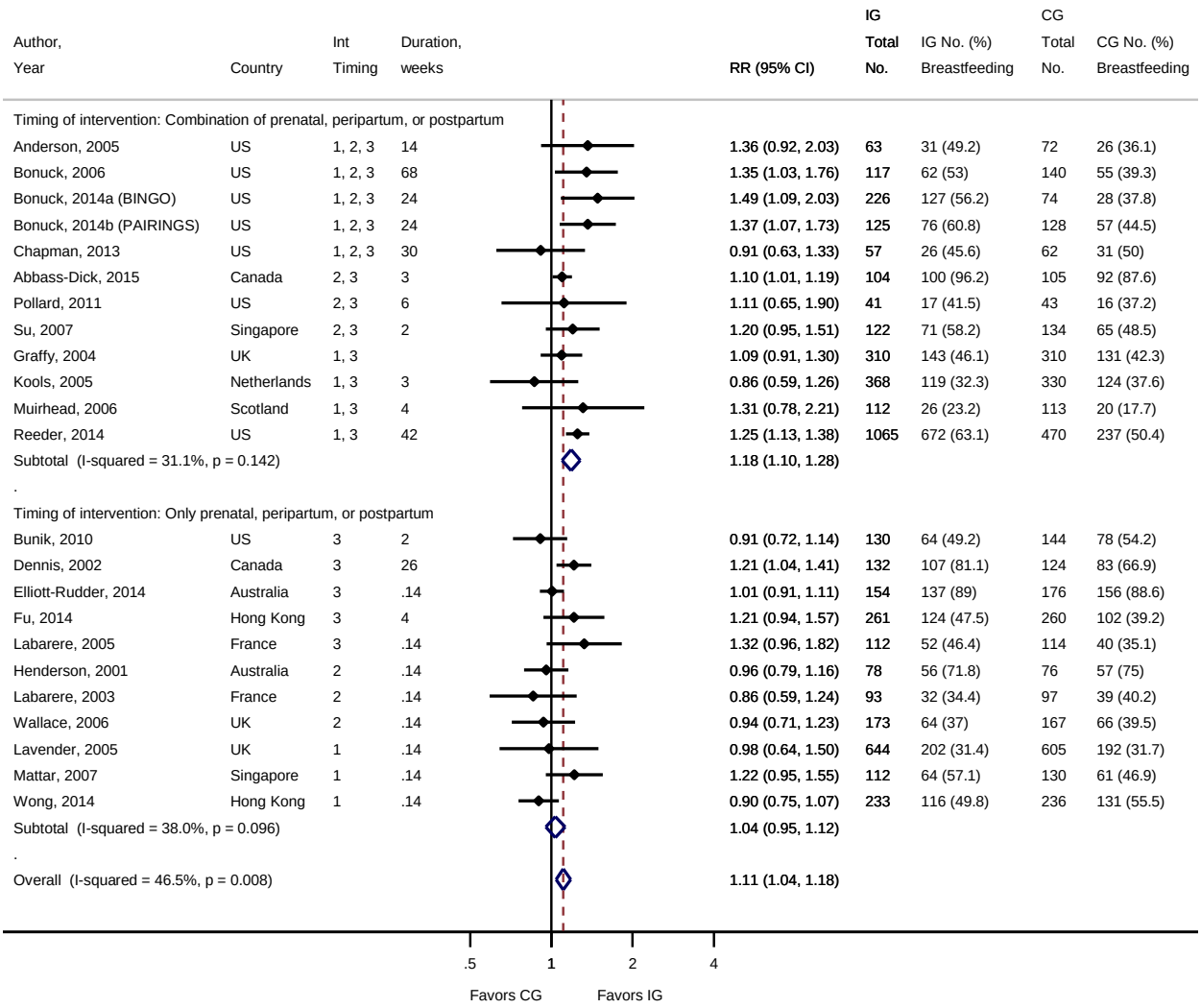
Figure 6. Pooled Analysis of Randomized, Controlled Trials for Exclusive Breastfeeding at Less Than 3 Months



No significant difference in risk ratios between groups (b=1.08, SE=0.11, p=0.424 [95% CI, 0.88 to 1.34]). Intervention timing: 1=prenatal, 2=peripartum, 3=postpartum; duration is presented in weeks.

Abbreviations: BINGO=Best Infant Nutrition for Good Outcomes; CG=control group; Ed=education; IG=intervention group; int=intervention; n=number; N=number analyzed; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; Peer=peer support; Prof=professional support; RR=risk ratio; SE=standard error; UK=United Kingdom; US=United States.

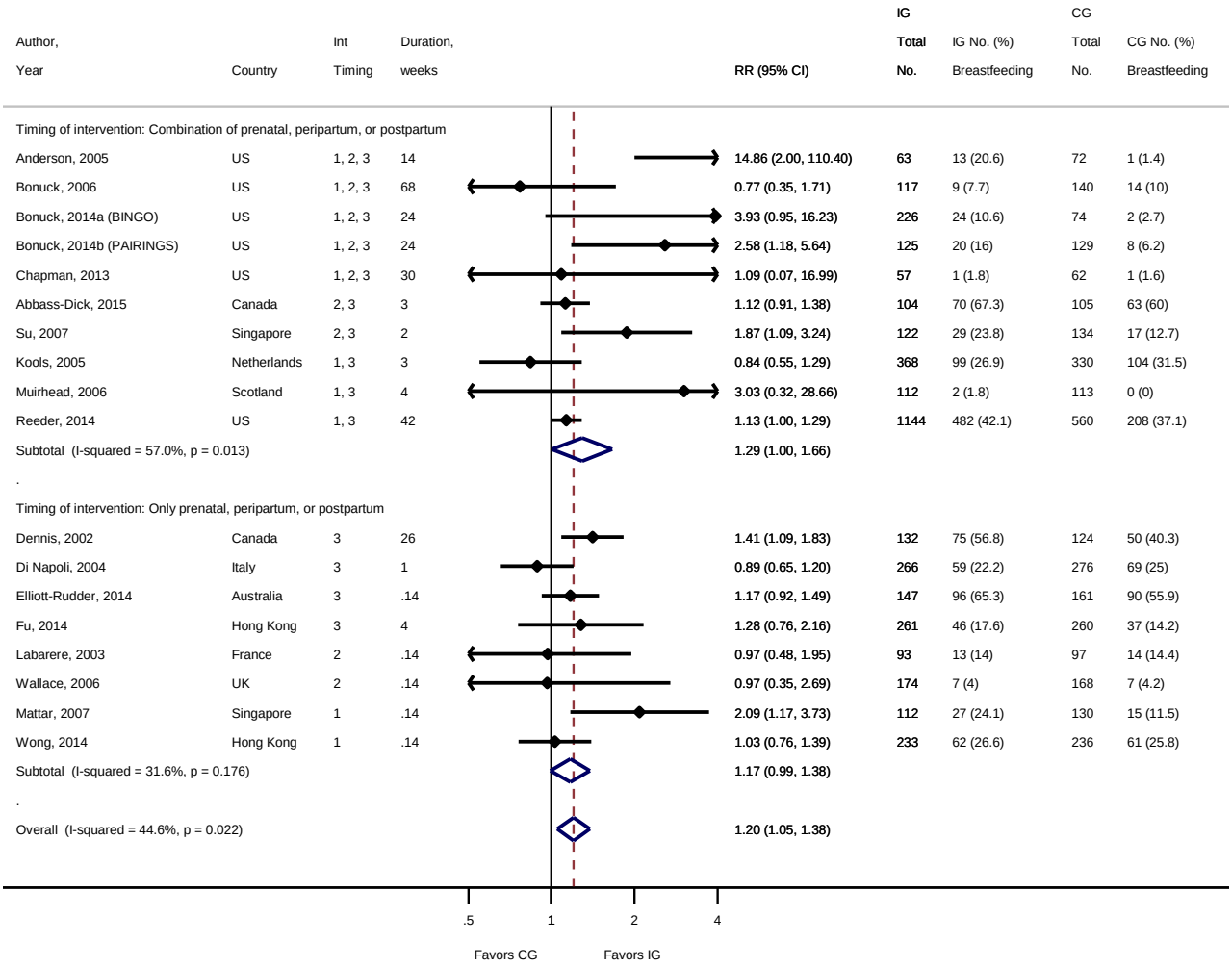
Figure 7. Pooled Analysis of Any Breastfeeding at 3 to Less Than 6 Months



Significant difference in risk ratios between groups (b=1.14, SE=0.06, p=0.026 [95% CI, 1.02 to 1.29]). Intervention timing: 1=prenatal, 2=peripartum, 3=postpartum; duration is presented in weeks.

Abbreviations: BINGO=Best Infant Nutrition for Good Outcomes; CG=control group; Ed=education; IG=intervention group; int=intervention; n=number; N=number analyzed; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; Peer=peer support; Prof=professional support; RR=risk ratio; SE=standard error; UK=United Kingdom; US=United States.

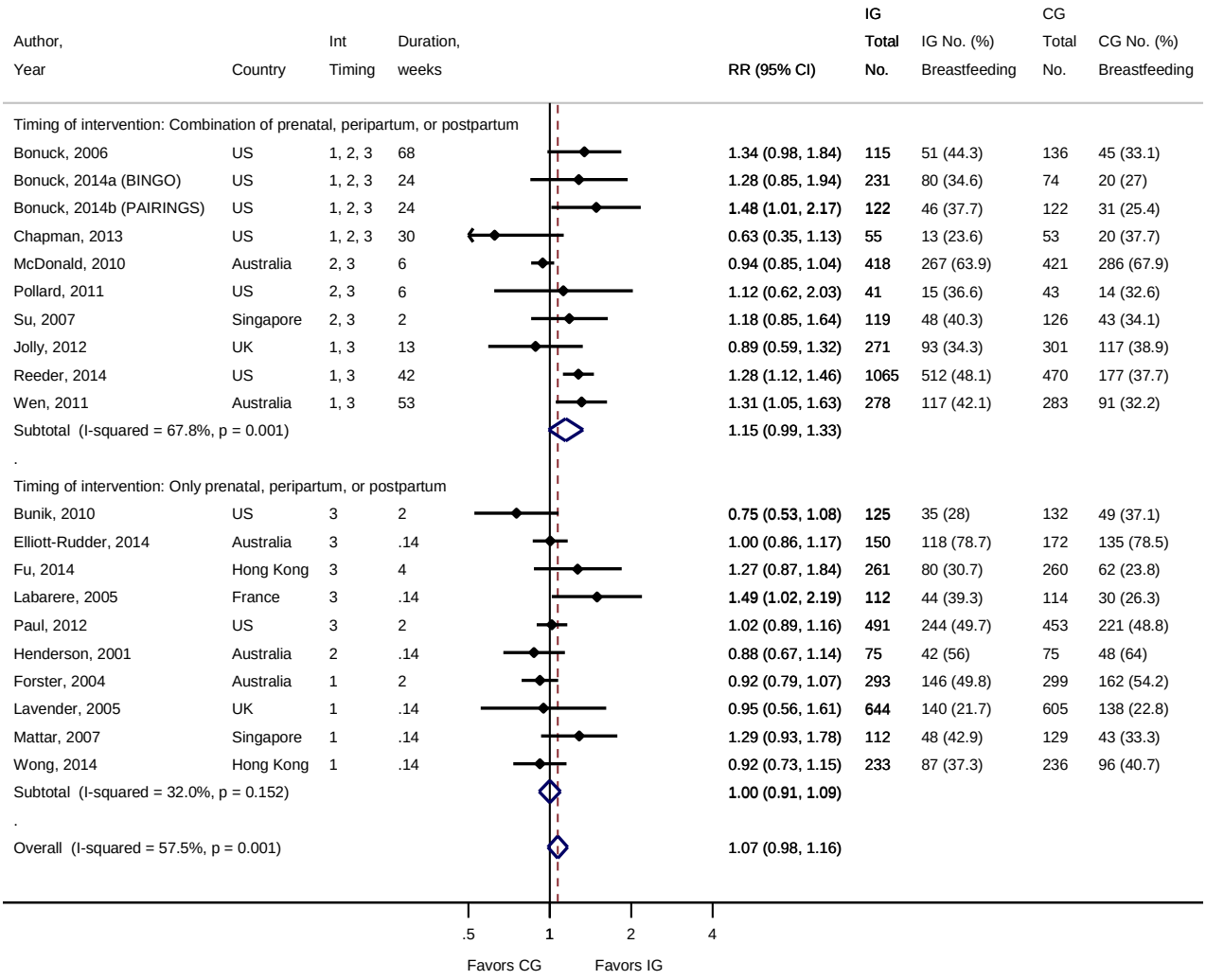
Figure 8. Pooled Analysis of Randomized, Controlled Trials for Exclusive Breastfeeding at 3 to Less Than 6 Months



No significant difference in risk ratios between groups (b=1.05, SE=0.17, p=0.761 [95% CI, 0.74 to 1.50]). Intervention timing: 1=prenatal, 2=peripartum, 3=postpartum; duration is presented in weeks.

Abbreviations: BINGO=Best Infant Nutrition for Good Outcomes; CG=control group; Ed=education; IG=intervention group; int=intervention; n=number; N=number analyzed; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; Peer=peer support; Prof=professional support; RR=risk ratio; SE=standard error; UK=United Kingdom; US=United States.

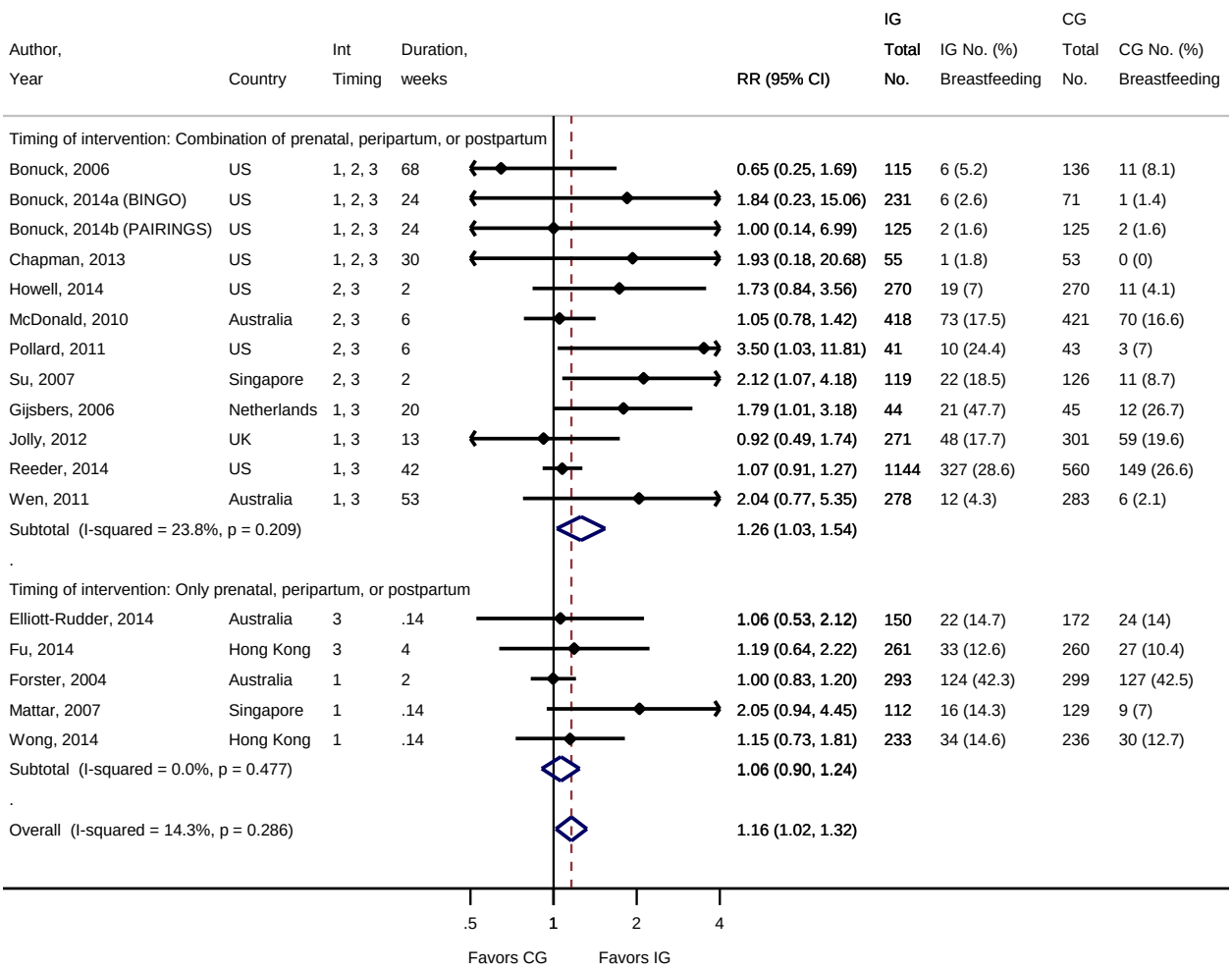
Figure 9. Pooled Analysis of Randomized, Controlled Trials for Any Breastfeeding at 6 Months



No test for subgroup differences performed given lack of statistical significance in overall effect.
Intervention timing: 1=prenatal, 2=peripartum, 3=postpartum; duration is presented in weeks.

Abbreviations: BINGO=Best Infant Nutrition for Good Outcomes; CG=control group; Ed=education; IG=intervention group; int=intervention; n=number; N=number analyzed; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; Peer=peer support; Prof=professional support; RR=risk ratio; SE=standard error; UK=United Kingdom; US=United States.

Figure 10. Pooled Analysis of Randomized, Controlled Trials for Exclusive Breastfeeding at 6 Months



No significant difference in risk ratios between groups (b=1.11, SE=0.17, p=0.497 [95% CI, 0.81 to 1.53]). Intervention timing: 1=prenatal, 2=peripartum, 3=postpartum; duration is presented in weeks.

Abbreviations: BINGO=Best Infant Nutrition for Good Outcomes; CG=control group; Ed=education; IG=intervention group; int=intervention; n=number; N=number analyzed; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; Peer=peer support; Prof=professional support; RR=risk ratio; SE=standard error; UK=United Kingdom; US=United States.

Table 1. WHO/UNICEF 10 Steps to Successful Breastfeeding

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within one hour of birth.
5. Show mothers how to breastfeed, and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless medically indicated.
7. Practice rooming in (allow mothers and infants to remain together) 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.*
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

*The AAP does not support a categorical ban on pacifiers because of their role in sudden infant death risk reduction and their analgesic benefit during painful procedures when breastfeeding cannot provide the analgesia. Pacifier use in the hospital in the neonatal period should be limited to specific medical indications such as pain reduction and calming in a drug-exposed infant, for example. Mothers of healthy full-term breastfed infants should be instructed to delay pacifier use until breastfeeding is well established, usually about 3 to 4 weeks after birth.[4]

Table 2. Healthy People 2020 Objectives[10] for Breastfeeding and Current Prevalence[46]

Objective	2020 Target (%)	2012 Overall Prevalence (%)							
		U.S. National	Maternal age <20 years	White*	Black*	Hispanic	Asian*	Hawaiian/Pacific Islander*	American Indian/ Alaska Native*
Any breastfeeding[†]									
Ever[‡]	81.9	80.0	58.6	83.0	66.4	82.4	83.2	83.9	71.5
At 6 months	60.6	51.4	17.4	55.8	35.3	51.4	65.6	32.6	28.8
At 1 year	34.1	29.2	4.3	32.8	16.9	27.9	42.3	14.4	17.9
Exclusive breastfeeding[§]									
Through 3 months	46.2	43.3	28.3	48.0	33.4	40.3	46.5	43.3	27.4
Through 6 months	25.5	21.9	8.0	24.4	13.9	20.8	26.9	11.8	12.5
Reduce the proportion of breastfed newborns who receive formula supplementation within the first 2 days of life	14.2	19.1	--	--	--	--	--	--	--
Increase the proportion of live births that occur in facilities that provide recommended care for lactating mothers and their babies	8.1	14.1[9]	--	--	--	--	--	--	--

* Non-Hispanic.
† Any breastfeeding or being fed breast milk.
‡ Ever breastfed or fed breast milk.
§ Child receives no solids, water, or other liquids.

Table 3. Association Between Breastfeeding and Infant/Child Outcomes

	Evidence From 2007 AHRQ EHC Report*			Recent Evidence From Existing Systematic Reviews		
Infant Outcome	k	Breastfeeding Comparison	Pooled Adjusted OR (95% CI)	k	Breastfeeding Comparison	Pooled OR (95% CI)
Acute otitis media	2[12]	Ever vs. never	0.77 (0.64 to 0.91)	5[17]	Ever vs. never	0.67 (0.56 to 0.80)
	3[12]	Exclusive ≥3 or ≥6 mo vs. never	0.50 (0.36 to 0.70)	5[17]	Exclusive 6 mo vs. nonexclusive	0.57 (0.44 to 0.75)
Asthma	18[12]	≥3 mo vs. never	0.73 (0.59 to 0.92)†	13[24]	Ever vs. never	0.88 (0.82 to 0.95)
				13[24]	Exclusive >3 or 4 mo vs. <3 mo	0.94 (0.69 to 1.29)
Atopic dermatitis	18[26]	Exclusive ≥3 mo vs. <3 mo	0.58 (0.41 to 0.92)‡	6[24§§]	≥3 to 4 mo vs. "other"	0.74 (0.57 to 0.97)[¶¶]
				17[24§§]	"More" vs. "less"	0.95 (0.85 to 1.07)[¶¶]
Cardiovascular risk factors: systolic blood pressure	24[190]	Ever vs. never	NR††	18[21]	Ever vs. never	-0.70 mm Hg (-1.18 to -0.21)[¶¶]
Cardiovascular risk factors: diastolic blood pressure	23[190]	Ever vs. never	NR††	19[21]	Ever vs. never	-0.34 mm Hg (-0.76 to 0.09)[¶¶]
Cardiovascular risk factors: cholesterol	37[191]	Ever vs. never	NR#	26[21]	Ever vs. never	-0.01 mmol/L (-0.05 to 0.02)[¶¶]
Childhood leukemia	3[12]	≤6 mo vs. never	0.91§ (0.83 to 1.00)	18[15]	Ever vs. never	0.89 (0.84 to 0.94)
	3[12]	>6 mo vs. never	0.80§ (0.71 to 0.91)	18[15]	≥6 mo vs. <6 mo	0.81 (0.73 to 0.89)
Cognitive development	48[12]	Ever vs. never	NR¶	17[22##]	Varied by study; 7/17 included studies were ever vs. never	3.44 points (2.30 to 4.58)[¶¶]
Diabetes mellitus: type 1	17[30]	Ever vs. never	NR**	14[18]	Ever vs. never	0.81 (0.72 to 0.92)
	17[30]	<3 mo vs. ≥3 mo	1.23§ (1.12 to 1.35)	28[18]	≥2 wk vs. <2 wk	0.93 (0.81 to 1.07)
Diabetes mellitus: type 2	7[31]	Ever vs. never	0.61 (0.44 to 0.85)	11[21]	Varied	0.65 (0.49 to 0.86)
Gastrointestinal infection	14[27]	Ever vs. never	0.36 (0.32 to 0.41)	2[23]	Never vs. ever	1.32 (1.06 to 1.63)***
Lower respiratory tract infection	7[29]	Exclusive ≥4 mo vs. never	0.28‖ (0.14 to 0.54)	No updated evidence synthesis identified		
Obesity	9[32]	Varied‡‡	0.78 (0.71 to 0.85)	113[21]	Varied	0.74 (0.70 to 0.78)
				26[21]	Ever vs. never	0.77 (0.69 to 0.86)
SIDS	7[12]	Ever vs. never	0.64 (0.51 to 0.81)	20[14]	Varied	NR†††
All-cause mortality	1[12]	Ever vs. never	0.79 (0.67 to 0.93)	2[25]	None vs. partial (infants 0 to 5 mo)	3.89 (2.28 to 6.65)‡‡‡
				4[25]	None vs. partial (infants 6 to 11 mo)	1.76 (1.28 to 2.41)‡‡‡
				6[25]	None vs. partial (children 12 to 23 mo)	1.97 (1.45 to 2.67)‡‡‡

* The 2007 AHRQ EHC Report[12] was based on original or updated systematic reviews as well as a review of existing systematic reviews or meta-analyses. We note the citation for the source of the data for each outcome alongside the number of studies.

† Among those without a family history.

‡ Among those with a family history.

§ Unadjusted.

‖ Hospitalization for lower respiratory tract infection.

¶ Authors concluded there was little or no evidence for an association between breastfeeding in infancy and cognitive performance in childhood based on qualitative synthesis.

Authors concluded the relationships between breastfeeding and adult cholesterol levels, cardiovascular disease mortality, or ischemic heart disease mortality cannot be characterized due to limited data.

** For risk of type 1 diabetes for breastfeeding <3 months vs. ≥3 months.

Table 3. Association Between Breastfeeding and Infant/Child Outcomes

†† Authors concluded an association between history of breastfeeding and small reduction in adult blood pressure exists but the clinical or public health implication of the finding is unclear.
‡‡ The pooled adjusted OR of obesity was 0.76 (95% CI, 0.64 to 0.86) in studies comparing ever with never breastfeeding (number of studies not reported) vs. 0.74 (95% CI, 0.64 to 0.85) in studies that used other comparisons (number of studies not reported).
§§ Eczema/atopic dermatitis.
‖‖ In children younger than age 2 years; ORs also reported for children older than age 2 years.
¶¶ Mean effect.
Studies in this review were limited to those with the specific outcome of performance on intelligence tests.
*** Risk ratio for the effect of not breastfeeding compared with any breastfeeding on diarrhea incidence among infants ages 6 to 11 months.
††† Pooled OR not reported. Breastfeeding was reported to have a protective effect on SIDS in 10 of 17 observational studies as well as 3 of 3 meta-analyses included in the review.
‡‡‡ Reported as risk ratio.

Abbreviations: AHRQ=Agency for Healthcare Research and Quality; CI=confidence interval; EHC=Effective Healthcare Program; k=number of studies; mo=month; NR=not reported; OR=odds ratio; SIDS=Sudden Infant Death Syndrome; wk=week.

Table 4. Association Between Breastfeeding and Maternal Health Outcomes

	Evidence from 2007 AHRQ EHC Report*			Recent Evidence From Existing Systematic Reviews		
Maternal Outcome	**k**	**Breastfeeding Comparison**	**Pooled OR (95% CI)**	**k**	**Breastfeeding Comparison**	**Pooled OR (95% CI)**
Breast cancer	47[39]	Ever vs. never	0.96† (99% SE, 0.2; p=0.04)	98[19]	Ever vs. never	0.78 (0.74 to 0.82)
	23[38]	Lifetime breastfeeding >12 mo vs. never	0.72 (0.65 to 0.80)	50[19]	Lifetime breastfeeding ≥12 mo vs. never	0.74 (0.69 to 0.79)
Ovarian cancer	9[12]	Ever vs. never	0.79† (0.68 to 0.91)	41[19]	Ever vs. never	0.70 (0.64 to 0.77)
	6[12]	Lifetime breastfeeding ≥12 mo vs. never	0.72† (0.54 to 0.97)	29[19]	Lifetime breastfeeding ≥12 mo vs. never	0.63 (0.56 to 0.71)
Diabetes mellitus: type 2	2[12]	Ever vs. never	NR‡	6[16]	"Longer" vs. "shorter" duration of lifetime breastfeeding	0.68 (0.57 to 0.82)

* The 2007 AHRQ EHC Report[12] was based on original or updated systematic reviews as well as a review of existing systematic reviews or meta-analyses. We note the citation for the source of the data for each outcome alongside the number of studies.

† Adjusted risk ratio reported.

‡ Longer duration of lifetime breastfeeding was associated with reduced risk of developing type 2 diabetes among parous women without a history of gestational diabetes in two large U.S. cohort studies.

Abbreviations: AHRQ=Agency for Healthcare Research and Quality; CI=confidence interval; EHC=Effective Healthcare Program; k=number of studies; mo=month; NR=not reported; OR=odds ratio; SE=standard error.

Table 5. Interventions to Support or Promote Breastfeeding

Intervention	Types	Examples
Individual-level support and education	Professional support	One-to-one support during hospital stay or outpatient visits, home visits, or telephone support from health professionals
	Peer support	Peer counseling or social support from peers or lay persons
	Formal or structured education	Structured education sessions or classes directed at mothers or other family members (workshops, didactic teaching session, booklets), typically provided in group sessions
System-level policies and practices	Policies, programs, and staff training	Baby-Friendly Hospital Initiative, implementation of a new policy or protocol, or training of health professionals
	Other maternity care practices	Encouragement of skin-to-skin contact*, rooming-in†, restricted pacifier use, and distribution of breast pumps

* After birth, the newborn is weighed and then immediately placed naked in a prone position between the mother's breasts until the mother chooses to stop the contact or the newborn seems to be ready for feeding.
† The hospital practice where postnatal mothers with healthy infants (including those born by caesarean delivery) stay together in the same room 24 hours a day, from the time they arrive in their room after delivery. They remain together until discharge unless there is a specific medical indication which warrants separation. During rooming-in the infant is placed close to the mother by bed-sharing, an attached side-car crib, or a stand-alone cot by her bedside.[7]

Table 6. Study and Population Characteristics for All Studies, by Author

Author, Year, Quality	Country	n Rand	Key Inclusion Criteria	Primiparous (%)	Previously Breastfed (%)*	Currently BF	Intending to BF (%)	Population Characteristics
Abbass-Dick, 2015[90] Good	Canada	214	≥18 years old; primiparous; exclusively breastfeeding in hospital and intending to breastfeed >12 weeks; living with male partner who is available to participate in study	100	NA	Y	100[†]	Predominantly well educated (72.9% attended university), race/ethnicity NR
Anderson, 2005[91] Fair	US	182	≥18 years old; considering breastfeeding; living in a household earning <185% of the federal poverty level	51.9	40	N	100	Predominantly inner city, Hispanic (71.9%), low-income, not married or cohabiting
Bonuck, 2006[93] Fair	US	382	Not on chronic therapy with medications incompatible with breastfeeding	39.8	42.4	N	76.6	Predominantly low-income Hispanic (56.6%) or black (36.2%), 39.3% foreign-born
Bonuck, 2014a (BINGO)[92] Good	US	666	≥18 years old	39.2	45.2	N	87.6	Predominantly urban, low-income Hispanic (56.8%) or black (28.5%)
Bonuck, 2014b (PAIRINGS)[92] Good	US	275	≥18 years old	43.5	49.2	N	94.3	Predominantly Hispanic (55.7%) or black (28.2%)
Bunik, 2010[95] Fair	US	341	≥18 years old; willing to consider breastfeeding	100	NA	N	100	Predominantly low-income, Spanish-speaking (65.1%), Hispanic (87.7%)
Carfoot, 2005[96] Fair	UK	204	Intending to breastfeed; did not request either skin-to-skin contact or no skin-to-skin contact after delivery	43.6	48.0	N	100	NR
Carlsen, 2013[97] Fair	Denmark	226	Infant postnatal age <48 hours; began breastfeeding at start of intervention and intending to continue; history of breast surgery; prepregnancy BMI ≥30 kg/m^2	60.4	NR	Y	100	Obese; demographic data sparse; race/ethnicity NR
Chapman, 2013[98] Fair	US	206	≥18 years old; considering breastfeeding; prepregnancy BMI ≥27.0 kg/m^2; income <185% of federal poverty level	NR	NR	N	100	Overweight or obese, predominantly low-income and unemployed Hispanic (81.8%), 50% of Puerto Rican origin
Dennis, 2002[99] Fair	Canada	258	≥16 years old; currently breastfeeding in the hospital; primiparous	100	NA	Y	99.6	Well educated (74.6% at least college education), race/ethnicity NR

Table 6. Study and Population Characteristics for All Studies, by Author

Author, Year, Quality	Country	n Rand	Key Inclusion Criteria	Primiparous (%)	Previously Breastfed (%)*	Currently BF	Intending to BF (%)	Population Characteristics
Di Meglio, 2010[100] Fair	US	78	<21 years old; currently breastfeeding (1 day postpartum)	87.2	9.0	Y	70.8‡	Young adults (<21 years old), predominantly low-income black (50.0%) or white (47.4%)
Di Napoli, 2004[101] Fair	Italy	605	Began breastfeeding at start of intervention and intending to continue	44.3	37.2	Y	100	Well educated (61.0% high school or college degree), race/ethnicity NR
Edwards, 2013[102] Fair	US	248	<21 years old; not planning on having a cesarean delivery	88.7	NR	N	62.1	Young adults (<21 years old), low-income African American, predominantly currently in school (54.4%) and residing with parent (78.2%)
Elliott-Rudder, 2014[80] Good	Australia	330	Currently breastfeeding for ≥8 weeks; planning to receive postnatal care at a participating general practice	36.2	44.1	Y	NR	Currently breastfeeding for ≥8 weeks, well educated (53.1% college degree or higher), race/ethnicity NR
Forster, 2004[103] Fair	Australia	984	Primiparous	100	NA	N	92.5	Low-income, culturally diverse, sparse demographic data
Fu, 2014[82] Fair	Hong Kong	724	≥18 years old; primiparous; Hong Kong Chinese; intending to breastfeed	100	NA	N	100	Hong Kong Chinese
Gagnon, 2002[104] Fair	Canada	586	Participating in hospital's short stay program; infant breastfed at least once in the hospital	32.6	NR	Y	89.1‡	General, race/ethnicity NR
Gijsbers, 2006[84] Fair	Netherlands	91	≥1 first-degree relative had asthma that had been diagnosed by a doctor	41.6	53.9	N	86.5	Family history of asthma, well educated (53.9% highest level of secondary education or university), race/ethnicity NR
Gouchon, 2010[105] Fair	Italy	36	Scheduled for elective cesarean delivery	23.5	58.8	N	NR	General, race/ethnicity NR
Graffy, 2004[106] Fair	UK	720	Considering breastfeeding; had not breastfed a previous child for ≥6 weeks	74.9	NR	N	96.9	General, predominantly white (69.7%)
Hawkins, 2014a[107] Good	US	25,327	Gave birth at BFHI-accredited hospital (or nonaccredited for CG) in Alaska, Maine, Nebraska, Ohio, or Washington during 1999 to 2009	41.9	NR	NR	NR	General, predominantly white (50.7%)

Table 6. Study and Population Characteristics for All Studies, by Author

Author, Year, Quality	Country	n Rand	Key Inclusion Criteria	Primiparous (%)	Previously Breastfed (%)*	Currently BF	Intending to BF (%)	Population Characteristics
Hawkins, 2014b[108] Good	US	2,014	Gave birth at BFHI-accredited hospital (or nonaccredited for CG) in Maine during 2004 to 2008	NR	NR	NR		General, predominantly white (95.6%)
Henderson, 2001[109] Good	Australia	160	Primiparous; planning on breastfeeding	100	NA	Y	100	General, race/ethnicity NR
Hoddinott, 2009[110] Good	Scotland	17,482	Pregnant or breastfeeding; registered at participating general practices in 2002	NR	NR	NR	NR	Predominantly living in deprived areas**
Hopkinson, 2009[111] Good	US	522	Mixed feeding in the hospital	NR	NR	Y	NR	Majority (98%) born in Mexico or Central America**
Howard, 2003[112] Good	US	807	Intending to breastfeed for ≥4 weeks; undecided about or wanted pacifier use	39.3	54.0	N	100	Predominantly white (86.6%), employed (77.1%), expectant father lives in household (91.0%)
Howell, 2014[114] Fair	US	540	≥18 years old; black or Hispanic	40.7	NR	N	NR	Black (37.6%) or Hispanic (62.4%), predominantly low-income and well-educated (54.0% some college or more)
Jenik, 2009[115] Good	Argentina	1,021	Exclusively breastfeeding at 2 weeks; intending to breastfeed for ≥3 months; not using pacifiers	NR	41.0	Y	100	Predominantly or exclusively Hispanic††
Jolly, 2012[83] Fair	UK	2,724	Estimated delivery date in study period	34.4	46.1	N	81.4	Predominantly of Asian or Middle Eastern origin, living in deprived urban areas
Kellams, 2015[116] Good	US	522	Women with income <185% of the federal poverty level	NR	NR	N	67.4	Low-income, predominantly black (45.4%) or white (41.6%)
Kools, 2005[81] Fair	Netherlands	781	Applied for maternity care in intervention or control maternity centers	55.9	28.7	N	68.3	General, race/ethnicity NR
Kramer, 2001[117] Good	Canada	281	Intending to breastfeed for ≥3 months	47.3	50.8	N	100	Multicultural (66.2% English predominant language), predominantly well educated (16.0 mean years of education), employed (76.0%), married (81.4%)

Table 6. Study and Population Characteristics for All Studies, by Author

Author, Year, Quality	Country	n Rand	Key Inclusion Criteria	Primiparous (%)	Previously Breastfed (%)*	Currently BF	Intending to BF (%)	Population Characteristics
Kronborg, 2012[118] Fair	Denmark	1,193	≥18 year old; primiparous	100	NA	N	NR	General, most with >10 years education (90.9%), race/ethnicity NR
Labarere, 2003[119] Good	France	210	≥18 year old; currently breastfeeding in the hospital	52.6	NR	Y	NR	Predominantly well-educated (58.9% partial college or college degree), employed (69.2%), race/ethnicity NR
Labarere, 2005[120] Good	France	231	Breastfeeding on day of discharge	52.4	NR	Y	NR	Predominantly well-educated (74.0% >high school), employed (77.5%), race/ethnicity NR
Lavender, 2005[79] Fair	UK	1,312	Expressing a desire to breastfeed	51.2	NR	N	100	Predominantly deprived or low-income white (92.1%)
Mattar, 2007[122] Fair	Singapore	401	No previous cesarean delivery; no obstetric complications that would contraindicate vaginal delivery	37.2	64.4	N	95.3	Asian, predominantly low-income and unemployed
McDonald, 2010[123] Good	Australia	849	≥18 years old; intending to breastfeed	50.4	NR	N	100[§]	General, lower SES (33.6%), race/ethnicity NR
McQueen, 2011[124] Good	Canada	150	Primiparous; intending to breastfeed	100	NA	N	100	Predominantly white (81.3%), well-educated (71.3% college)
Muirhead, 2006[126] Fair	Scotland	225	Received prenatal care at a participating clinic	53.3	23.6	N	51.6	NR
Noel-Weiss, 2006[128] Fair	Canada	101	Primiparous; intending to breastfeed	100	NA	N	100	Predominantly high family income, well-educated, in committed relationship
Nolan, 2009[129] Fair	US	50	Scheduled for a planned repeat cesarean delivery	0	NR	N	NR	Predominantly white (72.0%), married (68.0%)

Table 6. Study and Population Characteristics for All Studies, by Author

Author, Year, Quality	Country	n Rand	Key Inclusion Criteria	Primiparous (%)	Previously Breastfed (%)*	Currently BF	Intending to BF (%)	Population Characteristics
Paul, 2012[130] Fair	US	1,154	Attempting to breastfeed during maternity stay; intent to continue breastfeeding after discharge	47.5	48.6	Y	100	Predominantly white (88.4%), well-educated (57.4% college degree), higher income, married (79.0%)
Pollard, 2011[131] Good	US	86	18 to 40 years old; primiparous; intending to breastfeed; initiated breastfeeding within 24 hours of delivery	100	NA	Y	100	Predominantly white (96.5%), married (80.2%), employed (59.3%)
Quinlivan, 2003[132] Fair	Australia	136	≤18 years old; intending to continue with pregnancy and not relinquish the infant	NR	NR	N	NR	Adolescents (≤18 years), predominantly low SES (86.6%), 24.3% indigenous Australian
Reeder, 2014[133] Fair	US	1,948	Attending a new pregnancy appointment for WIC; intending or undecided about breastfeeding	NR	NR	N	NR	Low income, predominantly less educated, Hispanic (58.3%)
Stockdale, 2008[134] Fair	Ireland	182	Primiparous	100	NA	N	NR	General, race/ethnicity NR
Su, 2007[135] Fair	Singapore	450	Intending to breastfeed	39.6	56.4	N	100	Asian, predominantly low income
Wallace, 2006[136] Fair	UK	370	Primiparous; intending to breastfeed; able to sit out of bed at time of first feed; no cesarean delivery	100	NA	N	100	NR
Wambach, 2011[137] Fair	US	390	15 to 18 years old; primiparous; planning to keep newborn	100	NA	N	NR	Adolescents (15–18 years), predominantly black (61.0%), low family income, in school (71.0%), living with family (74.0%)
Wen, 2011[139] Good	Australia	667	≥16 years old; primiparous	100	NA	N	NR	General, race/ethnicity NR
Wong, 2014[140] Good	Hong Kong	469	≥18 years old; primiparous; intending to breastfeed; Hong Kong resident	100	NA	N	100	Asian, predominantly well-educated (54.4% postsecondary or university degree), high family income

* Among full sample not just multiparous.
† Intended to breastfeed for >12 weeks.
‡ Intended to exclusively breastfeed.
§ 76.3% intended to breastfeed >6 months.

Table 6. Study and Population Characteristics for All Studies, by Author

** As described in study text.
†† Race/ethnicity NR, assume 100% Hispanic.

Abbreviations: BF=breastfeed; BFHI=Baby-Friendly Hospital Initiative; BINGO=Best Infant Nutrition for Good Outcomes; BMI=body mass index; CG=control group; n=number; N=no; NA=not applicable; NR=not reported; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; rand=randomized; SES=socioeconomic status; UK=United Kingdom; US=United States; Y=yes.

Table 7. Intervention Characteristics for All Studies, by Author

Author, Year	Quality	Identified in Update	Country	n Rand	Key Inclusion Criteria	Primiparous, n (%)	Previously Breastfed (%)*	Currently BF	Intending to BF, n (%)	Population Characteristics
Abbass-Dick, 2015[3]	Good	X	Canada	214	≥18 years old; primiparous; exclusively breastfeeding in hospital and intending to breastfeed >12 weeks; living with male partner who is available to participate in study	214 (100)	NA	Y	214 (100)[†]	Predominantly well-educated (72.9% attended university), race/ethnicity NR
Anderson, 2005[4]	Fair		US	182	≥18 years old; considering breastfeeding; living in a household earning <185% of the federal poverty level	70 (51.9)	40	N	135 (100)	Predominantly inner city, Hispanic (71.9%), low-income, not married or cohabiting
Bonuck, 2006[5]	Fair		US	382	Not on chronic therapy with medications incompatible with breastfeeding	121 (39.8)	42.4	N	233 (76.6)	Predominantly low-income Hispanic (56.6%) or black (36.2%), 39.3% foreign-born
Bonuck, 2014a (BINGO)[6]	Good	X	US	666	≥18 years old	246 (39.2)	45.2	N	550 (87.6)	Predominantly urban, low-income Hispanic (56.8%) or black (28.5%)
Bonuck, 2014b (PAIRINGS)[6]	Good	X	US	275	≥18 years old	114 (43.5)	49.2	N	247 (94.3)	Predominantly Hispanic (55.7%) or black (28.2%)
Bunik, 2010[7]	Fair	X	US	341	≥18 years old; willing to consider breastfeeding	341 (100)	NA	N	339 (100)	Predominantly low-income, Spanish-speaking (65.1%), Hispanic (87.7%)
Carfoot, 2005[8]	Fair		UK	204	Intending to breastfeed; did not request either skin-to-skin contact or no skin-to-skin contact after delivery	89 (43.6)	48.0	N	204 (100)	NR

Table 7. Intervention Characteristics for All Studies, by Author

Author, Year	Quality	Identified in Update	Country	n Rand	Key Inclusion Criteria	Primiparous, n (%)	Previously Breastfed (%)*	Currently BF	Intending to BF, n (%)	Population Characteristics
Carlsen, 2013[9]	Fair	X	Denmark	226	Infant postnatal age <48 hours; began breastfeeding at start of intervention and intending to continue; history of breast surgery; prepregnancy BMI ≥30 kg/m^2	125 (60.4)	NR	Y	207 (100)	Obese; demographic data sparse; race/ethnicity NR
Chapman, 2013[10]	Fair	X	US	206	≥18 years old; considering breastfeeding; prepregnancy BMI ≥27.0 kg/m^2; income <185% of federal poverty level	NR (NR)	NR	N	154 (100)	Overweight or obese, predominantly low-income and unemployed Hispanic (81.8%), 50% of Puerto Rican origin
Dennis, 2002[11]	Fair		Canada	258	≥16 years old; currently breastfeeding in the hospital; primiparous	256 (100)	NA	Y	255 (99.6)	Well-educated (74.6% at least college education), race/ethnicity NR
Di Meglio, 2010[12]	Fair	X	US	78	<21 years old; currently breastfeeding (1 day postpartum)	68 (87.2)	9.0	Y	50 (70.8)[§]	Young adults (<21 years), predominantly low-income black (50.0%) or white (47.4%)
Di Napoli, 2004[13]	Fair		Italy	605	Began breastfeeding at start of intervention and intending to continue	268 (44.3)	37.2	Y	605 (100)	Well-educated (61.0% high school or college degree), race/ethnicity NR
Edwards, 2013[14]	Fair	X	US	248	<21 years old; not planning on having a cesarean delivery	219 (88.7)	NR	N	154 (62.1)	Young adults (<21 years), low-income African American, predominantly currently in school (54.4%) and residing with parent (78.2%)
Elliott-Rudder, 2014[15]	Good	X	Australia	330	Currently breastfeeding for ≥8 weeks; planning to receive postnatal care at a participating general practice	118 (36.2)	44.1	Y	NR (NR)	Currently breastfeeding for ≥8 weeks, well-educated (53.1% college degree or higher), race/ethnicity NR

Table 7. Intervention Characteristics for All Studies, by Author

Author, Year	Quality	Identified in Update	Country	n Rand	Key Inclusion Criteria	Primiparous, n (%)	Previously Breastfed (%)*	Currently BF	Intending to BF, n (%)	Population Characteristics
Forster, 2004[16]	Fair		Australia	984	Primiparous	981 (100)	NA	N	907 (92.5)	Low-income, culturally diverse, sparse demographic data
Fu, 2014[17]	Fair	X	Hong Kong	724	≥18 years old; primiparous; Hong Kong Chinese; intending to breastfeed	724 (100)	NA	N	415 (100)	Hong Kong Chinese
Gagnon, 2002[18]	Fair		Canada	586	Participating in hospital's short stay program; infant breastfed at least once in the hospital	191 (32.6)	NR	Y	522 (89.1)‡	General, race/ethnicity NR
Gijsbers, 2006[19]	Fair	X	Netherlands	91	≥1 first-degree relative had asthma that had been diagnosed by a doctor	37 (41.6)	53.9	N	77 (86.5)	Family history of asthma, well-educated (53.9% highest level of secondary education or university), race/ethnicity NR
Gouchon, 2010[20]	Fair	X	Italy	36	Scheduled for elective cesarean delivery	8 (23.5)	58.8	N	NR (NR)	General, race/ethnicity NR
Graffy, 2004[21]	Fair		UK	720	Considering breastfeeding; had not breastfed a previous child for ≥6 weeks	539 (74.9)	NR	N	689 (96.9)	General, predominantly white (69.7%)
Hawkins, 2014a[22]	Good	X	US	25,327	Gave birth at BFHI-accredited hospital (or nonaccredited for CG) in Alaska, Maine, Nebraska, Ohio, or Washington during 1999–2009	41.9	NR	NR	NR (NR)	General, predominantly white (50.7%)
Hawkins, 2014b[23]	Good	X	US	2,014	Gave birth at BFHI-accredited hospital (or nonaccredited for CG) in Maine during 2004–2008	NR (NR)	NR	NR	NR (NR)	General, predominantly white (95.6%)
Henderson, 2001[24]	Good		Australia	160	Primiparous; planning on breastfeeding	160 (100)	NA	Y	160 (100)	General, race/ethnicity NR

Table 7. Intervention Characteristics for All Studies, by Author

Author, Year	Quality	Identified in Update	Country	n Rand	Key Inclusion Criteria	Primiparous, n (%)	Previously Breastfed (%)*	Currently BF	Intending to BF, n (%)	Population Characteristics
Hoddinott, 2009[25]	Good	X	Scotland	17,482	Pregnant or breastfeeding; registered at participating general practices in 2002	NR (NR)	NR	NR	NR (NR)	Predominantly living in deprived areas[§]
Hopkinson, 2009[26]	Good	X	US	522	Mixed feeding in the hospital	NR (NR)	NR	Y	NR (NR)	Majority (98%) born in Mexico or Central America[§]
Howard, 2003[27]	Good		US	807	Intending to breastfeed for ≥4 weeks; undecided about or wanted pacifier use	275 (39.3)	54.0	N	700 (100)	Predominantly white (86.6%), employed (77.1%), expectant father lives in household (91.0%)
Howell, 2014[28]	Fair	X	US	540	≥18 years old; black or Hispanic	220 (40.7)	NR	N	NR (NR)	Black (37.6%) or Hispanic (62.4%), predominantly low-income and well-educated (54.0% some college or more)
Jenik, 2009[29]	Good	X	Argentina	1,021	Exclusively breastfeeding at 2 weeks; intending to breastfeed for ≥3 months; not using pacifiers	NR (NR)	41.0	Y	1021 (100)	Predominantly or exclusively Hispanic[¶]
Jolly, 2012[30]	Fair	X	UK	2,724	Estimated delivery date in study period	816 (34.4)	46.1	N	690 (81.4)	Predominantly of Asian or Middle Eastern origin, living in deprived urban areas
Kellams, 2015[31]	Good	X	US	522	Women with income <185% of the federal poverty level	NR (NR)	NR	N	335 (67.4)	Low-income, predominantly black (45.4%) or white (41.6%)
Kools, 2005[32]	Fair		Netherlands	781	Applied for maternity care in intervention or control maternity centers	390 (55.9)	28.7	N	477 (68.3)	General, race/ethnicity NR

Table 7. Intervention Characteristics for All Studies, by Author

Author, Year	Quality	Identified in Update	Country	n Rand	Key Inclusion Criteria	Primiparous, n (%)	Previously Breastfed (%)*	Currently BF	Intending to BF, n (%)	Population Characteristics
Kramer, 2001[33]	Good		Canada	281	Intending to breastfeed for ≥3 months	122 (47.3)	50.8	N	258 (100)	Multicultural (66.2% English predominant language), predominantly well educated (16.0 mean years of education), employed (76.0%), married (81.4%)
Kronborg, 2012[34]	Fair	X	Denmark	1,193	≥18 year old; primiparous	1162 (100)	NA	N	NR (NR)	General, most with >10 years education (90.9%), race/ethnicity NR
Labarere, 2003[35]	Good		France	210	≥18 year old; currently breastfeeding in the hospital	100 (52.6)	NR	Y	NR (NR)	Predominantly well-educated (58.9% partial college or college degree), employed (69.2%), race/ethnicity NR
Labarere, 2005[36]	Good		France	231	Breastfeeding on day of discharge	121 (52.4)	NR	Y	NR (NR)	Predominantly well-educated (74.0% >high school), employed (77.5%), race/ethnicity NR
Lavender, 2005[37]	Fair		UK	1,312	Expressing a desire to breastfeed	672 (51.2)	NR	N	1312 (100)	Predominantly deprived or low-income white (92.1%)
Mattar, 2007[38]	Fair		Singapore	401	No previous cesarean delivery; no obstetric complications that would contraindicate vaginal delivery	149 (37.2)	64.4	N	382 (95.3)	Asian, predominantly low-income and unemployed
McDonald, 2010[39]	Good	X	Australia	849	≥18 years old; intending to breastfeed	428 (50.4)	NR	N	849 (100)**	General, lower SES (33.6%), race/ethnicity NR
McQueen, 2011[40]	Good	X	Canada	150	Primiparous; intending to breastfeed	150 (100)	NA	N	150 (100)	Predominantly white (81.3%), well-educated (71.3% college)
Muirhead, 2006[41]	Fair		Scotland	225	Received prenatal care at a participating clinic	120 (53.3)	23.6	N	116 (51.6)	NR

Table 7. Intervention Characteristics for All Studies, by Author

Author, Year	Quality	Identified in Update	Country	n Rand	Key Inclusion Criteria	Primiparous, n (%)	Previously Breastfed (%)*	Currently BF	Intending to BF, n (%)	Population Characteristics
Noel-Weiss, 2006[42]	Fair		Canada	101	Primiparous; intending to breastfeed	92 (100)	NA	N	92 (100)	Predominantly high family income, well-educated, in committed relationship
Nolan, 2009[43]	Fair	X	US	50	Scheduled for a planned repeat cesarean delivery	0 (0)	NR	N	NR (NR)	Predominantly white (72.0%), married (68.0%)
Paul, 2012[44]	Fair	X	US	1,154	Attempting to breastfeed during the maternity stay; intent to continue breastfeeding after discharge	548 (47.5)	48.6	Y	1154 (100)	Predominantly white (88.4%), well-educated (57.4% college degree), higher income, married (79.0%)
Pollard, 2011[45]	Good	X	US	86	18–40 years old; primiparous; intending to breastfeed; initiated breastfeeding within 24 hours of delivery	86 (100)	NA	Y	86 (100)	Predominantly white (96.5%), married (80.2%), employed (59.3%)
Quinlivan, 2003[46]	Fair		Australia	136	≤18 years old; intending to continue with pregnancy and not relinquish the infant	NR (NR)	NR	N	NR (NR)	Adolescents (≤18 years), predominantly low SES (86.6%), 24.3% indigenous Australian
Reeder, 2014[47]	Fair	X	US	1,948	Attending a new pregnancy appointment for WIC; intending or undecided about breastfeeding	NR (NR)	NR	N	NR (NR)	Low income, predominantly less educated, Hispanic (58.3%)
Stockdale, 2008[48]	Fair	X	Ireland	182	Primiparous	144 (100)	NA	N	NR (NR)	General, race/ethnicity NR
Su, 2007[49]	Fair		Singapore	450	Intending to breastfeed	178 (39.6)	56.4	N	450 (100)	Asian, predominantly low income
Wallace, 2006[50]	Fair		UK	370	Primiparous; intending to breastfeed; able to sit out of bed at time of first feed; no cesarean delivery	370 (100)	NA	N	370 (100)	NR

Table 7. Intervention Characteristics for All Studies, by Author

Author, Year	Quality	Identified in Update	Country	n Rand	Key Inclusion Criteria	Primiparous, n (%)	Previously Breastfed (%)*	Currently BF	Intending to BF, n (%)	Population Characteristics
Wambach, 2011[51]	Fair	X	US	390	15–18 years old; primiparous; planning to keep newborn	315 (100)	NA	N	NR (NR)	Adolescents (15–18 years), predominantly black (61.0%), low family income, in school (71.0%), living with family (74.0%)
Wen, 2011[52]	Good	X	Australia	667	≥16 years old; primiparous	667 (100)	NA	N	NR (NR)	General, race/ethnicity NR
Wong, 2014[53]	Good	X	Hong Kong	469	≥18 years old; primiparous; intending to breastfeed; Hong Kong resident	469 (100)	NA	N	469 (100)	Asian, predominantly well-educated (54.4% postsecondary or university degree), high family income

* Among full sample not just multiparous.
† Intended to breastfeed for >12 weeks.
‡ Intended to exclusively breastfeed.
§ As described in study text.
¶ Race/ethnicity NR, assume 100% Hispanic.
** 76.3% intended to breastfeed >6 months.

Abbreviations: BF=breastfeed; BFHI=Baby-Friendly Hospital Initiative; BINGO=Best Infant Nutrition for Good Outcomes; BMI=body mass index; CG=control group; n=number; N=no; NA=not applicable; NR=not reported; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; rand=randomized; SES=socioeconomic status; UK=United Kingdom; US=United States; Y=yes.

Table 8. Included Interventions to Promote Breastfeeding

Interventions	Types	Number of Included Intervention Arms
Individual-level support and education	Professional support	29
	Peer support	9
	Formal or structured education	11
System-level policies and practices	Policies, programs, and staff training	3
	Other maternity care practices	6

Table 9. Pooled Results of Individual-Level Breastfeeding Support and Education Interventions for Any and Exclusive Breastfeeding Among Adults

Breastfeeding Outcome	Time Point	k	n	RR (95% CI)	I^2, %
Any	Initiation	14	9428	1.00 (0.99 to 1.02)	22.8
	<3 months	26	11,588	1.07 (1.03 to 1.11)	72.0
	3 to <6 months	23	8942	1.11 (1.04 to 1.18)	46.5
	6 months	20	9715	1.07 (0.98 to 1.16)	57.5
	12 months	3	1957	Not pooled	Not pooled
Exclusive	<3 months	22	8246	1.21 (1.11 to 1.33)	52.4
	3 to <6 months	18	7027	1.20 (1.05 to 1.38)	44.6
	6 months	17	7690	1.16 (1.02 to 1.32)	14.3
	12 months	0	NA	NA	NA

Abbreviations: CI=confidence interval; k=number of studies; NA=not applicable; RR=risk ratio.

Table 10. Results of Individual-Level Breastfeeding Support and Education Interventions on Breastfeeding Initiation, by Author

Author, Year	Group	Intervention Name	IG Event Rate, n/N (%)	CG Event Rate, n/N (%)	RR (95% CI)
Anderson, 2005[91]	IG1	Peer counseling	55/63 (90.5)	55/72 (76.4)	1.14 (0.98 to 1.34)
Bonuck, 2014a (BINGO)[92]	IG1	Lactation support and brief education	218/226 (96.5)	65/73 (89.0)	1.08 (1.00 to 1.18)
Bonuck, 2014a (BINGO)[92]	IG2	Lactation support	70/73 (95.9)	65/73 (89.0)	1.08 (0.98 to 1.18)
Bonuck, 2014a (BINGO)[92]	IG3	Brief education	207/223 (92.8)	65/73 (89.0)	1.04 (0.95 to 1.14)
Bonuck, 2014b (PAIRINGS)[92]	IG1	Lactation support and brief education	122/124 (98.4)	123/130 (94.6)	1.04 (0.99 to 1.09)
Chapman, 2013[98]	IG1	Peer counseling	75/76 (98.7)	77/78 (98.7)	1.00 (0.96 to 1.04)
Forster, 2004[103]	IG1	Group education (attitude modification)	291/308 (94.5)	297/310 (95.8)	0.99 (0.95 to 1.02)
Forster, 2004[103]	IG2	Group education (practical skills training)	296/306 (96.7)	297/310 (95.8)	1.01 (0.98 to 1.04)
Fu, 2014[82]	IG2	In-hospital support	190/190 (100)	256/260 (98.5)	1.01 (1.00 to 1.03)
Graffy, 2004[106]	IG1	Peer counseling	320/336 (95.2)	324/336 (96.4)	0.99 (0.96 to 1.02)
Jolly, 2012[83]	IG1	Peer counseling	747/1083 (69.0)	896/1315 (68.1)	1.01 (0.96 to 1.07)
Kellams, 2015 [116]	IG1	Breastfeeding video	174/249 (69.9)	172/248 (69.4)	1.01 (0.90 to 1.13)
Kools, 2005[81]	IG1	Home breastfeeding support	254/371 (68.5)	238/330 (72.1)	0.95 (0.86 to 1.04)
Kronborg, 2012[118]	IG1	Group education	533/552 (96.6)	529/538 (98.3)	0.98 (0.96 to 1.00)
Lavender, 2005[79]	IG1	Group education	515/644 (80.3)	463/605 (76.5)	1.04 (0.98 to 1.11)
Muirhead, 2006[126]	IG1	Peer counseling	61/112 (54.5)	60/113 (53.1)	1.03 (0.80 to 1.31)
Su, 2007[135]	IG2	Individual education	132/138 (95.7)	131/138 (94.9)	1.01 (0.96 to 1.06)
Wen, 2011[139]	IG1	Home breastfeeding support	312/337 (92.8)	304/330 (92.2)	1.00 (0.96 to 1.05)
Wong, 2014[140]	IG1	Lactation support	220/233 (94.4)	218/236 (92.4)	1.02 (0.97 to 1.07)

Abbreviations: CG=control group; IG=intervention group; n=number; N=number analyzed; RR=relative risk.

Table 11. Results of Individual-Level Breastfeeding Support and Education Interventions on Any and Exclusive Breastfeeding Duration Among Adults

Study, Year Country	Weeks of Followup	Intervention	Group	N	Median (IQR)	Unit	P-Value for Between-Group Difference
Any breastfeeding duration							
Carlsen, 2013[97] Denmark	26	Telephone support	IG1	105	184.0 (92.0 to 185.0)	days	0.002
			CG	102	108.0 (16.0 to 185.0)		
Forster, 2004[103] Australia	26	Group education (attitude modification)	IG1	293	17 (10.2)*	weeks	0.28†
		Group education (practical skills)	IG2	297	19 (9.3)*		
			CG	299	18 (9.7)*		
Graffy, 2004[106] UK	16	Peer counseling	IG1	336	110	days	0.445
			CG	336	96		
Howell, 2014[114] US	26	Brief education and counseling	IG1	270	12.0	weeks	0.019
			CG	270	6.5		
Kronborg, 2012[118] Denmark	52	Group education	IG1	NR	NR	NR	NS‡
			CG	NR	NR		
Labarere, 2005[120] France	26	Lactation support	IG1	112	18	weeks	0.03
			CG	114	13		
Muirhead, 2006[126] Scotland	16	Peer counseling	IG1	61	72 (6 to 138)§	days	0.4
			CG	60	56 (22 to 90)§		
Noel-Weiss, 2006[128] Canada	8	Group education	IG1	47	50.4 (14.2)*	days	0.875
			CG	45	49.9 (14.5)*		
Paul, 2012[130] US	26	Lactation support	IG1	NR	NR	NR	0.29
			CG	NR	NR		
Pollard, 2011[131] US	24	Self-monitoring	IG1	41	13.8	weeks	0.2387
			CG	43	12.1		
Wen, 2011[139] Australia	52	Home breastfeeding support	IG1	268	17 (13.9 to 20.4)§	weeks	0.03
			CG	259	13 (10.1 to 15.6)§		
Wong, 2014[140] Hong Kong	26	Lactation support	IG1	NR	NR	weeks	NS‡
			CG	NR	NR		
Exclusive breastfeeding duration							
Carlsen, 2013[97] Denmark	26	Telephone support	IG1	105	120 (14 to 142)	days	0.032
			CG	102	41 (3 to 133)		
Gijsbers, 2006[84] Netherlands	26	Lactation support	IG1	NR	NR	NR	0.05¶
			CG	NR	NR		
Kronborg, 2012[118] Denmark	52	Group education	IG1	NR	NR	NR	NS‡
			CG	NR	NR		
Wong, 2014[140] Hong Kong	26	Lactation support	IG1	NR	NR	NR	NS‡
			CG	NR	NR		

* Mean (SD).
† For test of difference in duration between IG1, IG2, and CG. IG2 was also a group education intervention focused on practical skills training.
‡ Not statistically significant according to hazards ratio, p-value not reported.
§ 95% confidence interval.
¶ Adjusted for maternal age, education level, and breastfeeding experience.

Abbreviations: BINGO=Best Infant Nutrition for Good Outcomes; IG=intervention group; CG=control group; IQR=interquartile range; NR=not reported; NS=not significant; PAIRINGS=Provider Approaches to Improved Rates of Infant Nutrition and Growth Study; SD=standard deviation.

Table 12. Characteristics and Results of System-Level Policy Interventions

Study, Year	Study Design	Setting	Comparison	Breastfeeding Outcome	Population*	N	Effect Estimate†
Hawkins, 2014a[107]	11-year longitudinal study	32 hospitals within 5 US states	BFHI accreditation before or during study period vs. non-BFHI accreditation	Initiation	All women	25,327	0.024 (95% CI, 0.00 to 0.05); p=0.09
					Low education	10,978	0.038 (95% CI, 0.00 to 0.08); p=0.05
					High education	13,718	0.002 (95% CI, -0.04 to 0.05); p=0.90
				Any ≥4 weeks	All women	24,776	0.006 (95% CI, -0.01 to 0.03); p=0.60
					Low education	10,749	0.027 (95% CI, -0.02 to 0.07); p=0.30
					High education	13,418	-0.028 (95% CI, -0.06 to 0.00); p=0.06
				Exclusive ≥4 weeks	All women	24,570	0.012 (95% CI, -0.01 to 0.03); p=0.30
					Low education	10,606	0.045 (95% CI, 0.01 to 0.08); p=0.02
					High education	13,964	-0.023 (95% CI, -0.05 to 0.01); p=0.10
Hawkins, 2014b[108]	4-year longitudinal study	10 hospitals within 1 US state	BFHI accreditation before or during study period vs. non-BFHI accreditation	Initiation	All women	1,975	0.070 (95% CI, -0.04 to 0.18); p=0.20
					Low education	821	0.093 (95% CI, -0.06 to 0.24); p=0.2
					High education	1,153	0.048 (95% CI, -0.07 to 0.17); p=0.4
				Any ≥4 weeks	All women	1,938	0.068 (95% CI, -0.02 to 0.16); p=0.10
					Low education	807	0.099 (95% CI, -0.11 to 0.30); p=0.30
					High education	1,130	0.013 (95% CI, -0.10 to 0.12); p=0.80
				Exclusive ≥4 weeks	All women	1,951	0.025 (95% CI, -0.07 to 0.12); p=0.60
					Low education	812	0.054 (95% CI, -0.09 to 0.20); p=0.40
					High education	1,138	-0.019 (95% CI, -0.20 to 0.16); p=0.80
Hoddinott, 2009[110] Breastfeeding in Groups (BIG) trial	Cluster RCT	14 localities of general practices in Scotland	Implementation of a breastfeeding support group policy vs. usual care	Any at 6–8 weeks	All women	17,482	Mean (SD) breastfeeding rate: IG: 0.26 (SD, 0.03) CG: 0.30 (SD, 0.07) Mean difference: -0.017‡ (95% CI, -0.036 to 0.002); p=0.08

* Low education: ≤12 years of education; high education: ≥13 years of education.
† Regression coefficient with model including birth facility as a fixed effect and an interaction between year and whether a birth facility ever received BFHI accreditation.
‡ Mean difference between groups postintervention adjusted for preintervention rate.

Abbreviations: BFHI=Baby-Friendly Hospital Initiative; IG=intervention group; CG=control group; CI=confidence interval; N=number; RCT=randomized, controlled trial; SD=standard deviation; US=United States.

Table 13. Overall Summary of Evidence by Key Question

Key Question	No. of studies (k), study design, n	Study Quality	Limitations*	Consistency	US Primary Care Applicability	Summary of Findings†
KQ1: Infant and maternal health outcomes	k=6 RCT n=2,219	Good: 1 Fair: 5	No studies reported maternal health outcomes. Most outcomes based on maternal recall. Followup ranged from 4 to 52 weeks.	Inconsistent	High Applicable to a predominantly Hispanic and black low-income population.	Mixed results for the effects on infant gastrointestinal outcomes (k=2): one trial (n=182) found greater risk of ≥1 diarrheal episodes over 3 months in usual care vs. intervention groups (RR, 2.15 [95% CI, 1.16 to 3.97]) while the other trial (n=338) found no difference between intervention and control groups at 1 year (22.7% vs. 25.7%). One trial (n=338) found no difference in risk of otitis media (43.6% vs. 54.9%) or the number of health care visits for respiratory tract illnesses (76% vs. 83.4%) at 1 year. 3 out of 4 trials that reported rates of infant health care utilization found higher use among the usual care control groups (2.8% to 36.0%) than intervention groups (1.2% to 25.0%). No studies reported the effects on maternal health outcomes.
KQ2: Breastfeeding outcomes	Individual-level interventions k=43 RCT n=21,973	Good: 14 Fair: 29	Statistical heterogeneity moderate or substantial in most analyses and considerable clinical variation. Lack of detail regarding measurement of breastfeeding, including recall period and definition of exclusivity. Sparse reporting of breastfeeding at 12 months. Indication of small study effects for exclusive breastfeeding for <3 months and at 6 months.	Consistent	Moderate US trials (k=15) applicable to a predominantly Hispanic and black low-income population. Non-US trials have low applicability given differences in usual care and underlying social and cultural differences.	Statistically significant associations between individual-level breastfeeding interventions and any breastfeeding for <3 months (RR, 1.07 [95% CI, 1.03 to 1.11]; k=26; n=11,588) and at 3 to <6 months (RR, 1.11 [95% CI, 1.04 to 1.18]; k=23; n=8,942) and for exclusive breastfeeding for <3 months (RR, 1.21 [95% CI, 1.11 to 1.33]; k=22; n=8,246), 3 to <6 months (RR, 1.20 [95% CI, 1.05 to 1.38]; k=18; n=7,027), and at 6 months (RR, 1.16 [95% CI, 1.02 to 1.32]; k=17; n=7,690). No significant association between individual-level interventions and breastfeeding initiation (RR, 1.00 [95% CI, 0.99 to 1.02]; k=14; n=9,428). Absolute differences in the rates of any breastfeeding ranged from 14.1 percentage points in favor of the control group to 18.4 percentage points in favor of the intervention group. Interventions delivered over more than one time point (e.g., prenatal and postpartum) may be more effective than those only delivered at one time point (e.g., postpartum only).

Table 13. Overall Summary of Evidence by Key Question

Key Question	No. of studies (k), study design, n	Study Quality	Limitations*	Consistency	US Primary Care Applicability	Summary of Findings†
	System-level interventions k=9 (7 RCTs, 2 before-after with matched control group) n= 44,784	Good: 6 Fair: 3	Only 1 cluster RCT evaluating system-level policy change; 2 studies were controlled before-after designs. Limited number of studies evaluating specific maternity care practices related to breastfeeding.	Consistent	High applicability for studies of policy changes (k=3). Moderate applicability for studies of maintaining mother-baby contact following delivery (k=3). Low applicability for studies of restricted pacifier use (k=3).	No consistent evidence of an association between system-level changes (BFHI accreditation and policies for breastfeeding support groups, minimizing mother and baby separation postdelivery, and restricting or delaying pacifier use) and the rate of any or exclusive breastfeeding at up to 16 weeks postpartum. One large observational study (n=25,327) found a statistically significant higher rate of breastfeeding initiation and exclusive breastfeeding at 4 weeks in women with a lower education (initiation increased by 3.8 percentage points) but not in women overall or among those with higher education (initiation increased by 0.02 percentage points) after implementation of the BFHI.
KQ3: Adverse events	k=2 RCTs n=844	Good: 0 Fair: 2	Only 2 trials reported adverse events related to the interventions.	NA	High	One trial (n=586) reported no difference in maternal state anxiety at 2 weeks postpartum between those receiving a home visit from a nurse vs. those receiving usual care (MD, 0.3 [95% CI, -0.5 to 1.1]). Another trial (n=258) reported that 2 mothers expressed feelings of anxiety, decreased confidence, or concerns about confidentiality during a peer support intervention.

* Includes reporting bias.
† Includes precision.

Abbreviations: BFHI=Baby-Friendly Hospital Initiative; CI=confidence interval; k=number of studies; KQ=key question; N=number; NA=not applicable; RCT=randomized, controlled trial; RR=risk ratio; US=United States.

Literature Search Strategies for Primary Literature

CINAHL

S53 S44 AND S52

Limiters - Published Date: 20080101-20151231; English Language

S52 S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51

S51 (TI (systematic* n3 review*)) or (AB (systematic* n3 review*)) or (TI (systematic* n3 bibliographic*)) or (AB (systematic* n3 bibliographic*)) or (TI (systematic* n3 literature)) or (AB (systematic* n3 literature)) or (TI (comprehensive* n3 literature)) or (AB (comprehensive* n3 literature)) or (TI (comprehensive* n3 bibliographic*)) or (AB (comprehensive* n3 bibliographic*)) or (JN “Cochrane Database of Systematic Reviews”) or (TI (information n2 synthesis)) or (TI (data n2 synthesis)) or (AB (information n2 synthesis)) or (AB (data n2 synthesis)) or (TI (data n2 extract*)) or (AB (data n2 extract*)) or (TI (medline or pubmed or psyclit or cinahl or (psycinfo not “psycinfo database”) or “web of science” or scopus or embase)) or (AB (medline or pubmed or psyclit or cinahl or (psycinfo not “psycinfo database”) or “web of science” or scopus or embase)) or (MH “Systematic Review”)

S50 TI (("comparison group*" or "control group*")) OR AB (("comparison group*" or "control group*"))

S49 TI ("controlled before and after") OR AB ("controlled before and after")

S48 TI "controlled before after" OR AB "controlled before after"

S47 (TX cohort OR TI longitudinal OR AB longitudinal OR TI "follow up" OR AB "follow up" OR TI followup OR AB followup)

S46 (MH "Prospective Studies") OR (MH "Concurrent Prospective Studies") OR (MH "Nonconcurrent Prospective Studies") OR (MH "Correlational Studies")

S45 (MH "Meta Analysis") OR (MH "Control Group") OR (MH "Single-Blind Studies") OR (MH "Double-Blind Studies") OR (MH "Triple-Blind Studies") OR (MH "Randomized Controlled Trials") OR (MH "Clinical Trials") OR (MH "Random Assignment") OR (AB clinical n1 trial*) OR (AB controlled n1 trial*) OR (TI clinical n1 trial*) OR (TI controlled n1 trial*) OR (PT Clinical trial) OR (PT randomized controlled trial)

S44 S38 OR S39 OR S40 OR S41 OR S42 OR S43

S43 TI (((intervention* or program* or clinic or clinics or policy or policies or plan*) N5 (“breast feed*" or "breast fed" or breastfeed* or breastfed or lactation or "newborn feeding" or "infant feeding"))) OR AB (((intervention* or program* or clinic or clinics or policy or policies or plan*) N5 (“breast feed*" or "breast fed" or breastfeed* or breastfed or lactation or "newborn feeding" or "infant feeding")))

S42 TI (((incr* or improv* or support* or promot* or encourag* or counsel* or educat* or train* or teach* or class* or facilitat*) N5 (“breast feed*" or "breast fed" or breastfeed* or breastfed or lactation or "newborn feeding" or "infant feeding"))) OR AB (((incr* or improv* or support* or promot* or encourag* or counsel* or educat* or train* or teach* or class* or facilitat*) N5 (“breast feed*" or "breast fed" or breastfeed* or breastfed or lactation or "newborn feeding" or "infant feeding")))

S41 (MH "Lactation Consultants") OR TI “lactation consult*” OR AB “lactation consult*”

S40 (MH "Breast Feeding/ED")

S39 (MH "Breast Feeding Promotion")

S38 S6 AND S37

S37 S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36

S36 TI (((hospital* or "health system" or "health systems" or "health care system" or "health care systems") N3 (policy or policies or initiative* or program* or practice*))) OR AB (((hospital* or "health system" or "health systems" or "health care system" or "health care systems") N3 (policy or policies or initiative* or program* or practice*)))

S35 TI “rooming in” OR AB “rooming in”

S34 TI (((“breast feed*” or “breast fed” or breastfeed* or breastfed or lactation) N1 “on demand”)) OR AB (((“breast feed*” or “breast fed” or breastfeed* or breastfed or lactation) N1 “on demand”))

S33 TI pacifier* OR AB pacifier*

S32 TI “skin to skin” OR AB “skin to skin”

S31 TI “baby friendly” OR AB “baby friendly”
S30 TI (kangaroo N3 care) OR AB (kangaroo N3 care)
S29 TI (((prenatal or pre natal or postnatal or post natal or atenatal or ante natal or childbirth* or "child birth*") N5 (train* or educat* or teach* or class*))) OR AB (((prenatal or pre natal or postnatal or post natal or atenatal or ante natal or childbirth* or "child birth*") N5 (train* or educat* or teach* or class*)))
S28 TI ((((staff or nurs* or midwife* or midwives or doula* or doctor* or physician* or obstetrician* or pediatrician* or paediatrician*) N5 (train* or educat* or teach* or class*))) OR AB ((((staff or nurs* or midwife* or midwives or doula* or doctor* or physician* or obstetrician* or pediatrician* or paediatrician*) N5 (train* or educat* or teach* or class*)))
S27 TI "home visit*" OR AB "home visit*"
S26 TI "social* support*" OR AB "social* support*"
S25 TI "group counsel*" OR AB "group counsel*"
S24 TI "peer counsel*" OR AB "peer counsel*"
S23 TI "motivational interview*" OR AB "motivational interview*"
S22 (MH "Hospital Programs")
S21 (MH "Program Implementation")
S20 (MH "Kangaroo Care") or (MH "Rooming In")
S19 (MH "Childbirth Education")
S18 (MH "Parenting Education")
S17 (MH "Nutritional Counseling")
S16 (MH "Prenatal Counseling")
S15 (MH "Patient Discharge Education")
S14 (MH "Patient Education")
S13 (MH "Health Education")
S12 (MH "Nutritional Counseling")
S11 (MH "Nurse Counselors")
S10 (MH "Counselors")
S9 (MH "Motivational Interviewing")
S8 (MH "Peer Counseling")
S7 (MH "Counseling")
S6 S1 OR S2 OR S3 OR S4 OR S5
S5 (TI "newborn feeding" OR AB "newborn feeding") OR (TI "infant feeding" OR AB "infant feeding")
S4 TI lactation OR AB lactation
S3 TI (breastfed OR "breast fed") OR AB (breastfed OR "breast fed")
S2 TI (breastfeed* OR "breast feed*") OR AB (breastfeed* OR "breast feed*")
S1 (MH "Breast Feeding") OR (MH "Attitude to Breast Feeding") OR (MH "Breast Feeding Positions") OR (MH "Latching, Breastfeeding") OR (MH "Milk Expression")

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#1 (breastfeed* or breastfed or "breast fed" or lactation):ti,ab,kw
#2 (breast next feed*):ti,ab,kw
#3 (infant or newborn):ti,ab,kw next feeding:ti,ab,kw
#4 #1 or #2 or #3 3641
#5 (motivational next interview*):ti,ab,kw
#6 (peer next counsel*):ti,ab,kw
#7 (group next counsel*):ti,ab,kw
#8 (social* next support*):ti,ab,kw
#9 (home next visit*):ti,ab,kw
#10 (staff or nurs* or midwife* or midwives or doula* or doctor* or physician* or obstetrician* or pediatrician* or paediatrician*):ti,ab,kw near/5 (train* or educat* or teach* or class*):ti,ab,kw
#11 (prenatal or "pre natal" or postnatal or "post natal" or atenatal or "ante natal" or childbirth* or (child next birth*)) near/5 (train* or educat* or teach* or class*):ti,ab,kw
#12 (kangaroo near/3 care):ti,ab,kw

#13 "baby friendly":ti,ab,kw
#14 "skin to skin":ti,ab,kw
#15 pacifier*:ti,ab,kw
#16 (breast next feed*):ti,ab,kw near/3 demand:ti,ab,kw
#17 (breast fed or breastfeed* or breastfed or lactation):ti,ab,kw near/3 demand:ti,ab,kw
#18 "rooming in":ti,ab,kw
#19 (hospital* or "health system" or "health systems" or "health care system" or "health care systems"):ti,ab,kw near/3 (policy or policies or initiative* or program* or practice*):ti,ab,kw
#20 {or #5-#19}
#21 #4 and #20
#22 (incr* or improv* or support* or promot* or encourag* or counsel* or educat* or train* or teach* or class* or facilitat*):ti,ab,kw near/5 ((breast next feed*) or "breast fed" or breastfeed* or breastfed or lactation or "newborn feeding" or "infant feeding"):ti,ab,kw
#23 (intervention* or program* or clinic or clinics or policy or policies or plan*):ti,ab,kw near/5 ((breast next feed*) or "breast fed" or breastfeed* or breastfed or lactation or "newborn feeding" or "infant feeding"):ti,ab,kw
#24 (lactation next consult*):ti,ab,kw
#25 #21 or #22 or #23 or #24 Publication Year from 2008 to 2015, in Trials

Ovid MEDLINE(R), 1946 to September Week 3 2015
Ovid MEDLINE(R) Daily Update, September 24, 2015
Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations, September 24, 2015

1 Breast feeding/
2 Milk, Human/
3 Breast Milk Expression/
4 Lactation/
5 (breast feed$ or breast fed or breastfeed$ or breastfed or lactation).ti.
6 (breast feed$ or breast fed or breastfeed$ or breastfed or lactation).ti,ab.
7 limit 6 to ("in data review" or in process or "pubmed not medline")
8 1 or 2 or 3 or 4 or 5 or 7
9 Health Promotion/
10 Health Education/
11 Patient Education as Topic/
12 Social Support/
13 Counseling/
14 Motivational Interviewing/
15 Prenatal Education/
16 Education, Medical/
17 Kangaroo-Mother Care Method/
18 Attitude of Health Personnel/
19 Organizational Policy/
20 Program development/
21 Pacifiers/
22 motivational interview$.ti,ab.
23 peer counsel$.ti,ab.
24 group counsel$.ti,ab.
25 social$ support$.ti,ab.
26 home visit$.ti,ab.
27 ((staff or nurs$ or midwife$ or midwives or doula$ or doctor$ or physician$ or obstetrician$ or p?ediatrician$) adj5 (train$ or educat$ or teach$ or class$)).ti,ab.
28 ((prenatal or pre natal or postnatal or post natal or atenatal or ante natal or childbirth$ or child birth$) adj5 (train$ or educat$ or teach$ or class$)).ti,ab.
29 (kangaroo adj3 care).ti,ab.
30 baby friendly.ti,ab.

31 skin to skin.ti,ab.
32 pacifier$.ti,ab.
33 ((breast feed$ or breast fed or breastfeed$ or breastfed or lactation) adj on demand).ti,ab.
34 rooming in.ti,ab.
35 ((hospital$ or health system$ or health care system$) adj3 (policy or policies or initiative$ or program$ or practice$)).ti,ab.
36 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35
37 8 and 36
38 ((incr$ or improv$ or support$ or promot$ or encourag$ or counsel$ or educat$ or train$ or teach$ or class$ or facilitat$) adj5 (breast feed$ or breast fed or breastfeed$ or breastfed or lactation or newborn feeding or infant feeding)).ti,ab.
39 ((intervention$ or program$ or clinic or clinics or policy or policies or plan$) adj5 (breast feed$ or breast fed or breastfeed$ or breastfed or lactation or newborn feeding or infant feeding)).ti,ab.
40 lactation consult$.ti,ab.
41 37 or 38 or 39 or 40
42 limit 41 to systematic reviews
43 clinical trials as topic/ or controlled clinical trials as topic/ or randomized controlled trials as topic/ or meta-analysis as topic/
44 (clinical trial or controlled clinical trial or meta analysis or randomized controlled trial).pt.
45 Random$.ti,ab.
46 control groups/ or double-blind method/ or single-blind method/
47 clinical trial$.ti,ab.
48 controlled trial$.ti,ab.
49 meta analy$.ti,ab.
50 cohort studies/ or longitudinal studies/ or follow-up studies/ or prospective studies/ or retrospective studies/
51 cohort.ti,ab.
52 longitudinal.ti,ab.
53 (follow up or followup).ti,ab.
54 controlled before after.ti,ab.
55 "controlled before and after".ti,ab.
56 (comparison group$ or control group$).ti,ab.
57 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56
58 41 and 57
59 42 or 58
60 Animal/ not (Human/ and Animal/)
61 59 not 60
62 limit 61 to (english language and yr="2008 -Current")
63 remove duplicates from 62

PsycINFO (via Ovid)

1 Breast Feeding/
2 Lactation/
3 (breast feed$ or breast fed or breastfeed$ or breastfed or lactation).ti,ab,id.
4 1 or 2 or 3
5 Health Promotion/
6 Counseling/
7 Counselors/
8 Motivational Interviewing/
9 Client Education/
10 Health Education/
11 Childbirth Training/
12 Support Groups/

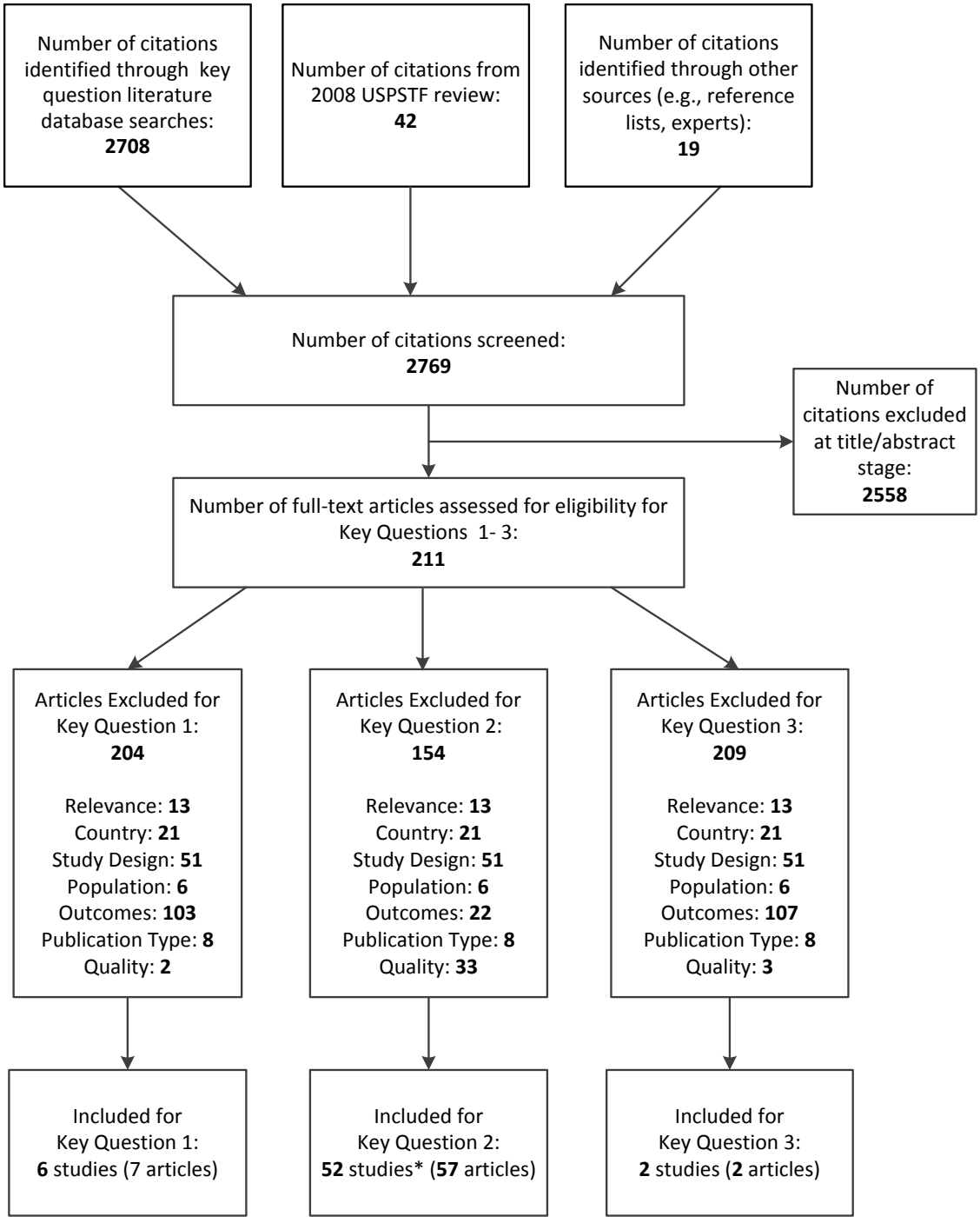
13 Social Support/
14 Prenatal Care/
15 Policy Making/
16 Organizational Behavior/
17 Personnel Training/
18 promotion & maintenance of health & wellness.cc.
19 motivational interview$.ti,ab,id.
20 peer counsel$.ti,ab,id.
21 group counsel$.ti,ab,id.
22 social$ support$.ti,ab,id.
23 home visit$.ti,ab,id.
24 ((staff or nurs$ or midwife$ or midwives or doula$ or doctor$ or physician$ or obstetrician$ or p?ediatrician$) adj5 (train$ or educat$ or teach$ or class$)).ti,ab,id.
25 ((prenatal or pre natal or postnatal or post natal or atenatal or ante natal or childbirth$ or child birth$) adj5 (train$ or educat$ or teach$ or class$)).ti,ab,id.
26 (kangaroo adj3 care).ti,ab,id.
27 baby friendly.ti,ab,id.
28 skin to skin.ti,ab,id.
29 pacifier$.ti,ab,id.
30 ((breast feed$ or breast fed or breastfeed$ or breastfed or lactation) adj on demand).ti,ab,id.
31 rooming in.ti,ab,id.
32 ((hospital$ or health system$ or health care system$) adj3 (policy or policies or initiative$ or program$ or practice$)).ti,ab,id.
33 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32
34 4 and 33
35 ((incr$ or improv$ or support$ or promot$ or encourag$ or counsel$ or educat$ or train$ or teach$ or class$ or facilitat$) adj5 (breast feed$ or breast fed or breastfeed$ or breastfed or lactation or newborn feeding or infant feeding)).ti,ab,id.
36 ((intervention$ or program$ or clinic or clinics or policy or policies or plan$) adj5 (breast feed$ or breast fed or breastfeed$ or breastfed or lactation or newborn feeding or infant feeding)).ti,ab,id.
37 lactation consult$.ti,ab,id.
38 34 or 35 or 36 or 37
39 ((comprehensive$ or integrative or systematic$) adj3 (bibliographic$ or review$ or literature)).ti,ab,id.
40 (cinahl or (cochrane adj3 trial*) or embase or medline or psyclit or pubmed or scopus or "sociological abstracts" or "web of science").ab.
41 (meta-analy$ or metaanaly$ or "research synthesis" or ((information or data) adj3 synthesis) or (data adj2 extract$)).ti,ab,id.
42 ("systematic review" or "meta analysis").md.
43 random$.ti,ab,id,hw.
44 placebo$.ti,ab,hw,id.
45 controlled trial$.ti,ab,id,hw.
46 clinical trial$.ti,ab,id,hw.
47 treatment outcome clinical trial.md.
48 cohort.ti,ab,id.
49 longitudinal.ti,ab,id.
50 (follow up or followup).ti,ab,id.
51 longitudinal study.md.
52 prospective study.md.
53 retrospective study.md.
54 controlled before after.ti,ab,id.
55 "controlled before and after".ti,ab,id.
56 (comparison group$ or control group$).ti,ab,id.
57 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56

55 38 and 57
59 limit 58 to (english language and yr="2008 -Current")

PubMed (publisher-supplied)

#20 Search #19 AND publisher[sb] AND English[Language] AND ("2008"[Date - Publication] : "3000"[Date - Publication])
#19 Search #1 AND #18
#18 Search #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17
#17 Search (support*[tiab] OR promot*[tiab] OR counsel*[tiab] OR educat*[tiab] OR intervention*[tiab])
#16 Search (hospital[tiab] OR "health system"[tiab] OR "health systems"[tiab] OR "health care system"[tiab] OR "health care systems"[tiab]) AND (policy[tiab] OR policies[tiab] OR initiative*[tiab] OR program*[tiab])
#15 Search "rooming in"[tiab]
#14 Search "on demand"[tiab]
#13 Search pacifier*[tiab]
#12 Search "skin to skin"[tiab]
#11 Search "baby friendly"[tiab]
#10 Search (kangaroo[tiab] AND care[tiab])
#9 Search (prenatal[tiab] OR "pre natal"[tiab] OR postnatal[tiab] OR "post natal"[tiab] OR antenatal[tiab] OR "ante natal"[tiab]) AND (train*[tiab] OR educat*[tiab])
#8 Search (staff[tiab] OR nurs*[tiab] OR midwife*[tiab] OR midwives[tiab] OR doula*[tiab] OR doctor*[tiab] OR physician*[tiab] OR obstetrician*[tiab] OR pediatrician*[tiab]) AND (train*[tiab] OR educat*[tiab])
#7 Search home visit*[tiab]
#6 Search social support*[tiab]
#5 Search group counsel*[tiab]
#4 Search peer counsel*[tiab]
#3 Search motivational interview*[tiab]
#2 Search lactation consult*[tiab]
#1 Search ("breast feed"[tiab] OR "breast feeds"[tiab] OR "breast feeding"[tiab] OR breastfeed*[tiab] OR "breast fed"[tiab] OR lactation[tiab] OR newborn feeding*[tiab] OR infant feeding*[tiab])

Appendix A Figure 1. Literature Flow Diagram



* Two studies were reported in a single publication.

Appendix A Table 1. Inclusion and Exclusion Criteria

	Include	Exclude
Study design	• Randomized, controlled trials; cluster randomized, controlled trials • Controlled before-and-after studies and prospective cohort studies of hospital policies and health system interventions (e.g., the Baby-Friendly Hospital Initiative*, provider training) • Systematic evidence reviews	• Observational studies (except studies of hospital policies) • Abstracts, editorials, or theses
Study aim	Studies targeting the effects of prenatal, peripartum, and postpartum breastfeeding interventions on child and maternal health outcomes and/or initiation, duration, and exclusivity of breastfeeding	Studies with breastfeeding as a secondary outcome, in which the intervention was not specifically targeted at breastfeeding (e.g., studies on increasing the frequency of prenatal visits)
Condition	Breastfeeding (including baby to breast, bottle feeding mother's expressed breast milk, and bottle feeding donated breast milk)	Studies with a focus on other forms of infant nutrition (e.g., formula)
Population	• Early-term (37 0/7 to 38 6/7 weeks), full-term (39 0/7 to 40 6/7 weeks), late-term (41 0/7 to 41 6/7 weeks), and post-term (42 0/7 weeks and beyond) newborns, as well as late-preterm newborns with gestational age ≥34 0/7 weeks or birth weight >2,500 g • Members of mother-child support system (e.g., partners, grandparents, or friends)	• Mothers of preterm or very preterm newborns (<34 weeks of gestation or low or very low birth weight [<2,500 g]), because of their special feeding needs • Studies limited to special populations of women or infants (e.g., institutionalized women, infants with prenatal disease, infants born to drug-using mothers, infants in a neonatal intensive care unit, infants born to HIV-positive mothers)
Interventions	• Intervention must be initiated in, conducted in, or referable from primary care (e.g., primary care referral of mother-infant pair or family to service, support provided in hospital setting at time of delivery or postpartum, primary care collaboration with community services) • Type of interventions may include, but are not limited to: individual or group counseling, peer counseling, home visits, structured education, technology- or computer-based support, distribution of written materials, rooming-in, restricted pacifier use, or skin-to-skin contact • Interventions may take place during the prenatal and/or postnatal period • Stand-alone or multicomponent/multidimensional interventions • Interventions may be conducted by, but are not limited to: lactation care providers, nurses/nurse practitioners, peer counselors, midwives, doulas, or physicians • Health care system interventions (e.g., staff training) and hospital policies, such as full or partial implementation of the Baby-Friendly Hospital Initiative*	• Mass media campaigns • Worksite lactation programs • Community interventions not affiliated with primary care
Setting	• Any setting linked with the health care system and provision of primary care (e.g., hospital, maternity services, home, clinic, or community) • Studies conducted in countries categorized as "Very High" on the 2014 Human Development Index (as defined by the United Nations Development Programme)	• Correctional facilities • Worksites • Inpatient/residential facilities • Studies conducted in countries that are not categorized as "Very High" on the 2014 Human Development Index

Appendix A Table 1. Inclusion and Exclusion Criteria

	Include	Exclude
Comparators	• Usual prenatal, peripartum, and/or postpartum care, as defined within each study • Another breastfeeding intervention (i.e., comparative effectiveness) • Wait list control • No attention control	
Outcomes	**KQ 1:** Maternal health outcomes associated with breastfeeding intervention (e.g., cessation of menses); child health outcomes associated with breastfeeding intervention (e.g., gastrointestinal symptoms, atopic dermatitis, respiratory symptoms, otitis media, asthma, obesity) **KQ 2:** Breastfeeding initiation, duration, or exclusivity, as defined within each study **KQ 3:** Adverse events associated with breastfeeding intervention (e.g., feeling criticized by interventionist, guilt related to not breastfeeding, increased anxiety about breastfeeding, postpartum depression, infant failure to thrive)	
Publication language	English	Languages other than English
Quality	Fair or good	Poor (according to design-specific USPSTF criteria)

* The "10 Steps to Successful Breastfeeding," as designated by the Baby-Friendly Hospital Initiative, are: 1) maintain a written breastfeeding policy that is routinely communicated to all health care staff; 2) train all health care staff in skills necessary to implement this policy; 3) inform all pregnant women about the benefits and management of breastfeeding; 4) help mothers initiate breastfeeding within 1 hour of birth; 5) show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants; 6) give infants no food or drink other than breast milk, unless medically indicated; 7) practice "rooming-in" (allowing mothers and infants to remain together 24 hours a day); 8) encourage breastfeeding on demand; 9) give no pacifiers or artificial nipples to breastfeeding infants; and 10) foster the establishment of breastfeeding support groups and refer mothers to them upon discharge from the hospital or clinic.

Appendix A Table 2. Quality Assessment Criteria

Study Design	Adapted Quality Criteria
Randomized, controlled trials, adapted from the U.S. Preventive Services Task Force methods[192]	• Valid random assignment? • Was allocation concealed? • Was eligibility criteria specified? • Were groups similar at baseline? • Was there a difference in attrition between groups? • Were outcome assessors blinded? • Were measurements equal, valid and reliable? • Was there intervention fidelity? • Was there risk of contamination? • Was there adequate adherence to the intervention? • Were the statistical methods acceptable? • Was the handling of missing data appropriate? • Was there acceptable followup? • Was there evidence of selective reporting of outcomes? • Was there a clear definition of the intervention? • Was the funding source defined?
Observational studies (e.g., prospective cohort studies), adapted from the Newcastle-Ottawa Scale (NOS)[193]	• Was there representativeness of the exposed cohort? • Was the non-exposed systematically selected? • Was the ascertainment of exposure reported? • Was the outcome of interest not present at baseline? • Were measurements equal, valid and reliable? • Were outcome assessors blinded? • Was followup long enough for the outcome to occur? • Was there acceptable followup? • Was the handling of missing data appropriate? • Were baseline characteristics well described? • Was the inclusion/exclusion criteria well described?

Appendix B. Excluded Studies

Reason for Exclusion	
E1.	Study relevance (not related to breastfeeding intervention)
E2a.	Setting: Not in very high human development country
E2b.	Setting: Not linked to health care (e.g., worksites, correctional facilities)
E2c.	Setting: Not applicable to U.S. health care (e.g., usual care in control group is extremely different than U.S. usual care
E3.	Study design: Not RCT for individual-level intervention; not RCT, controlled before-after, or prospective cohort study for system-level policies
E4.	Population: Studies of preterm or very preterm infants (<35 weeks), low or very low birth weight infants (<2500 g), or studies limited to special populations of women or infants
E5.	Outcomes: No relevant outcomes (maternal or infant health outcomes; breastfeeding initiation, duration, exclusivity; adverse events)
E6.	Poor-quality study
E7.	Non-English–language publication
E8.	Publication type (e.g., dissertation, thesis, conference abstract)

1. Aghdas K, Talat K, Sepideh B. Effect of immediate and continuous mother-infant skin-to-skin contact on breastfeeding self-efficacy of primiparous women: a randomised control trial. Women Birth. 2014;27(1):37-40. PMID: 24216342. **KQ1E2a, KQ2E2a, KQ3E2a.**
2. Aksu H, Kucuk M, Duzgun G. The effect of postnatal breastfeeding education/support offered at home 3 days after delivery on breastfeeding duration and knowledge: a randomized trial. J Matern Fetal Neonatal Med. 2011;24(2):354-61. PMID: 20608806. **KQ1E2a, KQ2E2a, KQ3E2a.**
3. Albert J, Heinrichs-Breen J. An evaluation of a breastfeeding privacy sign to prevent interruptions and promote successful breastfeeding. J Obstet Gynecol Neonatal Nurs. 2011;40(3):274-80. PMID: 21477213. **KQ1E5, KQ2E5, KQ3E5.**
4. Artieta-Pinedo I, Paz-Pascual C, Grandes G, et al. Antenatal education and breastfeeding in a cohort of primiparas. J Adv Nurs. 2013;69(7):1607-17. PMID: 23013265. **KQ1E3, KQ2E3, KQ3E3.**
5. Askelsdottir B, Lam-de Jonge W, Edman G, et al. Home care after early discharge: impact on healthy mothers and newborns. Midwifery. 2013;29(8):927-34. PMID: 23434021. **KQ1E3, KQ2E3, KQ3E3.**
6. Awano M, Shimada K. Development and evaluation of a self care program on breastfeeding in Japan: A quasi-experimental study. Int Breastfeed J. 2010;5:9. PMID: 20731820. **KQ1E3, KQ2E3, KQ3E3.**
7. Ball HL, Moya E, Fairley L, et al. Infant care practices related to sudden infant death syndrome in South Asian and White British families in the UK. Paediatr Perinat Epidemiol. 2012;26(1):3-12. PMID: 22150702. **KQ1E1, KQ2E1, KQ3E1.**
8. Barnes M, Cox J, Doyle B, et al. Evaluation of a practice-development initiative to improve breastfeeding rates. J Perinat Educ. 2010;19(4):17-23. PMID: 21886418. **KQ1E3, KQ2E3, KQ3E3.**
9. Battersby S. Breastfeeding peer support: implications for midwives. Pract Midwife. 2008;11(10):32-5. PMID: 19054954. **KQ1E3, KQ2E3, KQ3E3.**
10. Beiranvand S, Valizadeh F, Hosseinabadi R, et al. The Effects of Skin-to-Skin Contact on Temperature and Breastfeeding Successfulness in Full-Term Newborns after Cesarean Delivery. Int J Pediatr. 2014;2014:846486. PMID: 25610472. **KQ1E2a, KQ2E2a, KQ3E2a.**
11. Bica OC, Giugliani ER. Influence of counseling sessions on the prevalence of breastfeeding in the first year of life: a randomized clinical trial with adolescent mothers and grandmothers. Birth. 2014;41(1):39-45. PMID: 24654636. **KQ1E2a, KQ2E2a, KQ3E2a.**
12. Bick D, Murrells T, Weavers A, et al. Revising acute care systems and processes to improve breastfeeding and maternal postnatal health: a pre and post intervention study in one English maternity unit. BMC Pregnancy Childbirth. 2012;12:41. PMID: 22672354. **KQ1E3, KQ2E3, KQ3E3.**

13. Bigelow AE, Power M, Gillis DE, et al. Breastfeeding, skin-to-skin contact, and mother-infant interactions over infants' first three months. Infant Ment Health J. 2014;35(1):51-62. PMID: 25424406. **KQ1E3, KQ2E3, KQ3E3.**
14. Blixt I, Martensson LB, Ekstrom AC. Process-oriented training in breastfeeding for health professionals decreases women's experiences of breastfeeding challenges. Int Breastfeed J. 2014;9:15. PMID: 25221613. **KQ1E5, KQ2E5, KQ3E5.**
15. Bonuck KA, Lischewski J, Brittner M. Clinical translational research hits the road: RCT of breastfeeding promotion interventions in routine prenatal care. Contemp Clin Trials. 2009;30(5):419-26. PMID: 19523539. **KQ1E5, KQ2E5, KQ3E5.**
16. Brodribb W, Kruske S, Miller YD. Baby-friendly hospital accreditation, in-hospital care practices, and breastfeeding. Pediatrics. 2013;131(4):685-92. PMID: 23478863. **KQ1E3, KQ2E3, KQ3E3.**
17. Cameron SL, Heath AL, Gray AR, et al. Lactation Consultant Support from Late Pregnancy with an Educational Intervention at 4 Months of Age Delays the Introduction of Complementary Foods in a Randomized Controlled Trial. J Nutr. 2015;145(7):1481-90. PMID: 25995280. **KQ1E5, KQ2E5, KQ3E5.**
18. Carfoot S, Williamson PR, Dickson R. The value of a pilot study in breast-feeding research. Midwifery. 2004;20(2):188-93. PMID: 15177863. **KQ1E5, KQ2E5, KQ3E5.**
19. Chapman D, Damio G, Young S, et al. Association of degree and timing of exposure to breastfeeding peer counseling services with breastfeeding duration. Adv Exp Med Biol. 2004;554:303-6. PMID: 15384587. **KQ1E5, KQ2E6, KQ3E5.**
20. Ciftci EK, Arikan D. The effect of training administered to working mothers on maternal anxiety levels and breastfeeding habits. J Clin Nurs. 2012;21(15-16):2170-8. PMID: 22151299. **KQ1E2a, KQ2E2a, KQ3E2a.**
21. Conroy CC, Cottrell BH. The Influence of Skin-to-Skin Contact after Cesarean on Breastfeeding Rates, Infant Feeding Responses, and Maternal Satisfaction. JOGNN. 2015;44:S61-2. PMID: None. **KQ1E3, KQ2E3, KQ3E3.**
22. Corriveau SK, Drake EE, Kellams AL, et al. Evaluation of an office protocol to increase exclusivity of breastfeeding. Pediatrics. 2013;131(5):942-50. PMID: 23545382. **KQ1E3, KQ2E3, KQ3E3.**
23. Coutinho SB, de Lira PI, de Carvalho LM, et al. Comparison of the effect of two systems for the promotion of exclusive breastfeeding. Lancet. 2005;366(9491):1094-100. PMID: 16182897 **KQ1E2a, KQ2E2a, KQ3E2a.**
24. da Graca LC, Figueiredo Mdo C, Conceicao MT. Contributions of the nursing intervention in primary healthcare for the promotion of breastfeeding. Rev Lat Am Enfermagem. 2011;19(2):429-36. PMID: 21584392. **KQ1E3, KQ2E3, KQ3E3.**
25. Dabritz HA, Hinton BG, Babb J. Maternal hospital experiences associated with breastfeeding at 6 months in a northern California county. J Hum Lact. 2010;26(3):274-85. PMID: 20484659. **KQ1E3, KQ2E3, KQ3E3.**
26. Daniels LA, Mallan KM, Battistutta D, et al. Child eating behavior outcomes of an early feeding intervention to reduce risk indicators for child obesity: the NOURISH RCT. Obesity (Silver Spring). 2014;22(5):E104-11. PMID: 24415390. **KQ1E1, KQ2E1, KQ3E1.**
27. Daniels LA, Mallan KM, Battistutta D, et al. Evaluation of an intervention to promote protective infant feeding practices to prevent childhood obesity: outcomes of the NOURISH RCT at 14 months of age and 6 months post the first of two intervention modules. Int J Obes (Lond). 2012;36(10):1292-8. PMID: 22710926. **KQ1E1, KQ2E1, KQ3E1.**
28. De Carolis MP, Cocca C, Valente E, et al. Individualized follow up programme and early discharge in term neonates. Ital. 2014;40:70. PMID: 25024007. **KQ1E1, KQ2E1, KQ3E1.**
29. de Oliveira LD, Giugliani ER, Santo LC, et al. Impact of a strategy to prevent the introduction of non-breast milk and complementary foods during the first 6 months of life: a randomized clinical trial with adolescent mothers and grandmothers. Early Hum Dev. 2012;88(6):357-61. PMID: 22001312. **KQ1E2a, KQ2E2a, KQ3E2a.**
30. Declercq E, Labbok MH, Sakala C, et al. Hospital practices and women's likelihood of fulfilling their intention to exclusively breastfeed. Am J Public Health. 2009;99(5):929-35. PMID: 19299680. **KQ1E3, KQ2E3, KQ3E3.**
31. Dias de Oliveira L, Justo Giugliani ER, Cordova do Espirito Santo L, et al. Counselling sessions increased duration of exclusive breastfeeding: a randomized clinical trial with adolescent mothers and grandmothers. Nutr J. 2014;13:73. PMID: 25033743. **KQ1E2a, KQ2E2a, KQ3E2a.**

32. Dumas L, Lepage M, Bystrova K, et al. Influence of Skin-to-Skin Contact and Rooming-In on Early Mother–Infant Interaction: A Randomized Controlled Trial. Clin Nurs Res. 2013;22(3):310-36. PMID: 23291315. **KQ1E2a, KQ2E2a, KQ3E2a.**
33. Ekstrom A, Kylberg E, Nissen E. A process-oriented breastfeeding training program for healthcare professionals to promote breastfeeding: an intervention study. Breastfeed Med. 2012;7(2):85-92. PMID: 22168946. **KQ1E5, KQ2E6, KQ3E5.**
34. Ekstrom A, Nissen E. A mother's feelings for her infant are strengthened by excellent breastfeeding counseling and continuity of care. Pediatrics. 2006;118(2):e309-e14. PMID: 16882775 **KQ1E5, KQ2E6, KQ3E5.**
35. Ekstrom A, Widstrom AM, Nissen E. Does continuity of care by well-trained breastfeeding counselors improve a mother's perception of support? Birth. 2006;33(2):123-30. PMID: 16732777 **KQ1E5, KQ2E6, KQ3E5.**
36. Feldman-Winter L, Barone L, Milcarek B, et al. Residency curriculum improves breastfeeding care. Pediatrics. 2010;126(2):289-97. PMID: 20603262. **KQ1E3 KQ2E3, KQ3E3.**
37. Feldman-Winter L, Grossman X, Palaniappan A, et al. Removal of industry-sponsored formula sample packs from the hospital: does it make a difference? J Hum Lact. 2012;28(3):380-8. PMID: 22638306. **KQ1E3, KQ2E3, KQ3E3.**
38. Figueredo SF, Mattar MJG, de Vilhena Abrão ACF. Baby-Friendly Hospital: prevalence of exclusive breastfeeding at 6 months and intervening factors. Rev Esc Enferm USP. 2013;47(6):1291-7. PMID: 24626353. **KQ1E2a, KQ2E2a, KQ3E2a.**
39. Finch C, Daniel EL. Breastfeeding education program with incentives increases exclusive breastfeeding among urban WIC participants. J Am Diet Assoc. 2002;102(7):981-4. PMID: 12146564 **KQ1E5, KQ2E6, KQ3E5.**
40. Flaherman VJ, Aby J, Burgos AE, et al. Effect of early limited formula on duration and exclusivity of breastfeeding in at-risk infants: an RCT. Pediatrics. 2013;131(6):1059-65. PMID: 23669513. **KQ1E4, KQ2E4, KQ3E4.**
41. Gallegos D, Russell-Bennett R, Previte J, et al. Can a text message a week improve breastfeeding? BMC Pregnancy Childbirth. 2014;14(1):374. PMID: 25369808. **KQ1E3, KQ2E3, KQ3E3.**
42. Garcia-de-Leon-Gonzalez R, Oliver-Roig A, Hernandez-Martinez M, et al. Becoming baby-friendly in Spain: a quality-improvement process. Acta Paediatr. 2011;100(3):445-50. PMID: 20955351. **KQ1E3, KQ2E3, KQ3E3.**
43. Giglia R, Cox K, Zhao Y, et al. Exclusive Breastfeeding Increased by an Internet Intervention. Breastfeed Med. 2014. PMID: 25358119. **KQ1E5, KQ2E6, KQ3E5.**
44. Grassley JS, Sauls DJ. Evaluation of the Supportive Needs of Adolescents during Childbirth intrapartum nursing intervention on adolescents' childbirth satisfaction and breastfeeding rates. J Obstet Gynecol Neonatal Nurs. 2012;41(1):33-44. PMID: 22150878. **KQ1E3, KQ2E3, KQ3E3.**
45. Griffin R, Richardson M, Morris-Thompson T. An evaluation of the impact of maternity support workers. Br J Midwifery. 2012;20(12):884-9. PMID: None. **KQ1E5, KQ2E5, KQ3E5.**
46. Grossman X, Chaudhuri J, Feldman-Winter L, et al. Hospital Education in Lactation Practices (Project HELP): does clinician education affect breastfeeding initiation and exclusivity in the hospital? Birth. 2009;36(1):54-9. PMID: 19278384. **KQ1E3, KQ2E3, KQ3E3.**
47. Grossman X, Chaudhuri JH, Feldman-Winter L, et al. Neonatal weight loss at a US Baby-Friendly Hospital. J Acad Nutr Diet. 2012;112(3):410-3. PMID: 22717201. **KQ1E1, KQ2E1, KQ3E1.**
48. Haider SJ, Chang LV, Bolton TA, et al. An evaluation of the effects of a breastfeeding support program on health outcomes. Health Serv Res. 2014;49(6):2017-34. PMID: 25039793. **KQ1E3, KQ2E3, KQ3E3.**
49. Hake-Brooks SJ, Anderson GC. Kangaroo care and breastfeeding of mother-preterm infant dyads 0-18 months: a randomized, controlled trial. Neonatal Netw. 2008;27(3):151-9. PMID: 18557262. **KQ1E4, KQ2E4, KQ3E4.**
50. Hannula LS, Kaunonen ME, Puukka PJ. A study to promote breast feeding in the Helsinki Metropolitan area in Finland. Midwifery. 2014;30(6):696-704. PMID: 24210842. **KQ1E3, KQ2E3, KQ3E3.**
51. Hoddinott P, Craig L, Maclennan G, et al. The FEeding Support Team (FEST) randomised, controlled feasibility trial of proactive and reactive telephone support for breastfeeding women living in disadvantaged areas. BMJ Open. 2012;2(2):e000652. PMID: 22535790. **KQ1E5, KQ2E6, KQ3E5.**

52. Hoddinott P, Craig L, Maclennan G, et al. Process evaluation for the FEeding Support Team (FEST) randomised controlled feasibility trial of proactive and reactive telephone support for breastfeeding women living in disadvantaged areas. BMJ Open. 2012;2(2):e001039. PMID: 22535794. **KQ1E5, KQ2E6, KQ3E5.**
53. Holmes AV, McLeod AY, Thesing C, et al. Physician breastfeeding education leads to practice changes and improved clinical outcomes. Breastfeed Med. 2012;7(6):403-8. PMID: 23046226. **KQ1E3, KQ2E3, KQ3E3.**
54. Hongwei W, Senqi H, Thobaben M, et al. Continuous primary nursing care increases satisfaction with nursing care and reduces postpartum problems for hospitalized pregnant women. Contemp Nurse. 2011;37(2):149-59. PMID: 21692586. **KQ1E2a, KQ2E2a, KQ3E2a.**
55. Ingram J, Johnson D. Using community maternity care assistants to facilitate family-focused breastfeeding support. Matern Child Nutr. 2009;5(3):276-81. PMID: 19531048. **KQ1E3, KQ2E3, KQ3E3.**
56. Ingram J, Johnson D, Condon L. The effects of Baby Friendly Initiative training on breastfeeding rates and the breastfeeding attitudes, knowledge and self-efficacy of community health-care staff. Primary health care research & development. 2011;12(3):266-75. PMID: 21798124. **KQ1E3, KQ2E3, KQ3E3.**
57. Jang GJ, Kim SH. [Effects of breast-feeding education and support services on breast-feeding rates and infant's growth]. J Korean Acad Nurs. 2010;40(2):277-86. PMID: 20453574 **KQ1E7, KQ2E7, KQ3E7.**
58. Joshi A, Amadi C, Meza J, et al. Comparison of Socio-Demographic Characteristics of a Computer Based Breastfeeding Educational Intervention Among Rural Hispanic Women. J Community Health. 2015;40(5):993-1001. PMID: 25868495. **KQ1E5, KQ2E5, KQ3E5.**
59. Kair LR, Kenron D, Etheredge K, et al. Pacifier restriction and exclusive breastfeeding. Pediatrics. 2013;131(4):e1101-7. PMID: 23509161. **KQ1E3, KQ2E3, KQ3E3.**
60. Kamran A, Shrifirad G, Mirkarimi SK, et al. Effectiveness of breastfeeding education on the weight of child and self-efficacy of mothers - 2011. J Educ Health Promot. 2012;1:11. PMID: 23555114. **KQ1E2a, KQ2E2a, KQ3E2a.**
61. Kang JS, Choi SY, Ryu EJ. Effects of a breastfeeding empowerment programme on Korean breastfeeding mothers: a quasi-experimental study. Int J Nurs Stud. 2008;45(1):14-23. PMID: 17512527. **KQ1E3, KQ2E3, KQ3E3.**
62. Kao JC, Johnson JE, Todorova R, et al. The Positive Effect of a Group Intervention to Reduce Postpartum Depression on Breastfeeding Outcomes in Low-Income Women. Int J Group Psychother. 2015;65(3):445-58. PMID: 26076207. **KQ1E1, KQ2E1, KQ3E1.**
63. Kemp L, Harris E, McMahon C, et al. Child and family outcomes of a long-term nurse home visitation programme: a randomised controlled trial. Arch Dis Child. 2011;96(6):533-40. PMID: 21429975. **KQ1E4, KQ2E4, KQ3E4.**
64. Kervin BE, Kemp L, Pulver LJ. Types and timing of breastfeeding support and its impact on mothers' behaviours. J Paediatr Child Health. 2010;46(3):85-91. PMID: 20136700. **KQ1E1, KQ2E1, KQ3E1.**
65. Kim Y. [Effects of a breast-feeding empowerment program on exclusive breast-feeding]. J Korean Acad Nurs. 2009;39(2):279-87. PMID: 19411799 **KQ1E7, KQ2E7, KQ3E7.**
66. Kistin CJ, Barrero-Castillero A, Lewis S, et al. Maternal note-taking and infant care: a pilot randomised controlled trial. Arch Dis Child. 2012;97(10):916-8. PMID: 22806235. **KQ1E5, KQ2E6, KQ3E5.**
67. Korade RS, Dhande LA, Bendhari ML, et al. Can Re-training in Baby Friendly Hospital Initiative (BFHI) Improve Breast Feeding Indicators? Indian J Pediatr. 2015. PMID: 26374736. **KQ1E2a, KQ2E2a, KQ3E2a.**
68. Kramer MS, Chalmers B, Hodnett ED, et al. Promotion of Breastfeeding Intervention Trial (PROBIT): a randomized trial in the Republic of Belarus. JAMA. 2001;285(4):413-20. PMID: 11242425. **KQ1E2a, KQ2E2a, KQ3E2a.**
69. Kronborg H, Vaeth M. How are effective breastfeeding technique and pacifier use related to breastfeeding problems and breastfeeding duration? Birth. 2009;36(1):34-42. PMID: 19278381. **KQ1E3, KQ2E3, KQ3E3.**
70. Kronborg H, Vaeth M, Olsen J, et al. Effect of early postnatal breastfeeding support: a cluster-randomized community based trial. Acta Paediatr. 2007;96(7):1064-70. PMID: 17524018. **KQ1E5, KQ2E6, KQ3E5.**

71. Labarere J, Gelbert-Baudino N, Laborde L, et al. CD-ROM-based program for breastfeeding mothers. Matern Child Nutr. 2011;7(3):263-72. PMID: 21689269. **KQ1E3, KQ2E3, KQ3E3.**
72. Labbok MH, Taylor EC, Nickel NC. Implementing the ten steps to successful breastfeeding in multiple hospitals serving low-wealth patients in the US: innovative research design and baseline findings. Int Breastfeed J. 2013;8(1):5. PMID: 23688264. **KQ1E5, KQ2E5, KQ3E5.**
73. Leger-Leblanc G, Rioux FM. Effect of a prenatal nutritional intervention program on initiation and duration of breastfeeding. Can J Diet Pract Res. 2008;69(2):101-5. PMID: 18538064. **KQ1E3, KQ2E3, KQ3E3.**
74. Lovera D, Sanderson M, Bogle ML, et al. Evaluation of a breastfeeding peer support program for fathers of Hispanic participants in a Texas special supplemental nutrition program for women, infants, and children. J Am Diet Assoc. 2010;110(11):1696-702. PMID: 21034883. **KQ1E3, KQ2E3, KQ3E3.**
75. Lucchini Raies C, Uribe TC, Villarroel Del PL, et al. Randomized controlled clinical trial evaluating determinants of successful breastfeeding: Follow-up two months after comprehensive intervention versus standard care delivery. Revista chilena de pediatria. 2013;84(2):138-44. PMID: None. **KQ1E7, KQ2E7, KQ3E7.**
76. Macaluso A, Bettinelli ME, Chapin EM, et al. A controlled study on baby-friendly communities in Italy: methods and baseline data. Breastfeed Med. 2013;8:198-204. PMID: 23398142. **KQ1E5, KQ2E5, KQ3E5.**
77. Mannan I, Rahman SM, Sania A, et al. Can early postpartum home visits by trained community health workers improve breastfeeding of newborns? J Perinatol. 2008;28(9):632-40. PMID: 18596714. **KQ1E2a, KQ2E2a, KQ3E2a.**
78. Marin Gabriel MA, Llana Martin I, Lopez Escobar A, et al. Randomized controlled trial of early skin-to-skin contact: effects on the mother and the newborn. Acta Paediatr. 2010;99(11):1630-4. PMID: 19912138. **KQ1E5, KQ2E6, KQ3E5.**
79. Martin J, MacDonald-Wicks L, Hure A, et al. Reducing postpartum weight retention and improving breastfeeding outcomes in overweight women: a pilot randomised controlled trial. Nutrients. 2015;7(3):1464-79. PMID: 25723973. **KQ1E5, KQ2E5, KQ3E5.**
80. Martin-Iglesias S, del-Cura-Gonzalez I, Sanz-Cuesta T, et al. Effectiveness of an implementation strategy for a breastfeeding guideline in Primary Care: cluster randomised trial. BMC Fam Pract. 2011;12:144. PMID: 22208800. **KQ1E5, KQ2E5, KQ3E5.**
81. Maycock B, Binns CW, Dhaliwal S, et al. Education and support for fathers improves breastfeeding rates: a randomized controlled trial. J Hum Lact. 2013;29(4):484-90. PMID: 23603573. **KQ1E5, KQ2E6, KQ3E5.**
82. Maycock BR, Scott JA, Hauck YL, et al. A study to prolong breastfeeding duration: design and rationale of the Parent Infant Feeding Initiative (PIFI) randomised controlled trial. BMC Pregnancy Childbirth. 2015;15:159. PMID: 26231519. **KQ1E5, KQ2E5, KQ3E5, X17.**
83. Mazumder S, Taneja S, Bahl R, et al. Effect of implementation of Integrated Management of Neonatal and Childhood Illness programme on treatment seeking practices for morbidities in infants: cluster randomised trial. BMJ. 2014;349:g4988. PMID: 25172514. **KQ1E2a, KQ2E2a, KQ3E2a.**
84. McKeever P, Stevens B, Miller KL, et al. Home versus hospital breastfeeding support for newborns: a randomized controlled trial. Birth. 2002;29(4):258-65. PMID: 12431265. **KQ1E5, KQ2E6, KQ3E5.**
85. McLeod D, Pullon S, Benn C, et al. Can support and education for smoking cessation and reduction be provided effectively by midwives within primary maternity care? Midwifery. 2004;20(1):37-50. PMID: 15020026. **KQ1E5, KQ2E6, KQ3E5.**
86. McQueen KA. Improving breastfeeding outcomes: A pilot randomized controlled trial of a self-efficacy intervention with primiparous mothers: University of Toronto (Canada); 2009. **KQ1E8, KQ2E8, KQ3E8.**
87. Mejdoubi J, van den Heijkant SC, van Leerdam FJ, et al. Effects of nurse home visitation on cigarette smoking, pregnancy outcomes and breastfeeding: a randomized controlled trial. Midwifery. 2014;30(6):688-95. PMID: 24041564. **KQ1E4, KQ2E4, KQ3E4.**
88. Mellin PS, Poplawski DT, Gole A, et al. Impact of a formal breastfeeding education program. MCN Am J Matern Child Nurs. 2011;36(2):82-8; quiz 9-90. PMID: 21150474. **KQ1E3, KQ2E3, KQ3E3.**

89. Mitchell-Box KM, Braun KL. Impact of male-partner-focused interventions on breastfeeding initiation, exclusivity, and continuation. J Hum Lact. 2013;29(4):473-9. PMID: 23792369. **KQ1E3, KQ2E3, KQ3E3.**
90. Mizuno K, Mizuno N, Shinohara T, et al. Mother-infant skin-to-skin contact after delivery results in early recognition of own mother's milk odour. Acta Paediatr. 2004;93(12):1640-5. PMID: 15841774. **KQ1E2c, KQ2E2c, KQ3E2c.**
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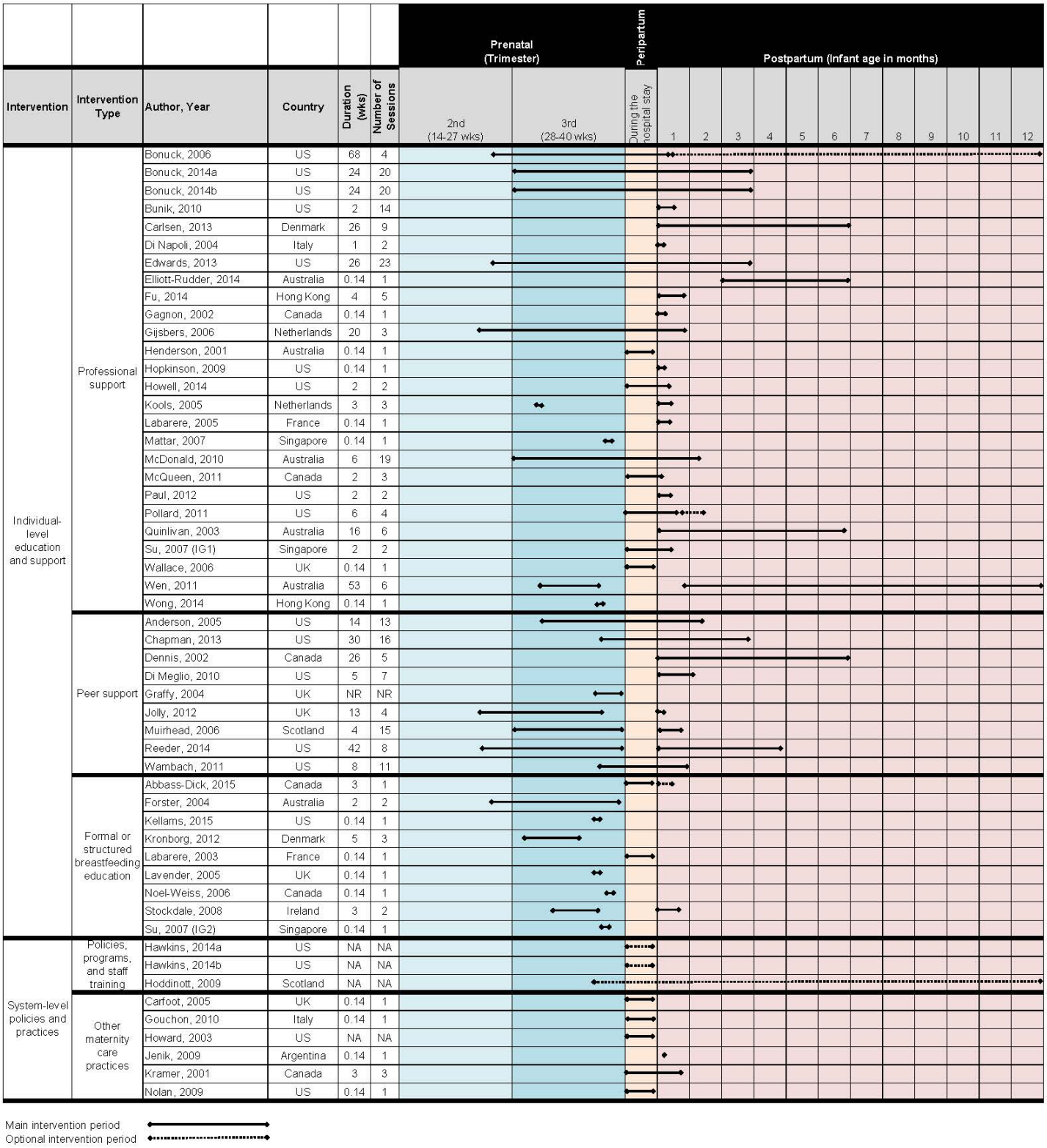
Appendix C Figure 1. Intervention Dose, by Intervention Type and Author Name



Abbreviations: UK=United Kingdom; US=United States; wks=weeks

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Abbass-Dick, 2015[90] Canada	IG1 Coparenting breastfeeding education	Peripartum, Postpartum	Coparenting breastfeeding support intervention consisting of one 15-min counseling session in postpartum hospital unit, in which couples were given breastfeeding information and an information package including a coparenting workbook, breastfeeding workbook, and information on a secure study Web site, and couples were given the option of watching an 11-min coparenting and breastfeeding video in the hospital or at home later. Couples were followed up at home with e-mails at 1 and 3 wk postpartum and a phone call at 2 wk postpartum. The coparenting workbook, video, and Web site contained extensive information on breastfeeding and coparenting. Elements were designed to help couples work cooperatively toward meeting their jointly determined child health outcomes.	3 1 Lactation care provider (NL)	Standard in-hospital breastfeeding support and any breastfeeding assistance that was proactively sought in the community.
Anderson, 2005[91] US	IG1 Peer counseling	Prenatal, Peripartum, Postpartum	3 prenatal (after enrollment, before 36 wk, and at 36 wk) home visits (actual 2.6 hr total), 9 postpartum (for 6 wk) home visits (planned and actual time NR), and daily in-hospital visits (actual 2.2 hr total) during postpartum stay from an assigned peer counselor. During 3 prenatal home visits, the peer counselor reviewed the benefits and reasons for EBF, avoidance of use of feeding bottles and pacifiers, and tested for inverted nipples. They also reviewed behaviors that impede early initiation and successful breastfeeding and explained why EBF babies do not need water during the first 6 mo of life, infant cues for readiness to breastfeed, and proper latch-on technique or positioning. If the woman had a video cassette recorder she was provided with an opportunity to watch a breastfeeding video. The entire family was encouraged to participate in the education, especially the principal person expected to support the woman after delivery. The assigned peer counselor also visited the mother-infant pair at least once a day starting within 24 hr after delivery and for as long as the dyad remained hospitalized. The 9 postpartum home visits were to provide hands-on breastfeeding support and counseling according to the mother's needs. The mothers in the PC had both the beeper and cell phone numbers of the peer counselor to be contacted during lactation crises occurring between scheduled home visits. The content of the postpartum home visits and any phone counseling were based on the specific needs for breastfeeding education and support of the mother-infant pair. Routine breastfeeding care from the hospital was also delivered.	14 13 Peer counselor (SLT)	Conventional prenatal breastfeeding education from the Women's Ambulatory Health Services clinic staff. Upon delivery, they received hands-on breastfeeding assistance and education from the maternity ward nursing staff. If any of the mothers experienced breastfeeding problems requiring assistance beyond that routinely provided by staff nurses, the hospital's on duty LC was called to assist. Hospital is BFHI-certified and staff are trained to provide lactation education and support to mothers who attend the prenatal clinic and deliver at the hospital. The hospital also provides a breastfeeding warm line that nursing mothers can call 24 hr/day for support and counseling from a staff nurse/ LC during lactation crises after hospital discharge. BFHI accredited.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Bonuck, 2006[93] US	IG1 Lactation support	Prenatal, Peripartum, Postpartum	Two 60-min prenatal clinic or home visits by a study LC. Initial prenatal meeting focused first on trust and rapport and then educational content, including feeding intentions and benefits of breastfeeding. A flipchart depicting the physiologic features of breastfeeding and color pamphlets were reviewed. Second meeting addressed what to expect after birth and specifics on how to initiate breastfeeding in the hospital (e.g., latch-on, positioning, importance of early initiation, and demand feeding). Practice with a culturally appropriate lactation doll and nipple was offered. During the postpartum hospital and 90-min home visits, the consultants provided hands-on instruction in latching on, proper positioning, and other techniques to avoid common breastfeeding complications, as well as pump use. After breastfeeding was established, topics included frequency of feeding, confidence, stooling patterns, determining adequate intake, and maternal nutrition. If later contacts were made, they tended to focus on expressing and storing milk, fatigue, nursing in public, returning to school or work, and supplementing. The LCs helped mothers garner support from their families, schools, workplaces, and health care providers. Study LCs offered a nursing bra to women in the intervention group, free of charge, to facilitate breastfeeding. Study LCs also provided manual or mini-electric breast pumps, free of charge, in certain circumstances. The general policy of the study LCs was to discourage the use of breast pumps in favor of nursing for women who were in continual proximity to their infants. Mean dose received (any intervention, averaged across all participants) was 143.2 min.	68 4 Lactation care provider (NL)	At 1 site, usual care included a mandatory prenatal care class, which did not address infant feeding in any detail. At the other site, there was no routine prenatal education. Neither site followed an established protocol for breastfeeding education or support or offered a private lactation space. Participants enrolled in WIC had the opportunity to visit with a breastfeeding coordinator at the WIC site, although such use was not assessed specifically. Given the study population's diversity, it would be difficult to characterize a community "standard" with respect to breastfeeding.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Bonuck, 2014a (BINGO)[92] US	IG1 Lactation counseling and brief education	Prenatal, Peripartum, Postpartum	Participants received both prenatal education by physician or midwife as well as support with an LC during the prenatal and postpartum periods. Support: Study staff programmed prompts to appear in the electronic medical record during 5 prenatal visits. Each included 2 to 3 brief open-ended questions for providers (resident, attending obstetrician/gynecologist, or certified nurse-midwives) to ask that portrayed breastfeeding as the norm ("What are your plans for breastfeeding?"), sought to clarify knowledge about how long or how much to breastfeed, and elicited information on social network support. At the 36-wk prenatal visit, the provider encouraged immediate skin-to-skin contact, initiating breastfeeding after birth, decreasing mother/ baby separation, and asking for help breastfeeding. Lactation support: 2 study-supported LCs had routine presence at prenatal sites and hospitals. The intervention included 2 prenatal sessions, a hospital visit, 1 visit during a routine pediatric appointment at 1 wk, and regular phone calls postpartum through 3 mo or until breastfeeding ceased. Prenatal sessions occurred in the exam room during the 30+ min of “downtime” while waiting for the prenatal care provider. If sessions were interrupted, attempts were made to finish them after the prenatal appointment. Initial session focused on rapport building and education, and 2nd was on practical aspects of breastfeeding. The study provided nursing bras and breast pumps to participants as needed. LCs met mothers and their infants at the 1-wk routine pediatric visit. Postpartum home visits were optional, based on participants’ and LC preference and comfort.	24 20 Lactation care provider (IBCLC) and physician or midwife	No explicit breastfeeding promotion or support. Hospital had 1 LC (IBCLC), available weekdays, whose primary focus was women intending to exclusively breastfeed or at risk for breastfeeding difficulties. Midway through the study, hospital postpartum and labor and delivery nursing staff began attending a 20-hr Certified Lactation Consultant training course.
	IG2 Lactation support	Prenatal, Peripartum, Postpartum	Two 45-min prenatal sessions, a 15-min hospital visit, a 15-min visit during a routine pediatric appointment at 1 wk, and regular phone calls postpartum through 3 mo or until breastfeeding ceased, all with a licensed LC. Prenatal sessions occurred in the exam room during the 30+ min of “downtime” while waiting for the prenatal care provider. If sessions were interrupted, attempts were made to finish them after the prenatal appointment. Initial session focused on rapport building and education and 2nd was on practical aspects of breastfeeding. The study provided nursing bras and breast pumps to participants as needed. LCs met mothers and their infants at the 1-wk routine pediatric visit. Postpartum home visits were optional, based upon participants’ and LC preference and comfort.	24 20 Lactation care provider (IBCLC)	No explicit breastfeeding promotion or support. Hospital had 1 LC (IBCLC), available weekdays, whose primary focus was women intending to exclusively breastfeed or at risk for breastfeeding difficulties. Midway through the study, hospital postpartum and labor and delivery nursing staff began attending a 20-hr Certified Lactation Consultant training course.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
	IG3 Brief education	Prenatal	Study staff programmed prompts to appear in the electronic medical record during 5 prenatal visits. Each included 2 to 3 brief open-ended questions for providers (resident, attending obstetrician/gynecologist, or certified nurse-midwives) to ask that portrayed breastfeeding as the norm ("What are your plans for breastfeeding?"), sought to clarify knowledge about how long or how much to breastfeed, and elicited information on social network support. At the 36-wk prenatal visit, the provider encouraged immediate skin-to-skin contact, initiating breastfeeding after birth, decreasing mother/baby separation, and asking for help breastfeeding.	24 5 Physician or midwife	No explicit breastfeeding promotion or support. Hospital had 1 LC (IBCLC), available weekdays, whose primary focus was women intending to exclusively breastfeed or at risk for breastfeeding difficulties. Midway through the study, hospital postpartum and labor and delivery nursing staff began attending a 20-hr Certified Lactation Consultant training course.
Bonuck, 2014b (PAIRINGS)[92] US	IG1 Lactation counseling and brief support	Prenatal, Peripartum, Postpartum	Participants received prenatal education by physician or midwife and support with an LC during prenatal and postpartum periods. Brief support: Study staff programmed prompts to appear in the electronic medical record during 5 prenatal visits. Each included 2 to 3 brief open-ended questions for providers (resident, attending obstetrician/gynecologist, or certified nurse-midwives) to ask that portrayed breastfeeding as the norm ("What are your plans for breastfeeding?"), sought to clarify knowledge about how long or how much to breastfeed, and elicited information on social network support. At the 36-wk prenatal visit, the provider encouraged immediate skin-to-skin contact, initiating breastfeeding after birth, decreasing mother/baby separation, and asking for help breastfeeding. Lactation support: 2 study-supported LCs had routine presence at prenatal sites and hospitals. Intervention included 2 prenatal sessions, a hospital visit, 1 visit during a routine pediatric appointment at 1 wk, and regular phone calls postpartum through 3 mo or until breastfeeding ceased. Prenatal sessions occurred in the exam room during the 30+ min of “downtime” while waiting for the prenatal care provider. If sessions were interrupted, attempts were made to finish them after the prenatal appointment. 1st session focused on rapport building and education and 2nd was on practical aspects of breastfeeding. The study provided nursing bras and breast pumps to participants as needed. LCs met mothers and their infants at the 1-wk routine pediatric visit. Postpartum home visits were optional, based upon participants’ and LC preference and comfort.	24 20 Physician or midwife and lactation care provider (IBCLC)	No explicit breastfeeding promotion or support. Hospital had 1 LC (IBCLC), available weekdays, whose primary focus was women intending to exclusively breastfeed or at risk for breastfeeding difficulties. Midway through the study, hospital postpartum and labor and delivery nursing staff began attending a 20-hr Certified Lactation Consultant training course.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Bunik, 2010[95] US	IG1 Telephone support	Postpartum	Intervention included daily phone calls by trained bilingual (English/Spanish) nurses starting at discharge and daily for 2 wk postpartum. Nurses followed scripted protocols, which included cultural issues found to influence breastfeeding initiation or continuation. Topics included advantages of colostrum and importance of a good latch; engorgement; concerns about unnecessary formula supplementation, supply and demand, and assessing milk supply via infant stooling patterns; breastfeeding duration and benefits; causes of infant crying; modesty, family support, and violation of la cuarentena (40 days postpartum); support groups and WIC; mother's illness; baby blues vs. postpartum depression; medications and diet; pumping and milk storage; return to work/school or time away from baby; and growth spurts and cluster feeding. During calls, nurses also used a published screening tool designed to ensure necessary referrals for lactation issues or medical problems.	2 14 Nurse	All participants received a bag with pamphlets in English and Spanish producted by U.S. Department of Health and Human Services that included illustrations of breastfeeding postions and latch, a hand breast pump, lanolin cream, and a water bottle. Both groups also received usual hospital and discharge care, which included the formula company discharge bags.
Carfoot, 2005[96] UK	IG1 Skin-to-skin contact	Peripartum	The midwife placed the baby naked in a prone position against the mother's skin between the breasts as soon as possible after birth. The midwives were encouraged to weigh the baby before initiating skin-to-skin contact so it would allow the contact to continue until the baby showed signs of readiness to feed or the mother chose to end the contact. The specified minimum skin-to-skin duration was 45 min. The midwife offered assistance with the first feed when both the mother and baby were ready.	0.14 1 NA	Babies were quickly dried and wrapped in a towel before being handed to mother or father. Mother-baby contact was interrupted for weighing, dressing, and measuring the baby, or for suturing the mother's perineum after delivery. Midwife offered assistance with breastfeeding when both mother and baby were ready.
Carlsen, 2013[97] Denmark	IG1 Telephone support	Postpartum	Women were offered at least 9 phone consultations within 6 mo postpartum with LC, provided they breastfed during the entire period. Contacts followed a structured design posing questions of physical and psychologic aspects related to breastfeeding and well-being of mother and child. During the conversation, it was determined whether the mother had sufficient knowledge of breastfeeding and advice was provided if necessary. Initial contact was made within 1 wk postpartum. 3 contacts were made within 1 mo, and after women were contacted every 2nd wk until 8 wk postpartum, and then once monthly. Extra contacts were offered for specific difficulties, and support was stopped when breastfeeding was terminated. Women had a direct phone number for the LC, who was available 7 days/wk. 1st contact was ~20 min; rest were 5 to 10 min.	26 9 Lactation care provider (IBCLC)	NR

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Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Chapman, 2013[98] US	IG1 Peer counseling	Prenatal, Peripartum, Postpartum	Access to three 60–90-min prenatal visits (average=2), daily in-hospital visits (average=3), up to 11 postpartum home visits (average=5), and optional phone calls (average=9) from a specialized breastfeeding peer counselor during the first 6 mo postpartum. The peer counseling intervention replaced the optional routine peer counseling program that was available to controls. Prenatal peer counselor visits involved assessments of previous breastfeeding knowledge/experiences, personalized education on breastfeeding logistics, the risks of formula feeding, and anticipatory guidance. Daily peer counselor visits were similar to those usually provided, except the peer counselor ensured that women received a manual breast pump before discharge. Postpartum visits and phone calls were individualized and tentatively scheduled as follows: 3 visits (first wk postpartum); 2 visits during each of the 2nd, 3rd, and 4th wk; and weekly visits during wk 5 and 6. Participants were contacted by phone between 2 and 3 mo postpartum, with additional calls and home visits provided as needed. Participants received a large breastfeeding sling to facilitate close infant contact and discreet breastfeeding. Those separated from their infant due to work or school received a single electric breast pump with correctly sized flanges.	30 16 Peer counselor (SLT)	Prenatal breastfeeding education included brief breastfeeding discussions during routine clinic appointments and receipt of written educational materials. Staff nurses provided routine perinatal breastfeeding assistance, with LCs available as needed. After discharge, women could call the hospital's "warm line" with breastfeeding questions. Standard care also included optional support from peer counselors, who provided the following: ≤3 prenatal visits (covering breastfeeding benefits, breastfeeding myths, positioning, and common breastfeeding problems); daily (except Sunday) in-hospital visits to assist with latch and positioning and educate on infant cues and breastfeeding frequency; ≤7 personalized home visits during 1st yr postpartum; and phone support. If available, electric breast pumps were loaned as needed. To receive prenatal peer counselor visits, controls could self-refer or be referred to the program at no charge. During the hospital stay, controls were routinely visited by standard peer counselors during daily rounds, and those desiring peer counseling services after discharge were enrolled in the standard peer counseling program. BFHI accredited.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Dennis, 2002[99] Canada	IG1 Peer counseling	Postpartum	Peer volunteers were asked to contact new mother within 48 hr after hospital discharge and as frequently thereafter as the mother deemed necessary. 97% were phone contacts and 3% were face-to-face meetings. Frequency of contact was not standardized in order to individualize the intervention to the mothers' specific needs and to give credibility to the peer volunteers' experiential knowledge.	26 5 Peer counselor	Women had access to the conventional in-hospital and community postpartum support services such as those provided by hospital-based nursing and medical staff, a hospital-based breastfeeding clinic managed by LCs, a phone breastfeeding support line managed by hospital nursing staff, and support services provided by public health nurses at the local regional community health department and by community-based physicians and pediatricians.
Di Meglio, 2010[100] US	IG1 Peer telephone support	Postpartum	Peer support persons phoned the new mother at 2, 4, and 7 days postdischarge and at 2, 3, 4, and 5 wk postdischarge. No specific discussion topics were assigned. Peers introduced themselves and asked about the breastfeeding experience. They offered their phone numbers so the new mothers could call for support. They were advised to refer anyone with a problem to phone resources for breastfeeding information or to their physician. Monthly pizza parties (including transportation) were held for peer counselors, participating mothers, and their children.	5 7 Peer counselor (SLT)	NR
Di Napoli, 2004[101] Italy	IG1 Home breastfeeding support	Postpartum	A home visit by a midwife within the first 7 days after discharge to assist with breastfeeding and provide breastfeeding support. After this session, the same midwife initiated a phone counseling session to provide additional breastfeeding support. 232/266 IG participants adhered to study protocol.	1 2 Midwife (SLT)	NR
Edwards, 2013[102] US	IG1 Lactation support	Prenatal, Peripartum, Postpartum	During weekly prenatal home visits (average=10), trained doulas focused on building relationship with the mother while discussing pregnancy health, childbirth preparation, and bonding with the unborn infant. They engaged mothers in ongoing conversations about infant feeding, listened to mothers' ideas and concerns about breastfeeding, and worked to dispel any myths that the mothers held. Doulas sometimes shared personal experiences of breastfeeding or those of others in the community to help normalize the idea of breastfeeding for women from their cultural and community backgrounds. Doulas educated mothers about	26 23 Doula (SLT)	NR

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
			benefits of breastfeeding, sometimes using print, video, or other informational materials. Doulas included fathers and other family members in discussions about the benefits of breastfeeding and helped mothers gain family acceptance for decisions around feeding. During labor and delivery, the doulas were present to provide emotional support and encourage breastfeeding soon after birth. During the hospital stay and after discharge, doulas continued to provide encouragement and guidance as mothers negotiated the initial challenges of breastfeeding, including relieving breast discomfort, getting the infant to latch, and finding effective holding positions. Doulas suggested that mothers put the infant to breast at frequent intervals and to not introduce formula while establishing lactation. Doulas provided information on ways to assess and reassure mothers that the infant was getting enough milk. During home visits in the 1st 3 mo postpartum (average=12), doulas helped mothers adjust to parenthood and get to know their infants and how to care for them. Doulas were available by phone 24 hr/day to help with problems. Doulas provided breast pumps for mothers who were returning to work or school. For mothers who fed breast milk from bottles or used formula, doulas discouraged use of cereal in the bottle. Doulas discouraged introduction of solid food during the early months for both breastfed and formula-fed infants.		
Elliott-Rudder, 2014[80] Australia	IG1 Lactation support	Postpartum	Intervention was structured conversation to support continuation of breastfeeding in mothers who had breastfed for ≥8 wk using a motivational interviewing approach. A Conversation Tool was used with each breastfeeding mother who attended a general practice intervention site for infant immunization at 2, 4 or 6 mo. Mothers were informed of the recommendation for breastfeeding exclusively to 6 mo and maintenance to 1 to 2 yr and asked "How would that work for you?" According to the mother's response, the practice nurse provided a targeted proactive conversational action. Those who planned to cease breastfeeding were given nondirective health information, and their autonomy was affirmed. Those who were unsure were asked about perceived barriers and benefits, and their ambivalence was acknowledged. Those who planned to continue were asked about future challenges such as their return to work and were given anticipatory guidance. The conversation closed after community support resources were offered.	0.14 1 Nurse (SLT)	Usual care from nurses who had not received WHO breastfeeding support training and who commonly asked whether the mother had any problems.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Forster, 2004[103] Australia	IG1 Group education, attitude modification	Prenatal	Two 60-min group sessions that focused on changing attitudes regarding breastfeeding. Women were encouraged to bring their partners or significant other. The 1st class included information about advantages of breastfeeding, an exploration of the expectant parents' views and attitudes on breastfeeding, and their perceptions of the views of their family and friends, as well as community attitudes. Each participant was encouraged to interview her own mother and her partners' mother about how they fed them as babies and about the mother's present attitudes to breastfeeding. The 2nd class was a group discussion based on these interviews and participants' reactions, and a discussion of resources available for breastfeeding women. Women were encouraged to develop a breastfeeding plan. All participants were approximately 20 to 25 wk of gestation.	2 2 Midwife and community educator	Standard care, which included formal breastfeeding education sessions; breastfeeding information as a component of standard childbirth education courses; LC support as necessary (inpatient and outpatient); peer support by means of community breastfeeding groups; optional attendance at a breastfeeding information evening; any videos or education on breastfeeding presented in the postnatal ward during their stay; 24-hr phone counseling support; and a post-natal home visit by a domiciliary midwife. BFHI accredited.
	IG2 Group education, practical skills training	Prenatal	One 90-min group session that focused on practical breastfeeding skills using teaching aids that were previously developed and tested. The technique of attachment of the baby to the breast was explained and demonstrated using dolls and knitted breasts. Breastfeeding complications and management were discussed. All participants were approximately 20 to 25 wk of gestation.	0.14 1 Midwife and community educator	Standard care, which included formal breastfeeding education sessions; breastfeeding information as a component of standard childbirth education courses; LC support as necessary (inpatient and outpatient); peer support by means of community breastfeeding groups; optional attendance at a breastfeeding information evening; any videos or education on breastfeeding presented in the postnatal ward during their stay; 24-hr phone counseling support; and a post-natal home visit by a domiciliary midwife. BFHI accredited.

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Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Fu, 2014[82] Hong Kong	IG1 Telephone support	Postpartum	Participants in the phone support intervention were contacted within 72 hr of hospital discharge and then weekly for up to 4 wk postpartum or until they had stopped breastfeeding. Early support sessions focused on general breastfeeding knowledge, assessing infant feeding patterns, physical and emotional health of the mother, and guidance on managing problems such as poor latching, poor weight gain, insufficient milk production, and breast complications. In later support sessions, additional advice was given on breastfeeding discretely in public places, preparation for returning to work, and expressing and storing breast milk. Exclusive breastfeeding was promoted and encouraged at each support session, and participants were told where to seek further professional support or medical consultation, if necessary. Sessions lasted for 20 to 30 min.	4 5 Nurse (SLT)	Standard postnatal hospital care consisted of routine perinatal care according to the type of delivery, group postnatal lactation education provided by a midwife or LC, one-on-one assistance with breastfeeding if problems arose and time permitted, and postdischarge followup, either at outpatient clinic of the delivery hospital or nearest Maternal and Child Health Center. Information on available peer support groups provided at hospital discharge.
	IG2 In-hospital support	Peripartum	In-hospital support consisted of 3 one-on-one sessions, with 2 delivered to participants in the 1st 24 hr postpartum and 1 delivered in the 2nd 24 hr, prior to discharge. Participants were given information on the benefits of exclusive breastfeeding, the physiology of lactation, and common early breastfeeding problems. In addition, participants were given guidance and instruction on breastfeeding techniques, such as positioning the infant, latching and attachment, assessing feeding behaviors, and manual breast milk expression. During each session, participants were observed positioning, attaching, and feeding the newborn, with appropriate feedback provided and hands-on guidance only when necessary. Each session lasted for 30 to 45 min, and participants were encouraged to raise questions and concerns.	0.42 3 Nurse (SLT)	Standard postnatal hospital care consisted of routine perinatal care according to the type of delivery, group postnatal lactation education provided by a midwife or LC, one-on-one assistance with breastfeeding if problems arose and time permitted, and postdischarge followup, either at outpatient clinic of the delivery hospital or nearest Maternal and Child Health Center. Information on available peer support groups provided at hospital discharge.
Gagnon, 2002[104] Canada	IG1 Home breastfeeding support	Postpartum	Nurse visit at 3 to 4 days postpartum in the woman's home by community nurse. Home visits were planned to last 1 hr, during which time "usual care" similar to that described in the literature on early postpartum care would be provided. Nurse contacts continued when community followup was judged to be required. Participants also received nurse phone contact at 48 hr postbirth as part of usual care.	0.14 1 Nurse (SLT)	Usual care was 48-hr postpartum phone call and day 3 postpartum hospital visit. Clinic contacts lasted at most 45 min, in which a standardized plan of care was provided. Care provided during each contact (phone + visit) was similar to that described in the literature on early postpartum care. Nurse contacts were terminated at the completion of the clinic visit, although referral for continued care was available.

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Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Gijsbers, 2006[84] Netherlands	IG1 Lactation support	Prenatal, Postpartum	Trained research assistant visited families twice before birth (3 to 6 mo of pregnancy and ~8 mo) and once after (within 4 wk after delivery); visits lasted about 1 hr each. The main goal was to prepare women for future problems that might occur during breastfeeding for at least 6 mo. At 1st visit, women received a booklet about breastfeeding. The contents of the booklet reinforced the information given orally and included specific health benefits for families predisposed to asthma, how breastfeeding works, and how to manage breastfeeding side effects such as sore nipples. During home visits, the assistant motivated women to breastfeed for 6 mo and postpone solids for 6 mo. Questions about breastfeeding were answered. All aspects of breastfeeding illustrated in the booklet were reviewed. At the end of 1st and 2nd visit women were encouraged to read the booklet themselves and with their partner before next home visit. Intervention was based on the principles of the Attitude-Social influences-Self-Efficacy model and results of previous focus group interviews. Important topics arising from focus groups were integrated into a booklet. The booklet was divided into 3 parts: pregnancy, period just after birth, and months after birth, in which practical information regarding breastfeeding and expressing milk alternated with the personal experiences of 3 mothers and 1 father, who were used as models. Models differed in age, ethnic group, and socioeconomic status to increase the chance that families could identify with a model.	20 3 Research staff	Families received usual care, in which breastfeeding was recommended for 6 mo for all babies.
Gouchon, 2010[105] Italy	IG1 Skin-to-skin contact	Peripartum	Infants were bathed and dried but not dressed; they were fitted with a disposable diaper and cap and wrapped in a warm cloth. When the mother was back in her room, the newborn was placed on the mother's skin, between her breasts, and left covered with the cloth, the bed sheet, and blanket for a maximum of 2 hr. During this time, the mother was instructed on how to breastfeed. Mean duration of skin-to-skin contact was 82.9 ± 45.9 min.	0.14 1 NA	Newborns were bathed, dried, and dressed and held by father or put in radiant warmer if there were no relatives or considered hypothermic; then, if not contraindicated, infant was taken to mother's room when she returned. Mother was instructed on how to breastfeed and, during the 2-hr observation time, could choose whether to keep the baby in her bed, in a crib next to the bed, or in the neonatal center. She could choose whether to breastfeed or not.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Graffy, 2004[106] UK	IG1 Peer counseling	Prenatal, Postpartum	Peer counselors accredited by the UK National Childbirth Trust visited women once before birth and offered postnatal phone support or further home visits if requested. At the antenatal visit, counselors gave the women a contact card and 2 leaflets published by the National Childbirth Trust and Health Education Authority.	NR 1 Peer counselor (SLT)	NR
Hawkins, 2014a[107] US	BFHI accreditation	Peripartum, Postpartum	BFHI accreditation from 1999–2009.	NA NA NA	Non-BFHI–accredited facilities
Hawkins, 2014b[108] US	BFHI accreditation	Peripartum, Postpartum	BFHI accreditation from 2004–2008.	NA NA NA	Non-BFHI–accredited facilities
Henderson, 2001[109] Australia	IG1 Positioning and attachment support	Peripartum	One 30-min one-on-one standardized education session for 30 min during the infant's breastfeeding session(s). Materials covered simple breast anatomy, various positions of infant at the breast, principles of correct attachment, and 3 stages of suckling. A cloth breast model was used to demonstrate anatomy and physiology and the importance of positioning. Advice and verbal assistance were given with positioning and attachment during breastfeed using a hands-off technique (educator did not physically position or attach the infant). The technique of self-positioning and self-attachment by the woman and the cues she could use to determine that her technique was correct were the main foci of the intervention. During the session and on each subsequent day in the hospital, the woman's positioning and attachment technique was assessed and immediate feedback given.	0.14 1 Research staff	NR
Hoddinott, 2009[110] Scotland	Policy to provide breastfeeding support groups	Prenatal, Postpartum	Clinics asked to increase the amount of breastfeeding support groups provided and standardize the structure and content.	104 NA Midwives and clinic staff	Usual care with no new breastfeeding group activity.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Hopkinson, 2009[111] US	IG1 Lactation support	Postpartum	One 60-min counseling session at hospital-based breastfeeding clinic at 3 to 7 days postpartum. An appointment reminder card was included with the discharge papers. A breastfeeding history, breast exam, infant oral-motor assessment, infant weight, evaluation of latch and milk transfer, and discussion of maternal concerns and support system were included in counseling sessions. The importance of exclusive breastfeeding was reviewed, and plans for attaining exclusivity were discussed if the mother desired to achieve that goal. Information and skills training were provided as indicated for identified deficits, concerns, and breastfeeding problems. Additional visits and/or phone consultations were provided if deemed necessary by the mother and the clinic staff. Women who missed appointments received a phone call. Visits were rescheduled if possible; if not, counseling was provided over the phone. During phone counseling, mothers were screened for breastfeeding problems and concerns regarding adequacy of milk supply. Problem management was discussed where indicated.	0.14 1 Breastfeeding counselor	Routine care included ≥4 hr of mother-infant separation immediately after delivery, bed-side breastfeeding assistance before discharge, and free formula discharge packs. Infants at elevated risk for hyperbilirubinemia and their mothers returned to the hospital's Newborn Followup Clinic at 3 to 5 days, where they were screened for medical and breastfeeding problems. Both high- and low-risk mothers received the phone number of hospital's breastfeeding clinic and WIC office with instructions to call for breastfeeding assistance if needed. 1st well-child exam for low-risk infants occurred ~2 wk after discharge coincidently with 1st postpartum WIC visit.
Howard, 2003[112] US	IG1 Restricted pacifier use	Peripartum	After discharge, families were instructed (via study discharge pack) to avoid use of a pacifier until the infant's 5th wk of life and in the interim to use alternative forms of comforting. The study pack also included educational materials on infant development, comforting a crying infant, and colic and included outlet covers as opposed to pacifiers. During the 4th wk of life, intervention families received 2 Soothie pacifiers in the mail. All families were also instructed about alternative methods of soothing infants (e.g., skin-to-skin contact, walking, massage, music, swaddling). Study did not report about pacifier use during the hospital stay. Median time to pacifier introduction, days (95% CI): IG: 28 (21 to 30) and CG: 7 (4 to 14).	NA NA NA	After discharge, families were given study discharge pack containing 2 Soothie pacifiers and instructed to introduce pacifier as soon as possible, using it as a mode of comforting in addition to any other techniques they wished to use. All families were also instructed about alternative methods of soothing infants (e.g., skin-to-skin contact, walking, massage, music, swaddling). Holds active certificate of intent to become BFHI accredited.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Howell, 2014[114] US	IG1 Brief education and counseling	Peripartum, Postpartum	Women were given a 2-step, culturally tailored intervention. 1st step occurred in the hospital when a trained bilingual social worker reviewed an education pamphlet and partner summary sheet with the mother. Education materials included information on breastfeeding, breast/nipple pain, cesaerean delivery, site pain, episiotomy site pain, urinary incontinence, back pain, headaches, hair loss, hemorrhoids, infant colic, and depressive symptoms. Additional information was given on social support. A partner summary sheet spelled out the typical pattern of experience for mothers after delivery to help normalize the experience. In the 2nd step (2-wk postdelivery call), the social worker assessed the patient's symptoms, skills in symptom management, and other needs. Patients and the social worker created action plans to address current needs that included assessment of community resources. 93% of IG was successfully reached for the 2-wk call.	2 2 Social worker	Women received routine postpartum education (i.e., discharge materials, television educational programs on infant care, breastfeeding, and peripartum care). Additionally, they received a 2-wk postdelivery call to inform them of future study assessments and a list of health-related and community resources was mailed to them.
Jenik, 2009[115] Argentina	IG1 Restricted pacifier use	Postpartum	Mothers were encouraged to avoid pacifier use until breastfeeding was well established. Received a guide with other alternatives for comforting a crying baby.	0.14 1 NA	Parents received 6 silicone pacifiers and a written pacifier guide. They were informed that others could be used according to their preference. Participating hospitals had established breastfeeding programs, with early breastfeeding initiation, LCs, and unrestricted rooming-in. 3 of 5 study facilities were BFHI accredited.
Jolly, 2012[83] UK	IG1 Peer counseling	Prenatal, Postpartum	New community-based prenatal service using peer support workers that included initial introduction in the prenatal clinic followed by at least 2 contacts (at 24–28 wk gestation and at ~36 wk). 1st contact could directly follow the introduction, but at least 1 contact had to be in home. Duration of each support session was based on need. Peer support workers followed up with women who initiated breastfeeding to give postnatal support. They were informed directly by the hospital or community midwives when women were discharged so they could contact and visit them within 24 to 48 hr. Further contact would be needs based (by phone or home visit) but at least 1 contact was in the 1st wk. Purpose of the prenatal consultations was to provide advice and information on benefits of breastfeeding and to support women with particular cultural barriers or concerns.	13 4 Peer counselor (SLT)	Community prenatal and postnatal midwife care (some home-based), which includes breastfeeding advice. Health visitors also routinely see women postnatally, sometimes home-based, from 10 to 14 days, which includes breastfeeding advice as appropriate. In-hospital breastfeeding advice and breastfeeding peer support workers was available from some midwives and hospitals in study area.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Kellams, 2015[116] US	IG1 (Breastfeeding video)	Prenatal	25-min educational breastfeeding video (Better Breastfeeding) that provided general information about breastfeeding, including importance, latch, hunger cues, positioning, sore nipples, engorgement, how breast milk is made, and lifestyle issues. Videos were shown using a laptop and earbuds in an alcove in the waiting room and/or in the exam room while the participant waited to be seen by the physician or nurse practitioner.	0.14 1 NA	Prenatal nutrition video.
Kools, 2005[81] Netherlands	IG1 Home breastfeeding support	Prenatal, Postpartum	Intervention started during usual care prepartum home visit by maternity nurse and included personal communication, brochure, and mother's booklet. Home visit postbirth included personal communication, mother's booklet, and phone calls. The health counseling and booklet included 6 steps addressing the behavioral determinants of breastfeeding: knowledge, motivation, ability, intention, practice, and continuation. The booklet was created to enhance cooperation between various interventionists. Mothers were asked to log their breastfeeding barriers, problems, and motivation to continue before each contact with interventionist. They were also given a number to call the interventionist in case questions or problems arose. Interventionists could fax their concerns or questions to an LC 24 hr/day. The LC then contacted the interventionist or mother within 24 hr and tried to resolve the problem. If needed, the LC could make home visits or followup calls.	3 3 Physician, nurse, and lactation care provider (NL)	Pregnant women typically apply for maternity care between the 6th and 7th mo of pregnancy and receive a home visit by a maternity care nurse in the 7th or 8th mo. Postpartum care NR.
Kramer, 2001[117] Canada	IG1 Restricted pacifier use	Peripartum, Postpartum	Mother was asked to avoid pacifiers when the baby cried or fussed and to first offer the breast instead, and failing that, to try carrying and rocking the infant. Both groups received one 45-min counseling session promoting breastfeeding plus an information sheet provided by a nurse with specialized training in lactation counseling during the hospital stay. The session and information focused on positioning, the importance of frequent feeding and feeding on demand, the avoidance of formula and other liquids, the management of sore nipples and breast engorgement, and provided the phone numbers of persons and agencies whom the mother could call for answers to questions, help with difficulties, and general support. Both groups received 2 followup phone calls.	3 3 NA	One 45-min interview promoting breastfeeding plus an information sheet provided by a nurse with specialized training in lactation counseling. Both focused on positioning, importance of frequent feeding and feeding on demand, avoidance of formula and other liquids, management of sore nipples and breast engorgement, and numbers of persons and agencies whom the mother could call for answers to questions, help with difficulties, and general support. All options were discussed for calming the infant, including breastfeeding, carrying, rocking, and pacifier.

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Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Kronborg, 2012[118] Denmark	IG1 Group education	Prenatal	"Ready for Child Programme" comprised of 3 group sessions, each lasting 3 hr. Training sessions were attended between 30 and 35 wk of pregnancy and the woman's partner was also invited to participate. The maximum number of couples in each class was 8. The content of the 3 modules included lectures and discussions about 1) the delivery process, pain relief, coping strategies; 2) infant care and breastfeeding; and 3) the paternal role and the relationship between the woman and her partner. The intervention sought to create a sense of coherence by taking its starting point in the experience of becoming parents and asking them to bring a doll for the sessions. The doll was used as an ice-breaker, a connector to the time following birth, and an instrumental guide in infant care and breastfeeding practice. In module 2, the parents-to-be were told about components of importance for successful breastfeeding establishment, prepared for conceivable breastfeeding problems, and shown a film about breastfeeding. The breastfeeding part was scheduled to be about 2 hr.	5 3 Midwife	Usual care offered by the clinic, which did not include any antenatal training program, but no effort was made to prevent the reference group from seeking additional support elsewhere. Different antenatal training programs were provided by other stakeholders, mainly relaxation therapists. Existing prenatal care includes standardized regular visits: 2 consultations at the GP, 2 ultrasound scans in early pregnancy, 4 to 5 midwife consultations, and a home visit by a health visitor for primiparous women. Most BFHI steps were completed but not accredited.
Labarere, 2003[119] France	IG1 Individual education	Peripartum	One 30-min one-on-one educational session during the postpartum hospital stay delivered by a midwife or maternity ward intern. Session covered feeding positions, importance of feeding on demand, avoidance of formula and pacifier, management of sore nipple and breast engorgement, and opportunities for prolonging lactation after returning to work. French law requires employers to allow working mothers to breastfeed or express milk at work. The intervention focused on legal dispositions such as adjustments in working hours, provision of lactation breaks, and availability of a refrigerator in which to store expressed milk. At the end of the session, the mother received a brochure containing key information in text and pictures on combining breastfeeding and maternal employment. They were also provided with the phone number of a peer support group they could call to ask questions and request help (21.5% of IG mothers vs. 25.8% of CG mothers contacted peer support group; p=0.49). In France, paid maternity leave is 6 wk before giving birth and 10 wk after. On the birth of third child, the paid maternity leave is increased to 8 wk before and 18 wk after the birth.	0.14 1 Midwife (SLT)	Breastfeeding support by ward nurses, an exam at discharge, and a phone number of a peer support group that mothers could call to ask questions or request help. Postdischarge followup monitoring consisted of routine outpatient visits in a PCP office.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Labarere, 2005[120] France	IG1 Lactation support	Postpartum	In addition to the usual pre- and post-discharge support, mothers were invited to attend an individual, routine, preventive outpatient visit in the office of a participating PCP within 2 wk after birth.	0.14 1 Physician (SLT) (Pediatrician or PCP)	Breastfeeding support by ward nurses, an exam at discharge, and a phone number of a peer support group that mothers could call to ask questions or request help. Postdischarge followup monitoring consisted of routine outpatient visits in a PCP office.
Lavender, 2005[79] UK	IG1 Group education	Prenatal	Women were invited to attend 1 educational group support session with their attending community midwife during the 3rd trimester. Each session involved up to 8 women. Community midwives were also asked to attend a separate training workshop immediately preceding the joint educational session. The objectives of the sessions were to assist midwives to revise their knowledge of lactation management and to educate women on basic lactation physiology and effective breastfeeding techniques. Potential breastfeeding difficulties and possible solutions were also highlighted.	0.14 1 Infant feeding coordinator	Included breastfeeding advice from attending midwives and information about hospital parent education classes.
Mattar, 2007[122] Singapore	IG1 Lactation support	Prenatal	Women received 1 session of antenatal breastfeeding education in which they were shown a 16-min educational video titled "14 Steps to Better Breastfeeding," which introduced the benefits of breastfeeding; demonstrated correct positioning, latch-on, and breast care; and discussed common concerns. They also received a booklet describing the techniques and benefits of breastfeeding. In addition, women had one 15-min session with an LC who assessed adequacy for breastfeeding and answered questions.	0.14 1 Lactation care provider (NL)	Included access to postnatal breastfeeding support.
	IG2 Individual education	Prenatal	Women received 1 session of antenatal breastfeeding education in which they were shown a 16-min educational video titled "14 Steps to Better Breastfeeding," which introduced the benefits of breastfeeding; demonstrated correct positioning, latch-on, and breast care; and discussed common concerns. They also received a booklet describing the techniques and benefits of breastfeeding.	0.14 1 NA	Included access to postnatal breastfeeding support.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
McDonald, 2010[123] Australia	IG1 Lactation support	Peripartum, Postpartum	Received a package of interventions in addition to routine midwifery care. The package included a comprehensive individual educational session in their hospital room and followup support at home. The aim was to complement information available in the routine promotional literature or the in-house video. The session reinforced advice about positioning and attachment and reviewed common breastfeeding problems, growth and development, crying patterns, and settling techniques. On discharge, women were phoned twice weekly and offered weekly home visits by a research midwife until the baby was age 6 wk.	6 19 Midwife (SLT)	Women received breastfeeding promotional literature and had access to an in-house video system on which they could view videos giving current information about establishing breastfeeding. Majority of women received ≥1 home visits by a hospital-based midwife after discharge and before baby was 7 days old (to provide health checks of mothers and babies, although breastfeeding was addressed). All women had access to LCs at outpatient clinics. Most BFHI steps were completed, but facility was not accredited.
McQueen, 2011[124] Canada	IG1 Self-efficacy counseling	Peripartum, Postpartum	Standard in-hospital and community postpartum care that included followup by a public health nurse postdischarge, plus a self-efficacy intervention. 1st session occurred within 24 hr of delivery. 2nd session also took place in hospital, ideally within 24 hr of 1st session. In addition, observation of breastfeeding at 1 of the 2 in-hospital sessions was planned to try to maximize successful breastfeeding. 3rd session occurred via phone within 1 wk of hospital discharge. One-on-one sessions were delivered in a standardized format that included assessment, strategies to increase breastfeeding self-efficacy, and evaluation. The assessment component included an exam of the mother's breastfeeding goals; breastfeeding self-efficacy on the BSES-SF; low- and high-scoring items on the BSES-SF; perceptions related to each low- and high-scoring item; and general physiologic and elective state, including fatigue, pain, and symptoms of depression and/or anxiety. Strategies were implemented to increase mothers' breastfeeding self-efficacy, including performance accomplishment, vicarious experience, verbal persuasion, and physiologic cues.	2 3 Nurse	Standard in-hospital and community postpartum care that included followup by a public health nurse postdischarge.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Muirhead, 2006[126] Scotland	IG1 Peer counseling	Prenatal, Postpartum	Peer supporters visited participants at least once during prenatal period. Further prenatal support was provided to women who requested it. Peer support was available to women if they were breastfeeding on returning home after delivery and if peer supporters were informed in time. Mothers still breastfeeding when returning home were contacted by peer supporters at least every 2 days or as often as required by phone or personal visit until day 28. If requested, peer supporters provided further support up to 16 wk. Content included specific breastfeeding information and skills and development of other transferable skills to enhance peer support.	4 15 Peer counselor (SLT)	Community midwife for the first 10 days, health visitor after 10 days, breastfeeding support groups, and breastfeeding workshops.
Noel-Weiss, 2006[127] Canada	IG1 Group education	Prenatal	One 2.5-hr prenatal breastfeeding group workshop designed using Bandura's theory of self-efficacy and adult learning principles. The 4 sources influencing self-efficacy (performance accomplishment, vicarious learning, social/verbal persuasion, and emotional/physiological arousal) were provided by using lifelike dolls, videos, and discussions in a comfortable atmosphere. Enrollment was limited to 8 women per session. Partners were welcome. Workshop design included a short introductory questionnaire, a PowerPoint presentation, a hands-on segment using lifelike dolls, 2 videos, and a brief postclass evaluation.	0.14 1 NR	Women were not limited in the types of breastfeeding support they could seek before and after their infant's birth. Usual care, including the choice of physician or midwife, frequency of prenatal visits, and attendance at prenatal classes, was defined by each mother.
Nolan, 2009[129] US	IG1 Skin-to-skin contact	Peripartum	The goal of the intervention was to promote sustained, close maternal-infant proximity as well as direct contact in the intra-operative and immediate postoperative period. The immediate postoperative period was defined as care administered in the obstetric PACU. The structured intervention protocol minimized the amount of spatial, tactile, olfactory, auditory, and visual separation of mother and infant. Protocol components included intra- and postoperative environmental manipulation to maintain a maternal-infant spatial distance of no more than 8 ft, with uninterrupted maternal visual and auditory contact, in face presentation at birth, intraoperative cheek-to-cheek skin contact, and a period of prolonged uninterrupted skin-to-skin contact. The protocol duration mean was 113 min; mean cheek-to-cheek component duration was 6 min; mean skin-to-skin contact duration was 33 min.	0.14 1 NA	Usual care was unstructured and driven by individual nurse practice preferences. Infants were typically removed from the operating room promptly after stabilization and transferred to the obstetric recovery room in advance of the mother's transfer. Most mothers had brief or no physical contact with their infants. Usual care practice may or may not include breastfeeding initiation in the PACU. Skin-to-skin contact was not routinely offered.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Paul, 2012[130] US	IG1 Home visits	Postpartum	Home nursing visits were scheduled to occur within 48 hr of discharge, typically 3 to 5 days after birth. Before hospital discharge, an office visit was also scheduled for newborns ~1 wk following the home visit to establish a medical home for the newborn and to ensure recovery from expected initial weight loss after birth. Depending on individual circumstances (e.g., day of the week, gestational age, early discharge), these visits were scheduled to occur 5 to 14 days after birth.	2 2 Nurse (SLT)	Usual care, including only office-based care. Postdischarge visit timing for newborns was determined by the nursery physician, and maternal office followup was scheduled by the obstetrician.
Pollard, 2011[131] US	IG1 Self-monitoring	Peripartum, Postpartum	During 1 postpartum session, participants watched one 35-min educational video and received instructions on completing a daily breastfeeding log for 6 wk. Video included content on effective latch and positioning strategies, milk production and transfer, signs of adequate intake, infant feeding patterns, average length and frequency of feedings, use of breast massage/compression, management of sore nipples and engorgement, recognizing and managing plugged ducts and mastitis, manual expression, indications and use of manual and electric pumps, sources of support and resources, and maternal nutrition. Participants also received 3 weekly followup phone calls at 1, 2, and 3 wk after delivery aimed at providing a reminder to return any logs.	6 4 Research staff	Usual care (NR) plus a standardized educational video.
Quinlivan, 2003[132] Australia	IG1 Home breastfeeding support	Postpartum	All participants were provided with routine postnatal support, counseling, and information services by the hospital, including access to routine hospital home-visiting services. Patients in the intervention group also received a series of structured home visits by 1 of 2 certified nurse midwives. The topics of the visits, done 1 wk, 2 wk, 1 mo, 2 mo, 4 mo, and 6 mo after birth, included teaching breastfeeding and maternal bonding skills, as well as general breastfeeding support. Intervention also included education on infant vaccinations and contraception.	16 6 Midwife	Routine postnatal support, counseling, and information services provided by the hospital, including access to routine hospital domiciliary home-visiting services.
Reeder, 2014[133] US	IG1 Peer telephone support	Prenatal, Postpartum	Women were assigned to low- or high-frequency phone counseling (4 vs. 8 calls). Women in the low-frequency peer counseling group received 4 planned peer-initiated contacts: 1st after initial prenatal assignment, 2nd 2 wk before expected due date, and 3rd and 4th at 1 and 2 wk postpartum. Women in the higher-frequency group received 8 scheduled calls. The 1st 4 calls were the same as those in the low-frequency group and the last 4 calls were scheduled at 1, 2, 3, and 4 mo. Women also received a packet of information from the state office including a guide to breastfeeding and an information sheet.	42 8 Peer counselor (SLT)	Standard WIC breastfeeding promotion and support (NR).

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Stockdale, 2008[134] Ireland	IG1 Group education	Prenatal, Postpartum	One prenatal infant-feeding class at 32–36 wk gestation focused on increasing motivation to breastfeed, including a breastfeeding information booklet and CD-ROM. Postnatal instructional support was provided by midwives up to 3 wk postnatal and additional lactation consultancy was provided on request.	3 2 Midwife	NR BFHI accredited.
Su, 2007[135] Singapore	IG1 Lactation support	Peripartum, Postpartum	2-session lactation support program. First, women were visited by an LC within the first 3 postnatal days before discharge from hospital. They also received the same printed guides (as IG1 received) on breastfeeding during this visit. A second support session was provided during their first routine postnatal visit 1 to 2 wk after delivery. During these 2 encounters, women received hands-on instructions in latching on, proper positioning, and other techniques to avoid common complications. Each encounter lasted about 30 min.	2 2 Lactation care provider (NL)	Received routine antenatal, intra-partum, and postnatal obstetric care with no special intervention applied. At study hospital, this included optional antenatal classes, which did address infant feeding, and postnatal visits by an LC should any problems with breastfeeding arise.
Su, 2007[135] Singapore	IG2 Individual education	Prenatal	Women received 1 session of antenatal breastfeeding education in which they were shown a 16-min educational video titled “14 Steps to Better Breastfeeding,” which introduced the benefits of breastfeeding; demonstrated correct positioning, latching on, and breast care; and discussed common concerns. They were also given printed guides on breastfeeding and an opportunity to talk to an LC for about 15 min.	0.14 1 Lactation care provider (NL)	Received routine antenatal, intra-partum, and postnatal obstetric care with no special intervention applied. At study hospital, this included optional antenatal classes, which did address infant feeding, and postnatal visits by an LC should any problems with breastfeeding arise.
Wallace, 2006[136] UK	IG1 "Hands off" lactation support	Peripartum	Midwives attended a 4-hr workshop covering the rationale and skills of a “hands off” approach to care at first feed, including explanation of the protocol. The experimental protocol included advice about baby initiation of feeding, positioning, and attachment. The rationale included physiologic explanation of milk synthesis, supply, and removal, facilitated by correct attachment of the baby to the breast rather than the nipple. Positioning of the mother and baby to achieve comfortable and effective feeding includes ensuring the mother is sitting upright and supported, her baby is supported and able to take sufficient breast tissue into the mouth, feeding is uninterrupted, and feed times and duration are baby led. Verbal-only care was advised to ensure the mother was able to attach the baby herself. A leaflet explained this information and also reminded mothers that their baby needed only breast milk until at least 4 mo postpartum, in line with contemporary UK guidance.	0.14 1 Midwife	Midwives received ≥1 hr of breastfeeding policy update and briefing on the trial. Routine care followed each maternity unit’s policy, which did not stipulate advice about positioning, attachment, or verbal-only care. Additional breastfeeding advice leaflets in line with local policy were available. However, trial protocol required that this care was delivered by a midwife, which was not required by local maternity unit policies at this time. Care at subsequent feeds was not controlled in this trial.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Wambach, 2011[137] US	IG1 Peer counseling and lactation care provider support	Prenatal, Peripartum, Postpartum	A certified LC (also an RN) and a trained peer counselor (who had been a breastfeeding teen mother) provided the intervention, composed of prenatal, in-hospital, and postnatal education and support through 4 wk postpartum. Intervention based on the theory of planned behavior, adolescent decisionmaking theory, and developmental theories. 2 prenatal classes (1.5- and 2-hr) provided content from the Breastfeeding Educated and Supported Teen Club curriculum. Classes, taught by the LC and peer counselor, focused on benefits of breastfeeding for mother and baby, decisionmaking, and the "how to" of breastfeeding as well as managing breastfeeding after return to work and/or school. Participants were encouraged to bring a support person of their choice to class to enhance social network support for breastfeeding decisionmaking, initiation, and continuation. Participants were required to attend at least 1 class or they were dropped from the study. Peer counselor phone calls occurred before and after class 1 and following class 2 to provide ongoing decisionmaking support and information. The in-hospital experimental intervention was a face-to-face visit from the peer counselor, who provided encouragement and support for early breastfeeding efforts. Teens choosing to breastfeed, or leaning toward doing so, also received an LC visit. Postpartum phone contact with the LC and/or peer counselor occurred at 4, 7, 11, and 18 days and 4 wk for those who initiated breastfeeding, unless they ceased breastfeeding before 4 wk. These calls provided ongoing support and advice to address barriers to continued breastfeeding (e.g., breastfeeding problems, milk supply concerns, preparation for return to school). Participants received a double-set-up electric breast pump at no charge on an as needed basis (e.g., return to school or work).	8 11 Peer counselor (SLT) and lactation care provider (IBCLC)	Participants received standard prenatal and postpartum care at their respective clinic with varying provider types and birth settings. No standards were placed on level or content of care or on educational or social support services for participants.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Author, Year Country	Intervention	Timing	Intervention Details	Estimated Duration (wk) No Sessions* Provider	Usual Care Description
Wen, 2011[139] Australia	IG1 Home breastfeeding support	Prenatal, Postpartum	4 community nurses were recruited and trained by health promotion practitioners to deliver the staged intervention, which in the 1st yr comprised 1 home visit at 30 to 36 wk gestation and 5 home visits at 1, 3, 5, 9, and 12 mo after birth. Mothers who received the baseline assessment after giving birth received only 5 home visits. Timing of the visits corresponds to milestones in early childhood development, particularly in regard to healthy feeding practice, nutrition, and physical activity, as well as parent-child interactions. At each visit, the research nurse spent 1 to 2 hr with mother and infant. The nurse addressed 4 key areas: infant feeding practices, infant nutrition and active play, family physical activity and nutrition, and social support. Each visit involved standard information with key discussion points for each key area and appropriate resources to reinforce the information. One-to-one consultation focusing on feeding behavior and recommended problem solving activities were conducted. A checklist for each visit was developed to ensure all information was covered. Intervention resources promoting breastfeeding, appropriate timing of solids introduction, tummy time and active play, and family nutrition and physical activity were developed based on the Infant Feeding Guidelines for Health Workers, Australian National Health and Medical Research Council Dietary Guidelines, Australian Guide to Healthy Eating, and National Physical Activity Guidelines. Key intervention messages included “breast is best”; “no solids for me until 6 mo”; “I eat a variety of fruits and vegetables every day”; “only water in my cup”; and “I am part of an active family.”	53 6 Nurse	Usual childhood nursing service, comprising 1 home visit within 1 mo of birth if needed.
Wong, 2014[140] Hong Kong	IG1 Lactation support	Prenatal	Intervention consisted of standard prenatal care plus a 20- to 30-min one-on-one breastfeeding education and support session based on the WHO guidelines for baby-friendly hospitals and evidence-based maternity care. Handouts about the content discussed were distributed to participants at the end of the intervention and active communication with family and peers was encouraged. At the end of the education session, 10 to 15 min was allocated to answer questions or address any concerns of the mother. A log sheet was kept to ensure consistency in information delivery and to keep track of questions raised by participants.	0.14 1 Nurse (SLT)	Routine maternal and fetal health checks by either clinic midwives or obstetricians, along with health education to promote a healthy pregnancy. Breastfeeding was promoted and childbirth preparation and breastfeeding classes were available to mothers at no cost.

* Number of sessions was based on the intended number of sessions, not the actual number of sessions delivered.

Appendix C Table 1. Intervention Details, by Intervention Type and Author

Abbreviations: ASE=Attitude-Social Influences Self-Efficacy; BFHI=Baby-Friendly Hospital Initiative; BSES-SF=Breastfeeding Self-Efficacy Scale-Short Form; CG=control group; EBF=exclusive breastfeeding; GP=general practitioner; hr=hour; IBCLC=International Board-Certified Lactation Consultant; IG=intervention group; LC=lactation consultant; min=minute; mo=month; NA=not applicable; NL=non-lactation care provider; No=number; NR=not reported; PACU=post-anesthesia care unit; PC=peer counseling; PCP=primary care physician; RN=registered nurse; SLT=specialized lactation training; UK=United Kingdom; US=United States; WHO=World Health Organization; WIC=Special Supplemental Nutrition Program for Women, Infants, and Children; wk=week.

Appendix C Table 2. Results of Individual-Level Breastfeeding Support and Education Interventions on Prevalence of Any Breastfeeding, by Author

Author, Year	Group	Intervention Name	Breastfeeding Outcome*	Followup, Weeks	IG Event Rate, n/N (%)	CG Event Rate, n/N (%)	RR (95% CI)
Abbass-Dick, 2015[3]	IG1	Coparenting breastfeeding education	Any†	6	102/104 (98.1)	94/102 (92.2)	1.06 (1.00 to 1.13)
				12	100/104 (96.2)	92/105 (87.6)	1.10 (1.01 to 1.19)
			Exclusive† (WHO)	6	75/104 (72.1)	62/102 (60.8)	1.19 (0.97 to 1.44)
				12	70/104 (67.3)	63/105 (60.0)	1.12 (0.91 to 1.38)
Anderson, 2005[4]	IG1	Peer counseling	Any	0	55/63 (90.5)	55/72 (76.4)	1.14 (0.98 to 1.34)
				12	31/63 (49.2)	26/72 (36.1)	1.36 (0.92 to 2.03)
			Exclusive (NR)	0	37/63 (58.7)	32/72 (44.4)	1.32 (0.95 to 1.84)
				4	17/63 (27.0)	5/72 (6.9)	3.89 (1.52 to 9.93)
				8	15/63 (23.8)	1/72 (1.4)	17.14 (2.33 to 126.14)
				12	13/63 (20.6)	1/72 (1.4)	14.86 (2.00 to 110.40)
Bonuck, 2006[5]	IG1	Lactation support	Any	2	124/143 (86.7)	102/159 (65.0)	1.35 (1.18 to 1.54)
				6	99/137 (72.3)	85/155 (54.8)	1.32 (1.10 to 1.57)
				13	79/130 (60.8)	66/143 (46.2)	1.32 (1.05 to 1.65)
				20	62/117 (53.0)	55/140 (39.3)	1.35 (1.03 to 1.76)
				26	51/115 (44.3)	45/136 (33.1)	1.34 (0.98 to 1.84)
				52	15/82 (18.3)	15/99 (15.2)	1.21 (0.63 to 2.32)
			Exclusive (NR)	2	29/143 (20.3)	30/157 (19.1)	1.06 (0.67 to 1.68)
				6	21/137 (15.3)	25/155 (16.1)	0.95 (0.56 to 1.62)
				13	11/130 (8.5)	16/143 (11.2)	0.76 (0.36 to 1.57)
				20	9/117 (7.7)	14/140 (10.0)	0.77 (0.35 to 1.71)
				26	6/115 (5.2)	11/136 (8.1)	0.65 (0.25 to 1.69)
Bonuck, 2014a (BINGO)[6]	IG1	Lactation support and brief education	Any	0	218/226 (96.5)	65/73 (89.0)	1.08 (1.00 to 1.18)
				4	172/226 (76.1)	44/73 (60.3)	1.26 (1.03 to 1.54)
				12	127/226 (56.2)	28/74 (37.8)	1.48 (1.08 to 2.03)
				26	80/231 (34.6)	20/74 (27.0)	1.28 (0.85 to 1.94)
			Exclusive (WHO)	4	31/226 (13.7)	7/73 (9.6)	1.43 (0.66 to 3.11)
				12	24/226 (10.6)	2/74 (2.7)	3.93 (0.95 to 16.23)
				26	6/231 (2.6)	1/71 (1.4)	1.84 (0.23 to 15.06)
	IG2	Lactation support	Any	0	70/73 (95.9)	65/73 (89.0)	1.08 (0.98 to 1.18)
				4	54/73 (74.0)	44/73 (60.3)	1.23 (0.97 to 1.55)
				12	37/73 (50.7)	28/74 (37.8)	1.34 (0.93 to 1.94)
				26	30/74 (40.5)	20/74 (27.0)	1.50 (0.94 to 2.39)
			Exclusive (WHO)	4	10/73 (13.7)	7/73 (9.6)	1.43 (0.58 to 3.55)
				12	8/73 (11.0)	2/74 (2.7)	4.05 (0.89 to 18.45)
				26	1/71 (1.4)	1/71 (1.4)	1.00 (0.06 to 15.68)
	IG3	Brief education	Any	0	207/223 (92.8)	65/73 (89.0)	1.04 (0.95 to 1.14)
				4	158/223 (70.9)	44/73 (60.3)	1.18 (0.85 to 1.63)
				12	102/229 (44.5)	28/74 (37.8)	1.18 (0.85 to 1.63)
				26	75/227 (33.0)	20/74 (27.0)	1.22 (0.81 to 1.86)
			Exclusive (WHO)	4	17/223 (7.6)	7/73 (9.6)	0.80 (0.34 to 1.84)
				12	10/227 (4.4)	2/74 (2.7)	1.63 (0.37 to 7.27)
				26	4/222 (1.8)	1/71 (1.4)	1.28 (0.15 to 11.26)

Appendix C Table 2. Results of Individual-Level Breastfeeding Support and Education Interventions on Prevalence of Any Breastfeeding, by Author

Author, Year	Group	Intervention Name	Breastfeeding Outcome*	Followup, Weeks	IG Event Rate, n/N (%)	CG Event Rate, n/N (%)	RR (95% CI)
Bonuck, 2014b (PAIRINGS)[6]	IG1	Lactation support and brief education	Any	0	122/124 (98.4)	123/130 (94.6)	1.04 (0.99 to 1.09)
				4	108/124 (87.1)	92/130 (70.8)	1.23 (1.08 to 1.40)
				12	76/125 (60.8)	57/128 (44.5)	1.36 (1.08 to 1.73)
				26	46/122 (37.7)	31/122 (25.4)	1.48 (1.02 to 2.17)
			Exclusive (WHO)	4	30/124 (24.2)	9/130 (6.9)	3.49 (1.73 to 7.06)
				12	20/125 (16.0)	8/129 (6.2)	2.58 (1.18 to 5.64)
				26	2/125 (1.6)	2/125 (1.6)	1.00 (0.14 to 6.99)
Bunik, 2010[7]	IG1	Telephone support	Any	4	110/149 (74.0)	122/165 (74.0)	1.00 (0.88 to 1.14)
				12	64/130 (49.0)	78/144 (54.0)	0.91 (0.72 to 1.14)
				26	35/125 (28.0)	49/132 (37.0)	0.75 (0.53 to 1.08)
Carfoot, 2005[8]	IG1	Skin-to-skin contact	Any	16	42/97 (43)	40/100 (40)	1.08 (0.78 to 1.51)
Carlsen, 2013[9]	IG1	Telephone support	Exclusive (WHO)	2	NR	NR	2.71 (1.43 to 5.12)‡
				4	NR	NR	2.98 (1.61 to 5.50)‡
				12	NR	NR	2.45 (1.36 to 4.41)‡
Chapman, 2013[10]	IG1	Peer counseling	Any	0	75/76 (98.7)	77/78 (98.7)	1.00 (0.96 to 1.04)
				2	71/76 (93.0)	66/78 (84.0)	1.10 (0.99 to 1.24)
				12	26/57 (46.0)	31/62 (50.0)	0.91 (0.63 to 1.33)
				26	13/55 (23.0)	20/53 (37.0)	0.63 (0.35 to 1.13)
			Exclusive (WHO)	0	34/76 (44.7)	35/78 (44.9)	1.00 (0.70 to 1.42)
				2	16/76 (21.4)	12/78 (15.2)	1.37 (0.69 to 2.70)
				4	12/67 (17.6)	8/66 (12.1)	1.48 (0.65 to 3.38)
				8	8/67 (11.9)	7/66 (11.1)	1.13 (0.43 to 2.93)
				12	3/57 (5.0)	6/62 (9.4)	0.54 (0.14 to 2.07)
				16	1/57 (1.6)	3/62 (4.8)	0.36 (0.04 to 3.39)
				20	1/57 (1.6)	1/62 (1.6)	1.09 (0.07 to 16.99)
				26	1/55 (1.7)	0/53 (0)	2.89 (0.12 to 69.47)
Dennis, 2002[11]	IG1	Peer counseling	Any	4	122/132 (92.4)	104/124 (83.9)	1.10 (1.01 to 1.21)
				8	112/132 (84.8)	93/124 (75.0)	1.13 (1.00 to 1.28)
				12	107/132 (81.1)	83/124 (66.9)	1.21 (1.04 to 1.40)
			Exclusive (WHO)	4	98/132 (74.2)	78/124 (62.9)	1.18 (1.00 to 1.40)
				8	83/132 (62.9)	68/124 (54.8)	1.15 (0.95 to 1.39)
				12	75/132 (56.8)	50/124 (40.3)	1.21 (0.96 to 1.53)
Di Napoli, 2004[13]	IG1	Home breastfeeding support	Exclusive† (WHO, predom)	16	59/266 (22.2)	69/276 (25.0)	0.89 (0.65 to 1.20)
Edwards, 2013[14]	IG1	Lactation support	Any	0	78/122 (63.9)	61/123 (49.6)	1.29 (1.03 to 1.61)
				6	31/108 (28.7)	19/113 (16.8)	1.71 (1.03 to 2.83)
				16	9/108 (8.3)	5/113 (4.4)	1.88 (0.65 to 5.44)
Elliott-Rudder, 2014[15]	IG1	Lactation support	Any	16	137/154 (89.0)	156/176 (88.6)	1.00 (0.93 to 1.08)
				26	118/150 (78.7)	135/172 (78.5)	1.00 (0.89 to 1.12)
			Exclusive (NR)	16	96/147 (65.3)	90/161 (55.9)	1.17 (0.97 to 1.40)§
				26	22/150 (14.7)	24/172 (14.0)	1.05 (0.62 to 1.80)

Appendix C Table 2. Results of Individual-Level Breastfeeding Support and Education Interventions on Prevalence of Any Breastfeeding, by Author

Author, Year	Group	Intervention Name	Breastfeeding Outcome*	Followup, Weeks	IG Event Rate, n/N (%)	CG Event Rate, n/N (%)	RR (95% CI)
Forster, 2004[16]	IG1	Group education (attitude modification)	Any	0	291/308 (94.5)	297/310 (95.8)	0.99 (0.95 to 1.02)
				26	146/293 (49.8)	162/299 (54.2)	0.92 (0.79 to 1.07)
			Exclusive (NR)	0	239/308 (77.6)	242/310 (78.1)	0.99 (0.91 to 1.08)
				26	124/293 (42.3)	127/299 (42.5)	1.00 (0.83 to 1.20)
	IG2	Group education (practical skills training)	Any	0	296/306 (96.7)	297/310 (95.8)	1.01 (0.98 to 1.04)
				26	162/297 (54.5)	162/299 (54.2)	1.01 (0.87 to 1.17)
			Exclusive (NR)	0	238/306 (77.8)	242/310 (78.1)	1.00 (0.92 to 1.08)
				26	133/297 (44.8)	127/299 (42.5)	1.05 (0.88 to 1.27)
Fu, 2014[17]	IG1	Telephone support	Any†	4	199/261 (76.2)	175/260 (67.3)	1.13 (1.02 to 1.26)
				8	153/261 (58.6)	127/260 (48.9)	1.20 (0.99 to 1.48)¶
				12	124/261 (47.5)	102/260 (39.2)	1.21 (0.99 to 1.48)
				26	80/261 (30.7)	62/260 (23.9)	1.28 (0.97 to 1.71)
			Exclusive† (WHO)	4	74/261 (28.4)	44/260 (16.9)	1.68 (1.20 to 2.33)
				8	56/261 (21.5)	40/260 (15.4)	1.39 (0.97 to 2.01)
				12	46/261 (17.6)	37/260 (14.2)	1.24 (0.83 to 1.84)
				26	33/261 (12.6)	27/260 (10.4)	1.22 (0.75 to 1.97)
	IG2	In-hospital support	Any†	0	190/190 (100)	256/260 (98.5)	1.01 (1.00 to 1.03)
				4	136/190 (71.6)	175/260 (67.3)	1.06 (0.94 to 1.20)
				8	101/190 (53.2)	127/260 (48.9)	1.09 (0.91 to 1.31)
				12	82/190 (43.2)	102/260 (39.2)	1.10 (0.88 to 1.37)
				26	51/190 (26.8)	62/260 (23.9)	1.13 (0.82 to 1.55)
			Exclusive† (WHO)	0	108/190 (56.8)	133/260 (51.2)	1.11 (0.94 to 1.32)
				4	41/190 (21.6)	44/260 (16.9)	1.28 (0.87 to 1.87)
				8	33/190 (17.4)	40/260 (15.4)	1.13 (0.74 to 1.72)
				12	34/190 (17.9)	37/260 (14.2)	1.26 (0.82 to 1.93)
				26	22/190 (11.6)	27/260 (10.4)	1.12 (0.66 to 1.90)
Gagnon, 2002[18]	IG1	Home breastfeeding support	Any†	2	247/252 (98.0)	243/247 (98.4)	1.00 (0.97 to 1.02)
			Exclusive† (NR)	2	183/252 (72.6)	171/247 (69.2)	1.05 (0.94 to 1.17)
Gijsbers, 2006[19]	IG1	Lactation support	Exclusive (WHO)	26	21/44 (48.0)	12/45 (27.0)	1.79 (1.01 to 3.18)
Gouchon, 2010[20]	IG1	Skin-to-skin contact	Any	0	13/17 (76.5)	11/17 (64.7)	1.18 (0.76 to 1.83)
				12	11/17 (64.7)	8/17 (47.1)	1.38 (0.74 to 2.54)
			Exclusive (NR)	0	9/17 (52.9)	9/17 (52.9)	1.00 (0.53 to 1.88)
				12	8/17 (47.1)	5/17 (29.4)	1.60 (0.66 to 3.91)
Graffy, 2004[21]	IG1	Peer counseling	Any	0	320/336 (95.2)	324/336 (96.4)	0.99 (0.96 to 1.02)
				6	218/336 (64.9)	213/336 (63.4)	1.02 (0.91 to 1.15)
				16	143/310 (46.1)	131/310 (42.3)	1.09 (0.91 to 1.30)
			Exclusive (WHO)	6	103/336 (30.7)	86/336 (25.6)	1.20 (0.94 to 1.53)
Henderson, 2001[24]	IG1	Positioning and attachment support	Any	6	60/79 (76)	65/79 (82)	0.92 (0.79 to 1.08)
				12	56/78 (72)	57/76 (75)	0.96 (0.79 to 1.16)
				26	42/75 (56)	48/75 (64)	0.88 (0.67 to 1.14)

Appendix C Table 2. Results of Individual-Level Breastfeeding Support and Education Interventions on Prevalence of Any Breastfeeding, by Author

Author, Year	Group	Intervention Name	Breastfeeding Outcome*	Followup, Weeks	IG Event Rate, n/N (%)	CG Event Rate, n/N (%)	RR (95% CI)
Hopkinson, 2009[26]	IG1	Lactation support	Any†	4	202/226 (89.4)	218/241 (90.4)	0.99 (0.93 to 1.05)
			Exclusive† (WHO)	4	38/226 (16.8)	25/241 (10.4)	1.62 (1.01 to 2.60)
Howell, 2014[28]	IG1	Brief education and counseling	Exclusive (NR)	26	19/270 (7.0)	11/270 (4.0)	1.73 (0.84 to 3.56)
Jenik, 2009[29]	IG1	Restricted pacifier use	Any	4	482/484 (99.6)	510/511 (99.8)	1.00 (0.99 to 1.00)
				8	476/477 (99.8)	503/504 (99.8)	1.00 (0.99 to 1.01)
				12	468/471 (99.4)	494/499 (99.0)	1.00 (0.99 to 1.02)
				16	452/462 (97.8)	482/487 (99.0)	0.99 (0.97 to 1.00)
			Exclusive (WHO)	4	471/484 (97.3)	496/511 (97.1)	1.00 (0.98 to 1.02)
				8	434/477 (91.0)	465/504 (92.3)	0.99 (0.95 to 1.02)
				12	406/471 (86.2)	428/499 (85.8)	1.00 (0.96 to 1.06)
				16	354/462 (76.6)	371/487 (76.2)	1.01 (0.94 to 1.08)
Jolly, 2012[30]	IG1	Peer counseling	Any†	0	747/1083 (69.0)	896/1315 (68.1)	1.01 (0.96 to 1.07)
				2	818/1193 (68.5)	928/1370 (67.7)	1.01 (0.96 to 1.07)
				6	170/271 (62.7)	194/301 (64.5)	0.98 (0.86 to 1.10)
				26	93/271 (34.3)	117/301 (38.9)	0.88 (0.71 to 1.10)
			Exclusive (NR)	2	446/1193 (37.4)	470/1370 (34.3)	1.09 (0.98 to 1.21)
				6	104/271 (38.5)	123/301 (40.9)	0.94 (0.77 to 1.15)
				26	48/271 (17.8)	59/301 (19.6)	0.90 (0.64 to 1.27)
Kellams, 2015[31]	IG1	Breastfeeding video	Any	0	174/249 (69.9)	172/248 (69.4)	1.01 (0.90 to 1.13)
			Exclusive (NR)	0	84/249 (33.7)	84/248 (33.9)	1.00 (0.78 to 1.27)
Kools, 2005[32]	IG1	Home breastfeeding support	Any	0	254/371 (68.5)	238/330 (72.1)	0.95 (0.86 to 1.04)
				12	119/368 (32.0)	124/330 (38.0)	0.86 (0.70 to 1.05)
			Exclusive (WHO)	0	225/371 (60.6)	222/330 (67.3)	0.90 (0.81 to 1.01)
				12	99/368 (27.0)	104/330 (32.0)	0.85 (0.68 to 1.08)
Kramer, 2001[33]	IG1	Restricted pacifier use	Any	12	103/127 (81.1)	107/131 (81.7)	0.99 (0.88 to 1.12)
			Exclusive (NR)	12	46/127 (36.2)	44/131 (33.6)	1.08 (0.77 to 1.51)
Kronborg, 2012[34]	IG1	Group education	Any	1	533/552 (96.6)	529/538 (98.3)	0.98 (0.96 to 1.00)
			Any	6	503/535 (94.0)	478/525 (91.0)	1.03 (1.00 to 1.07)
Labarere, 2005[36]	IG1	Lactation support	Any†	4	100/112 (89.3)	93/114 (81.6)	1.09 (0.98 to 1.22)
				8	87/112 (77.7)	84/114 (73.7)	1.05 (0.91 to 1.22)
				12	80/112 (71.4)	72/114 (63.2)	1.13 (0.94 to 1.36)
				16	61/112 (54.5)	48/114 (42.1)	1.29 (0.98 to 1.70)
				20	52/112 (46.4)	40/114 (35.1)	1.32 (0.96 to 1.82)
				26	44/112 (39.3)	30/114 (26.3)	1.49 (1.02 to 2.19)
			Exclusive† (WHO)	4	94/112 (83.9)	82/114 (71.9)	1.17 (1.01 to 1.34)
Labarere, 2003[35]	IG1	Individual education	Any†	17	32/93 (34.4)	39/97 (40.2)	0.86 (0.59 to 1.24)
			Exclusive† (WHO)	17	13/93 (14.0)	14/97 (14.4)	0.97 (0.48 to 1.95)

Appendix C Table 2. Results of Individual-Level Breastfeeding Support and Education Interventions on Prevalence of Any Breastfeeding, by Author

Author, Year	Group	Intervention Name	Breastfeeding Outcome*	Followup, Weeks	IG Event Rate, n/N (%)	CG Event Rate, n/N (%)	RR (95% CI)
Lavender, 2005[36]	IG1	Group education	Any	0	515/644 (80.3)	463/605 (76.5)	1.04 (0.98 to 1.11)
				2	444/644 (68.9)	389/605 (64.2)	1.07 (0.99 to 1.16)
				4	380/644 (59.0)	343/605 (56.7)	1.04 (0.95 to 1.14)
				6	332/644 (51.5)	297/605 (49.1)	1.05 (0.94 to 1.17)
				16	202/644 (31.4)	192/605 (31.7)	0.99 (0.84 to 1.16)
				26	140/644 (21.7)	138/605 (22.8)	0.95 (0.78 to 1.17)
				52	60/644 (9.3)	61/605 (10.1)	0.92 (0.66 to 1.30)
			Exclusive (NR)	16	NR	NR	1.1 (0.6 to 1.8)**
Mattar, 2007[38]	IG1	Lactation support	Any	2	106/112 (94.6)	124/135 (91.9)	1.03 (0.96 to 1.10)
				6	79/112 (70.5)	86/135 (63.7)	1.11 (0.93 to 1.32)
				12	64/112 (57.1)	61/130 (46.9)	1.22 (0.96 to 1.55)
				26	48/112 (42.9)	43/129 (33.3)	1.29 (0.93 to 1.78)
			Exclusive (WHO, predom)	2	61/112 (54.5)	69/135 (51.1)	1.07 (0.84 to 1.35)
				6	40/112 (35.7)	36/135 (26.7)	1.34 (0.92 to 1.95)
				12	27/112 (24.1)	15/130 (11.5)	2.09 (1.17 to 3.73)
				26	16/112 (14.3)	9/129 (7.0)	2.05 (0.94 to 4.45)
	IG2	Individual education	Any	2	111/123 (90.2)	124/135 (91.9)	0.98 (0.91 to 1.06)
				6	88/123 (71.5)	86/135 (63.7)	1.01 (0.67 to 1.51)
				12	66/112 (55.0)	61/130 (46.9)	1.26 (0.99 to 1.60)
				26	39/120 (32.5)	43/129 (33.3)	0.98 (0.68 to 1.39)
			Exclusive (WHO, predom)	2	60/123 (48.8)	69/135 (51.1)	0.95 (0.75 to 1.22)
				6	33/123 (26.8)	36/135 (26.7)	1.01 (0.67 to 1.51)
				12	21/112 (17.5)	15/130 (11.5)	1.63 (0.88 to 3.00)
				26	8/120 (6.7)	9/129 (7.0)	0.96 (0.38 to 2.40)
McDonald, 2010[39]	IG1	Lactation support	Any	26	267/418 (63.9)	286/421 (67.9)	0.94 (0.85 to 1.04)
			Exclusive (Labbok)	26	73/418 (17.5)	70/421 (16.6)	1.05 (0.78 to 1.42)
McQueen, 2011[40]	IG1	Self-efficacy counseling	Any	4	55/64 (85.9)	58/78 (74.4)	1.16 (0.98 to 1.36)
				8	43/61 (70.5)	48/73 (65.6)	1.07 (0.85 to 1.35)
			Exclusive (NR)	8	31/61 (50.8)	33/73 (45.2)	1.12 (0.79 to 1.60)
Muirhead, 2006[41]	IG1	Peer counseling	Any	0	61/112 (54.5)	60/113 (53.1)	1.03 (0.80 to 1.31)
				6	35/112 (31.3)	33/113 (29.2)	1.07 (0.72 to 1.59)
				16	26/112 (23.2)	20/113 (17.7)	1.31 (0.78 to 2.21)
			Exclusive (NR)	6	27/112 (24.1)	24/113 (21.2)	1.14 (0.70 to 1.84)
				8	23/112 (20.5)	16/113 (14.2)	1.45 (0.81 to 2.60)
				16	2/112 (1.8)	0/113 (0)	5.04 (0.24 to 103.90)
Noel-Weiss, 2006[54]	IG1	Group education	Any	8	40/47 (85.1)	35/45 (77.8)	1.09 (0.90 to 1.33)
			Exclusive (WHO)	8	34/47 (72.3)	29/45 (64.4)	1.12 (0.85 to 1.49)
Nolan, 2009[43]	IG1	Skin-to-skin contact	Any†	0	19/25 (76.0)	13/25 (52.0)	1.46 (0.94 to 2.26)
				4	16/22 (72.7)	8/24 (33.3)	2.18 (1.17 to 4.06)
Paul, 2012[44]	IG1	Home visits	Any	2	497/538 (92.3)	467/527 (88.6)	1.04 (1.00 to 1.08)
				8	367/509 (72.1)	326/491 (66.4)	1.09 (1.00 to 1.18)
				26	244/491 (49.8)	221/453 (48.9)	1.02 (0.90 to 1.16)

Appendix C Table 2. Results of Individual-Level Breastfeeding Support and Education Interventions on Prevalence of Any Breastfeeding, by Author

Author, Year	Group	Intervention Name	Breastfeeding Outcome*	Followup, Weeks	IG Event Rate, n/N (%)	CG Event Rate, n/N (%)	RR (95% CI)
Pollard, 2011[45]	IG1	Self-monitoring	Any	3	32/41 (78.0)	28/43 (65.1)	1.20 (0.91 to 1.57)
				6	30/41 (73.2)	26/43 (60.5)	1.21 (0.89 to 1.64)
				12	23/41 (56.1)	18/43 (41.9)	1.34 (0.86 to 2.09)
				18	17/41 (41.5)	16/43 (37.2)	1.11 (0.66 to 1.90)
				24	15/41 (36.6)	14/43 (32.6)	1.12 (0.62 to 2.03)
			Exclusive (WHO, predom)	24	10/41 (24.4)	3/43 (7.0)	3.50 (1.03 to 11.81)
Quinlivan, 2003[46]	IG1	Home breastfeeding support	Any	4	40/71 (56.3)	38/65 (58.5)	0.96 (0.72 to 1.29)
				8	32/71 (45.1)	27/65 (41.5)	1.08 (0.74 to 1.60)
				12	27/71 (38.0)	24/65 (36.9)	1.03 (0.67 to 1.59)
				16	24/71 (33.8)	16/65 (24.6)	1.37 (0.80 to 2.35)
				20	21/71 (29.6)	21/65 (32.3)	0.92 (0.55 to 1.51)
				26	16/71 (22.5)	16/65 (24.6)	0.92 (0.50 to 1.68)
Reeder, 2014[47]	IG1	Peer telephone support	Any	4	839/1065 (78.8)	312/470 (66.4)	1.19 (1.10 to 1.28)
				12	672/1065 (63.1)	237/470 (50.4)	1.25 (1.13 to 1.38)
				26	512/1065 (48.1)	177/470 (37.7)	1.28 (1.12 to 1.46)
			Exclusive (NR)	4	650/1144 (56.8)	295/560 (52.7)	1.08 (0.98 to 1.18)
				12	482/1144 (42.1)	208/560 (37.1)	1.13 (1.00 to 1.29)
				26	327/1144 (28.6)	149/560 (26.6)	1.07 (0.91 to 1.27)
Stockdale, 2008[48]	IG1	Group education	Exclusive† (Labbok)	0	44/69 (63.8)	33/75 (44.0)	1.45 (1.06 to 1.98)
				3	36/69 (52.2)	15/75 (20.0)	2.61 (1.57 to 4.33)
Su, 2007[49]	IG1	Lactation support	Any	2	126/128 (98.4)	127/136 (93.4)	1.05 (1.00 to 1.11)
				6	108/128 (84.4)	96/136 (70.6)	1.20 (0.95 to 1.51)††
				12	71/122 (58.2)	65/134 (48.5)	1.20 (0.95 to 1.51)
				26	48/119 (40.3)	43/126 (34.1)	1.18 (0.85 to 1.64)
			Exclusive (WHO)	2	48/128 (37.5)	28/136 (20.6)	1.82 (1.22 to 2.71)
				6	40/128 (31.3)	23/136 (16.9)	1.85 (1.18 to 2.91)
				12	29/122 (23.8)	17/134 (12.7)	1.87 (1.09 to 3.24)
				26	22/119 (18.5)	11/126 (8.7)	2.12 (1.07 to 4.18)
	IG2	Individual education	Any	0	132/138 (95.7)	131/138 (94.9)	1.01 (0.96 to 1.06)
				2	126/133 (94.7)	127/136 (93.4)	1.01 (0.96 to 1.08)
				6	97/133 (72.9)	96/136 (70.6)	1.03 (0.89 to 1.20)
				12	73/127 (57.5)	65/134 (48.5)	1.18 (0.94 to 1.49)
				26	52/122 (42.6)	43/126 (34.1)	1.25 (0.91 to 1.72)
			Exclusive (WHO)	0	27/138 (19.6)	25/138 (18.1)	1.08 (0.66 to 1.76)
				2	36/133 (27.1)	28/136 (20.6)	1.31 (0.85 to 2.03)
				6	39/133 (29.3)	23/136 (16.9)	1.73 (1.10 to 2.74)
				12	31/127 (24.4)	17/134 (12.7)	1.92 (1.12 to 3.30)
				26	23/122 (18.9)	11/126 (8.7)	2.16 (1.10 to 4.24)

Appendix C Table 2. Results of Individual-Level Breastfeeding Support and Education Interventions on Prevalence of Any Breastfeeding, by Author

Author, Year	Group	Intervention Name	Breastfeeding Outcome*	Followup, Weeks	IG Event Rate, n/N (%)	CG Event Rate, n/N (%)	RR (95% CI)
Wallace, 2006[50]	IG1	"Hands off" lactation support	Any	6	111/172 (64.5)	114/167 (68.3)	0.94 (0.81 to 1.10)
				17	64/173 (37.0)	66/167 (39.5)	0.94 (0.71 to 1.23)
			Exclusive (WHO, predom)	6	42/172 (24.4)	37/163 (22.7)	1.08 (0.73 to 1.58)
				17	7/174 (4.0)	7/168 (4.2)	0.97 (0.35 to 2.69)
Wambach, 2011[51]	IG1	Peer counseling and lactation care provider support	Any	0	77/97 (79.0)	64/102 (63.0)	1.26 (1.06 to 1.52)
				3	50/59 (84.8)	46/56 (82.1)	1.03 (0.88 to 1.21)
				6	40/45 (88.9)	32/42 (76.2)	1.17 (0.96 to 1.42)
				12	28/35 (80.0)	16/26 (61.5)	1.30 (0.92 to 1.84)
				26	14/19 (73.7)	10/12 (83.3)	0.88 (0.61 to 1.28)
			Exclusive (Labbok)	0	50/97 (51.5)	38/102 (37.2)	1.38 (1.01 to 1.90)
Wen, 2011[52]	IG1	Home breastfeeding support	Any	0	312/337 (92.8)	304/330 (92.2)	1.00 (0.96 to 1.05)
				26	117/278 (42.2)	91/283 (32.1)	1.31 (1.05 to 1.63)
				52	56/268 (21.0)	39/259 (14.9)	1.39 (0.96 to 2.01)
			Exclusive (WHO)	26	12/278 (4.3)	6/283 (2.1)	2.04 (0.77 to 5.35)
Wong, 2014[53]	IG1	Lactation support	Any†	0	220/233 (94.4)	218/236 (92.4)	1.02 (0.97 to 1.07)
				6	160/233 (68.7)	169/236 (71.6)	0.96 (0.85 to 1.08)
				12	116/233 (49.8)	131/236 (55.5)	0.90 (0.76 to 1.07)
				26	87/233 (37.3)	96/236 (40.7)	0.92 (0.73 to 1.15)
			Exclusive† (WHO)	0	149/233 (63.9)	143/236 (60.6)	1.06 (0.92 to 1.22)
				6	88/233 (37.8)	86/236 (36.4)	1.04 (0.82 to 1.31)
				12	62/233 (26.6)	61/236 (25.9)	1.03 (0.76 to 1.39)
				26	34/233 (14.6)	30/236 (12.7)	1.15 (0.73 to 1.81)

* Most studies recalled breastfeeding since birth or did not report the recall period. Those that reported during the 24-hour recall period are noted.
† Based on 24-hour recall.
‡ Adjusted odds ratio as presented in study. No within-group data presented; adjusted for prepregnancy BMI, gestational weight gain, parity, birth weight, gestational age, and infant sex.
§ Study reported statistically significant odds ratio after adjustment for planned timing of paid work or study and infant age in months (aOR, 1.9 [95% CI, 1.01 to 3.5]; p=0.047).
¶ Study reported statistically significant odds ratio after adjustment for cluster and hospital (adjusted RR, 1.89 [95% CI, 1.04 to 2.10]; p=0.03).
** Adjusted odds ratio as reported in study. No within-group data presented; adjusted for health care team and hospital ward.
†† Study reported statistically significant odds ratio, adjustments not reported (adjusted RR, 1.19 [95% CI, 1.05 to 1.36]; p=0.008).

Exclusive breastfeeding definitions: WHO=World Health Organization exclusive[77]; WHO, predom=World Health Organization predominant[77]; Labbock=Labbock et al exclusive.[2]

Abbreviations: BMI=body mass index; CG=control group; CI=confidence interval; IG=intervention group; n=number; N=number analyzed; NR=not reported; RR=relative risk.

Appendix C Table 3. Number Needed to Treat for Any and Exclusive Breastfeeding for Varying Levels of Usual Breastfeeding Rates

Breastfeeding Outcome	Followup	Breastfeeding in CG, %	Pooled RR	Absolute Change in Risk	Risk After Change	NNT Benefit (95% CI)
Any	<3 months	65	1.07	0.05	0.70	22 (14 to 51)
		70	1.07	0.05	0.75	20 (13 to 48)
		80	1.07	0.06	0.86	18 (11 to 42)
	3 to <6 months	40	1.11	0.04	0.44	23 (14 to 62)
		45	1.11	0.05	0.50	20 (12 to 56)
		55	1.11	0.06	0.61	17 (10 to 45)
	6 months	30	1.07	0.02	0.32	48 (21 to 167)
		35	1.07	0.02	0.37	41 (18 to 143)
		45	1.07	0.03	0.48	32 (14 to 111)
Exclusive	<3 months	15	1.21	0.03	0.18	32 (20 to 61)
		25	1.21	0.05	0.30	19 (12 to 36)
		55	1.21	0.12	0.67	9 (6 to 17)
	3 to <6 months	5	1.20	0.01	0.06	100 (53 to 400)
		15	1.20	0.03	0.18	33 (18 to 133)
		35	1.20	0.07	0.42	14 (8 to 57)
	6 months	5	1.16	0.01	0.06	125 (63 to 1000)
		10	1.16	0.02	0.12	63 (31 to 500)
		20	1.16	0.03	0.23	31 (16 to 250)

Abbreviations: CG=control group; CI=confidence interval; NNT=number needed to treat; RR=risk ratio.

Appendix D. Ongoing Studies

Study Reference Trial Identifier	Study Name	Location	Estimated N	Description	Relevant Outcomes	2015 Status
Abbott, Jonathan. The Effect of Early (2-3 Week Postpartum) Versus Traditional (6-8 Week Postpartum) Follow-Up on Breastfeeding Rates at 6 Months. 2014. Madigan Army Medical Center. PMID: None NCT02221895	NR	United States	346	Randomized trial comparing early postpartum followup to traditional postpartum followup	Any breastfeeding	Recruiting
Forster DA, McLachlan HL, Davey MA, et al. Ringing Up about Breastfeeding: a randomised controlled trial exploring early telephone peer support for breastfeeding (RUBY): trial protocol. *BMC Pregnancy Childbirth*. 2014;14:177. PMID: 24886264 ACTRN12612001024831	Ringing Up about Breastfeeding (RUBY)	Australia	NR	Randomized trial comparing telephone-delivered peer support with usual care	Any breastfeeding, exclusive breastfeeding	Not yet recruiting
Furman, Lydia. Breast for Success: A Family-Centered Intervention in Support of Breastfeeding Among High-Risk Low-Income Mothers in Cleveland (BFS). 2014. University Hospital Case Medical Center. PMID: None NCT01272661	Breast for Success (BFS)	United States	1296	Nonrandomized trial comparing the effectiveness of 3 interventions: 1) CHW home-delivered enhanced curriculum, 2) CHW home-delivered enhanced curriculum with support person, and 3) CHW home-delivered enhanced curriculum with paternal support	Any breastfeeding	Study completed, results not published
Horodynski MA, Olson B, Baker S, et al. Healthy babies through infant-centered feeding protocol: an intervention targeting early childhood obesity in vulnerable populations. *BMC Public Health*. 2011;11:868. PMID: 22085421 NCT01816516	Healthy Babies (HB)	United States	372	Randomized trial comparing Healthy Babies curriculum with Expanded Food and Nutrition Education Program (EFNEP) curriculum	Breastfeeding style, breastfeeding practice	Completed, no results published
Iglesia, Susana Martin. Effectiveness of an Educational Group Intervention in Primary Care to Maintain Exclusive Breastfeeding (PROLACT): A Cluster Randomized Clinical Trial. 2015. PMID: None NCT01869920	PROLACT	Spain	432	Cluster randomized trial comparing a group education session with usual care	Exclusive breastfeeding	Recruiting

Appendix D. Ongoing Studies

Study Reference Trial Identifier	Study Name	Location	Estimated N	Description	Relevant Outcomes	2015 Status
Kenyon S, Jolly K, Hemming K, et al. Evaluation of Lay Support In Pregnant women with Social risk (ELSIPS): a randomised controlled trial. *BMC Pregnancy Childbirth*. 2012;12:11. PMID: 22375895 ISRCTN35027323	Evaluation of Lay Support In Pregnant women with Social risk (ELSIPS)	United Kingdom	1316	Randomized trial comparing lay Pregnancy Outreach Worker (POW) support with standard maternity care versus standard maternity care alone	Breastfeeding initiation rate, breastfeeding continuation	Recruitment completed
Martinez, Josep Balaguer. Telephone Support From Primary Care to Breastfeeding Mothers: A Randomized Multicentre Clinical Trial. 2015. Jordi Gol I Gurina Foundation. PMID: None NCT02186613	NR	Spain	434	Randomized, controlled trial comparing a telephone support intervention with standard care	Exclusive breastfeeding	Recruiting
McLachlan HL, Forster DA, Amir LH, et al. Supporting breastfeeding In Local Communities (SILC): protocol for a cluster randomised controlled trial. *BMC Pregnancy Childbirth*. 2014;14:346. PMID: 25281300 ACTRN12611000898954	Supporting breastfeeding In Local Communities (SILC)	Australia	NR	3-arm cluster randomized trial comparing: 1) home-based support, 2) home-based support plus access to community-based breastfeeding drop-in center, and 3) standard maternity care	Any breastfeeding	Recruiting
Scott, Jane. Parent Infant Feeding Initiative: a study to enhance breastfeeding duration. 2015. PMID: None ACTRN12614000605695	Parent Infant Feeding Initiative (PIFI)	Australia	1600	4-arm randomized, controlled trial comparing: 1) specialized antenatal class for fathers, 2) Internet- and phone-delivered social support for fathers, 3) specialized antenatal class and social support, and 4) usual care	Any breastfeeding, Exclusive breastfeeding	Not yet recruiting
Zakarija-Grkovic, Irena. The Effect of Written Information and Support Phone Calls for First Time Mothers on Breastfeeding Rates: A Randomized Controlled Trial. 2015. University of Split. PMID: None NCT01998087	NR	Croatia	500	3-arm randomized trial comparing: 1) written and telephone-delivered support, 2) general support, and 3) standard care	Any breastfeeding, exclusive breastfeeding	Recruiting