

Clinical Interventions to Promote Breastfeeding by Latinas: A Meta-analysis

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abstract

CONTEXT: Breastfeeding duration and exclusivity among Latinas fall below recommended levels, indicating a need for targeted interventions. The effectiveness of clinical breastfeeding interventions for Latinas remains unclear.

OBJECTIVE: To systematically review the documented effectiveness of clinical breastfeeding interventions on any and exclusive breastfeeding among Latinas.

DATA SOURCES: English-language publications in Medline, CINAHL, and Embase were searched through May 28, 2015.

STUDY SELECTION: Fourteen prospective, controlled studies describing 17 interventions met inclusion criteria.

DATA EXTRACTION: Extracted study characteristics include study design, population characteristics, intervention components, timing and intensity of delivery, provider type, control procedures, and outcome measures.

RESULTS: Random-effects meta-analyses estimated risk differences (RDs) between breastfeeding mothers in intervention and control arms of each study and 95% prediction intervals (PIs) within which 95% of intervals cover the true value estimated by a future study. Interventions increased any breastfeeding at 1 to 3 and 4 to 6 months (RD 0.04 [95% PI -0.15 to 0.23] and 0.08 [-0.08 to 0.25], respectively) and exclusive breastfeeding at 1 to 3 and 4 to 6 months (0.04 [-0.09 to 0.18] and 0.01 [-0.01 to 0.02]). Funnel plot asymmetry suggested publication bias for initiation and 1- to 3-month any breastfeeding. Estimates were slightly larger among interventions with prenatal and postpartum components, 3 to 6 patient contacts, and delivery by an International Board Certified Lactation Consultant or lay provider.

LIMITATIONS: The published evidence for Latinas is limited, and studies have varying methodologic rigor.

CONCLUSIONS: Breastfeeding interventions targeting Latinas increased any and exclusive breastfeeding compared with usual care.



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Breastfeeding is associated with a number of well-established health benefits for both mothers and infants.¹ The American Academy of Pediatrics, American College of Obstetricians and Gynecologists, and American Academy of Family Physicians recommend exclusive breastfeeding for 6 months, with continued breastfeeding alongside complementary foods for 1 year or longer.²⁻⁴ Models suggest that current suboptimal breastfeeding in the United States is associated with >900 excess child deaths and >4000 potentially preventable maternal deaths annually.^{5,6} Healthy People 2020 has established national objectives to increase breastfeeding initiation, duration, and exclusivity.⁷ Whereas 82.4% of Latinas initiated breastfeeding in 2011, only 27.9% continued any breastfeeding at 12 months and 20.8% exclusively breastfed at 6 months.⁸ Latinas indicate a strong desire to breastfeed, surpassing the 80% of US mothers who initiate⁹; however, Latina breastfeeding duration and exclusivity are lower than national averages and ~30% below Healthy People 2020 targets. These data highlight a need for interventions that support Latinas to achieve breastfeeding goals.

Latinas in the United States experience some barriers to breastfeeding more frequently than mothers of other ethnicities. Latinas are more likely than white women to stop breastfeeding because of latching difficulty,¹⁰ pain or fear of pain,^{10,11} perception of insufficient milk supply or infant preference for formula,^{10,12,13} and modesty or embarrassment.¹⁰ Latinas are more likely than both white and African American women to cite inconvenience or interference with desired lifestyle^{10,11} and belief that only poor women breastfeed¹¹ as obstacles impeding breastfeeding. Latinas also experience a number of culturally unique barriers to

breastfeeding, including family and partner pressures, norms regarding privacy, and cultural beliefs surrounding maternal diet and infant weight.¹⁴ Additionally, Latina women are 2 to 3 times more likely than non-Latinas to experience postpartum depression,^{15,16} which is associated with shorter breastfeeding duration and increased infant health concerns.¹⁷⁻¹⁹

Latina mothers have a lower prevalence of exclusive breastfeeding at 6 months compared with whites, Asians, and women who identify as ≥ 2 races.⁹ Latina mothers are more likely than white or African American mothers to mix breastfeeding with formula supplementation,²⁰⁻²² especially when family support is limited and free formula is distributed at hospital discharge.^{10,23} Mixed feeding becomes more prevalent with longer acculturation,^{10,23,24} and this practice is associated with both shorter breastfeeding duration and increased risk of childhood obesity.^{5,20,22}

The Centers for Disease Control and Prevention recommend interventions delivered by health care professionals as a key strategy to support breastfeeding mothers and increase breastfeeding rates.²⁵ Previous systematic reviews of clinical breastfeeding interventions have found that breastfeeding education and support improve initiation and duration through 6 months²⁶ and increase both short- and long-term breastfeeding in the general population.²⁷ However, although a recent review qualitatively evaluated interventions targeting minority women,²⁸ no review has focused exclusively on Latina women. As Latinos become the largest minority group in the United States, accounting for more than half of total population growth,²⁹ they are burdened by high rates of both uninsurance³⁰ and illnesses for which breastfeeding reduces risks, including childhood asthma and

asthma-related hospitalization,³¹⁻³³ diabetes,³⁴ and obesity.³⁵ Thus it is essential to identify evidence-based clinical interventions to increase breastfeeding in this population.

This systematic review and meta-analysis has 2 main objectives: (1) to estimate the absolute effects of clinical breastfeeding interventions on any breastfeeding and exclusive breastfeeding at varying time points among Latinas and (2) to identify methodologic and etiologic factors that might modify these effects.

METHODS

Search Strategy

This systematic review and meta-analysis assesses both qualitative intervention characteristics and quantitative estimates of effect to systematically summarize the extant literature. In accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines,³⁶ we searched for English-language publications in Medline, CINAHL, and Embase through May 28, 2015, with no specified start date to ensure a comprehensive review of available evidence for this understudied population. We used the MeSH terms “breast feeding,” “lactation,” and “Hispanic Americans” and the key words “breastfeed,” “counseling,” “health education,” “medical advice,” “health practitioner,” and “clinical intervention.”

Study Selection

For inclusion, we required that articles be published in a peer-reviewed journal (research abstracts were excluded), describe a clinical breastfeeding intervention for which women were recruited in a health care setting, include a control or comparison group, be conducted in the United States, report any or exclusive breastfeeding outcomes, and enroll a study sample $\geq 50\%$ Latina. For this review, “Latina”

refers to women of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin.²⁹ Interventions originating from a variety of health care settings, regardless of provider type and intervention location, were considered for inclusion. Comparison or control groups were those that represented usual standard of care in the facility from which the intervention originated.

Two investigators independently screened all titles, abstracts, and full-text publications based on these inclusion criteria. In addition, 1 of these 2 investigators reviewed reference lists of included publications and a related systematic review²⁶⁻²⁸ to identify additional publications. Fig 1 illustrates our search and selection process.

Data Extraction and Quality Assessment

Two investigators extracted descriptive data from the Methods section of each publication, including study design, population characteristics, intervention components, timing and intensity of the intervention, provider delivering the intervention, control procedures, and outcome measures (Table 1). To assess methodologic quality, we examined randomization procedures, initial comparability of groups, attrition, allocation concealment, outcome measures, and whether intervention and control groups were clearly defined. We also assessed adherence to intent-to-treat principles, handling of missing data, and inclusion of appropriate covariates. Considering all these factors, the same 2 investigators assigned a qualitative rating (good, fair, or poor) to each study based on criteria adapted from the US Preventive Services Task Force (Supplemental Table 4).³⁷ Where ratings assigned by the 2 investigators were discordant, a

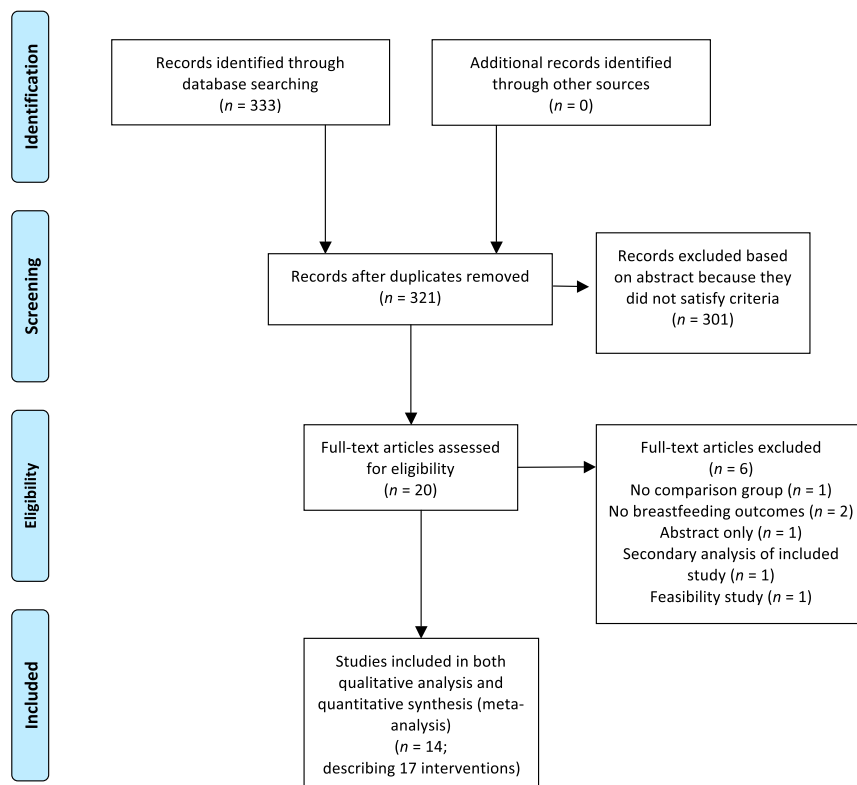


FIGURE 1

Search results and study selection procedures according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines.³⁶

final rating was reached through consensus.

Breastfeeding Definitions

Interventions may have differing effects on breastfeeding outcomes depending on the length of postnatal follow-up time. For consistency with outcome categorizations from previous meta-analyses,^{26,27} we defined breastfeeding prevalence at 3 different intervals: breastfeeding initiation at hospital discharge or within 2 weeks of delivery; short-term breastfeeding at 1 to 3 months; and longer-term breastfeeding at 4 to 6 months. If a study reported outcomes at both 1 and 3 months or 4 and 6 months, we included in the meta-analysis the more commonly reported estimates from 3 and 6 months. Exclusive breastfeeding definitions were adopted from each study (Table 1).

Data Synthesis and Analysis

To estimate the absolute effect of breastfeeding interventions on any breastfeeding at each of the 3 time intervals and on exclusive breastfeeding at 1 to 3 months and 4 to 6 months, risk difference (RD) estimates, corresponding standard errors, and number needed to treat (NNT) were calculated. The RD is the difference in the proportion of breastfeeding mothers in the intervention arm (P_1) and control arm (P_2) of each study. Thus, a positive RD value suggests a beneficial intervention effect, and a negative RD value suggests that no benefit was gained from the intervention. The NNT is defined for each breastfeeding interval as $1/RD$, where positive values denote the estimated number of women who need to receive an intervention to result in 1 additional mother breastfeeding and negative values

TABLE 1 Characteristics of Trials of Breastfeeding Interventions on Breastfeeding Outcomes Among Latina Women

Author, Year (Reference)	n	Study Design	Intervention	Study Population and Recruitment	Percent Latina	Intervention Components ^a							Timing of Intervention ^b	Intensity (number of intended contacts)	Provider Category	Control	Outcomes Measured	Quality ^c
						A	B	C	D	E	F	A							B	C
Bonuck et al, 2014 ^{38d}	666	RCT with allocation concealed in outcome assessment	(1) BINGO; LC; (2) BINGO-EP; (3) BINGO; LC+EP	Recruited from prenatal clinic	(1) 61; (2) 56; (3) 56	1,3	1,2,3	1,2,3	1,3	1,3	1,3	1,3	1,3	(1) 6; (2) 5; (3) 11	(1) IBCLC; (2) medical provider; (3) IBCLC	Usual care: access to IBCLC	Any and exclusive BF at 1, 3, and 6 mo	Good
						•	•	•	•	•	•	•	•	•				
						•	•	•	•	•	•	•	•	•				
Howell et al, 2014 ³⁹	275	RCT with allocation concealed in outcome assessment	PAIRINGS	Recruited from L&D unit	54	•	•	•	•	•	•	•	11	Medical provider	Usual care: list of community resources; control: phone call	Any and exclusive BF duration at 3 wks, 3 and 6 mo	Good	
						•	•	•	•	•	•	•	•					•
Bunik et al, 2010 ²¹	341	RCT; allocation not concealed in outcome assessment	BINGO-EP	Recruited from majority low-income Mexican-American; consider BF	88	•	•	•	•	•	•	•	14	Medical provider	Usual care: postpartum visits at 3–5 d and 2 wks for all mothers	Any and predominant BF at 1, 3, and 6 mo	Good	
						•	•	•	•	•	•	•	•					•
Hopkinson et al, 2009 ²²	522	RCT with allocation concealed in outcome assessment	MILK	WIC—eligible immigrant Latinas; 85% spoke Spanish only; recruited from L&D unit; 98% plan to mixed feed	100	•	•	•	•	•	•	•	1	Lay provider	Usual care: bedside BF assistance; formula discharge packs; access to phone support	Any and exclusive BF at 1 mo	Good	
						•	•	•	•	•	•	•	•					•
Bonuck et al, 2005 ⁴⁰	382	RCT; allocation not concealed in outcome assessment	MILK	Recruited from health center prenatal class or prenatal clinic serving primarily low-income women	57	•	•	•	•	•	•	•	4	IBCLC	Usual care: mandatory prenatal care class; WIC BF coordinator available at 1 site	Any and exclusive BF duration at 1, 2, 3, 4, 6, 8, 10, and 12 mo	Good	

TABLE 1 Continued

Author, Year (Reference)	n	Study Design	Intervention	Study Population and Recruitment	Percent Latina	Intervention Components ^a										Timing of Intervention ^b	Intensity (number of intended contacts)	Provider Category	Control	Outcomes Measured	Quality ^c
						A	B	C	D	E	F	A	B	C							
Chapman et al, 2013 ⁴¹	206	RCT; allocation not concealed in outcome assessment but bias minimized by asking PC contact questions at end of interview		Recruited from prenatal clinic; overweight or obese and low-income; must consider BF	82	.	.	.	.	.	.	.	.	.	.	.	Lay provider	Usual care at Baby-Friendly Hospital	Any and exclusive BF at birth, 1, 3, and 6 mo	Fair
Petrova et al, 2009 ⁴²	104	RCT; allocation not concealed in outcome assessment		WIC participants; recruited from prenatal clinic	87.5	.	.	.	.	.	.	.	.	.	.	6	IBCLC	Usual care: BF education and support; access to IBCLC	Any and exclusive BF at 7 d, 1, 2, and 3 mo	Fair
Chapman et al, 2004 ⁴⁵	165	RCT; allocation not concealed in outcome assessment but bias minimized by asking PC contact questions at end of interview		Majority Puerto Rican; recruited from prenatal clinic; low-income; all participants considering BF	80	.	.	.	.	.	.	.	.	.	.	6	Lay provider	Usual care: prenatal BF information; hands-on assistance from a nurse in-hospital; access to IBCLC and BF phone line	Any BF at birth, 1, 3, and 6 mo	Fair
Grassley et al, 2012 ⁴⁴	106	Non-RCT	SNAC	Recruited from L&D unit; adolescents 13–20 y; plan to BF; mixed feed, or undecided	56	.	.	.	.	.	.	.	.	.	.	4	Medical provider	Usual care: before nurses trained in SNAC intervention	Any BF at discharge, 6 wks, and 3 mo	Poor
Sandy et al, 2009 ⁴⁵	281	RCT; allocation not concealed in outcome assessment	Best Beginnings	Mostly Dominican ethnicity; 88% born outside US; low-income; urban; recruited from prenatal clinics and WIC sites	99	.	.	.	.	.	.	.	.	.	.	Weekly until weaning	Lay provider	1 or 2 prenatal home visits; community services; information and educational materials	Any and exclusive BF during 1st week	Poor

denote the number who need to receive an intervention to result in 1 fewer.

Two models were used for these analyses, a crude model and a univariable meta-regression model. The crude model was run to estimate the mean and variance of a random-effects distribution of RDs for any (Fig 2) and exclusive (Fig 3) breastfeeding stratified by time interval. The restricted maximum likelihood estimate of the among-populations variance (τ^2) and random-effects summarization were used to calculate summary estimates (Table 2).⁴⁹ τ^2 is the variance of the presumptively normal distribution of true values among populations in which each population has its own true value (ie, its own true risk of breastfeeding). In each meta-analysis, we calculated a 95% confidence interval (CI) for the estimated mean ($\hat{\mu}$) of the presumptively normal distribution of population RDs:

$$95\% \text{ CI} = \hat{\mu} \pm 1.96\widehat{SE},$$

where \widehat{SE} is the estimated SE of the sampling distribution for $\hat{\mu}$.

We calculated 2 additional intervals to convey the estimated spread of each random-effects distribution. The first was a 95% population effects interval (PEI), $95\% \text{ PEI} = \hat{\mu} \pm 1.96\tau$, where τ is the restricted maximum likelihood estimate of the SD of the random-effects distribution. The 95% PEI is the central range within which 95% of populations' RD values are estimated to lie.^{50,51} The second was a 95% prediction interval (PI),

$$95\% \text{ PI} = \hat{\mu} \pm t_{k-2} \sqrt{\tau^2 + \widehat{SE}^2},$$

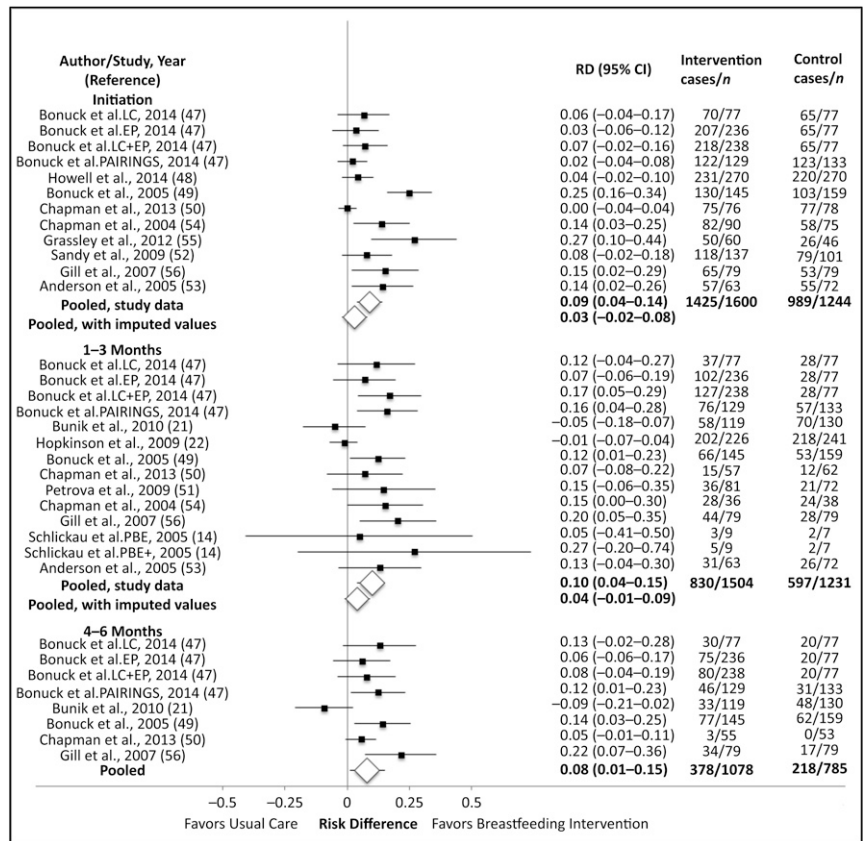


FIGURE 2 Summary RDs of breastfeeding interventions for any breastfeeding versus no breastfeeding.

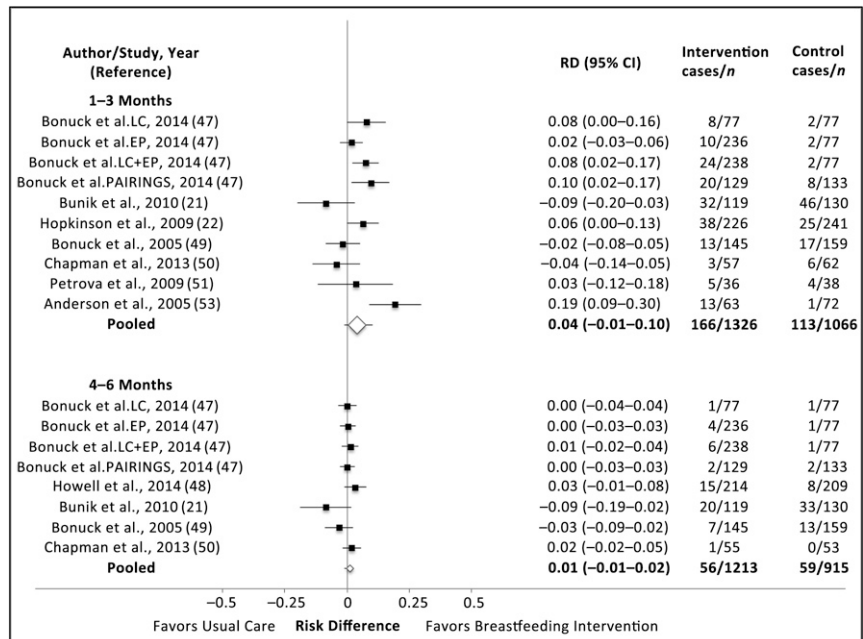


FIGURE 3 Summary RDs of breastfeeding interventions for exclusive breastfeeding versus nonexclusive breastfeeding.

TABLE 2 Meta-analysis Results of Trials of the Association Between Breastfeeding Interventions and Any or Exclusive Breastfeeding Outcomes

Estimate	Number of Estimates (<i>k</i>)	Cochran <i>Q</i> (<i>P</i> value)	Random-effects variance (τ^2)	RD_{RE}^a (95% CI)	95% Population Effects Interval	95% Prediction Interval
Initiation, study data	12	41.32 (<.001)	0.005	0.09 (0.04 to 0.14)	(−0.04 to 0.22)	(−0.07 to 0.25)
Initiation, with imputed values	18	96.4 (<.001)	0.009	0.03 (−0.02 to 0.08)	(−0.20 to 0.26)	(−0.22 to 0.28)
1- to 3-mo any breastfeeding, study data	14	23.75 (.03)	0.004	0.10 (0.04 to 0.15)	(−0.02 to 0.21)	(−0.05 to 0.24)
1- to 3-mo any breastfeeding, with imputed values	20	47.98 (<.001)	0.007	0.04 (−0.01 to 0.09)	(−0.14 to 0.22)	(−0.15 to 0.23)
4- to 6-mo any breastfeeding	8	14.95 (.04)	0.004	0.08 (0.01 to 0.15)	(−0.04 to 0.20)	(−0.08 to 0.25)
1- to 3-mo exclusive breastfeeding	10	25.23 (.003)	0.003	0.04 (−0.01 to 0.10)	(−0.06 to 0.15)	(−0.09 to 0.18)
4- to 6-mo exclusive breastfeeding	8	7.40 (.39)	0	0.01 (−0.01 to 0.02)	(0.01 to 0.01)	(−0.01 to 0.02)

^a Random-effects summary RD.

where *k* is the number of RD estimates in the meta-analysis and τ_{k-2} is the 97.5th percentile of a *t* distribution with *k*−2 degrees of freedom. In hypothetical repetitions of the entire literature-generating process, 95% of the 95% PIs will cover the true RD in a future study population. Hence, a 95% PI may be informally interpreted as a 95% CI for the RD in the “next” study population.^{52–54} Overall heterogeneity was assessed for each outcome by calculating a *P* value for the Cochran *Q* statistic. A funnel plot was examined visually for asymmetry and statistically by the tests of Egger et al.⁵⁵ and Begg and Mazumdar,⁵⁶ as well as by the trim-and-fill method of Duval and Tweedie⁵⁷ (Supplemental Figs 4 and 8).

The univariable meta-regression model was used to explore heterogeneity of random-effects estimates by 3 potentially influential and clinically meaningful intervention characteristics: timing of the intervention (prenatal, postpartum, or combined prenatal and postpartum), intervention intensity (number of intended contacts), and provider delivering the intervention (medical provider, International Board Certified Lactation Consultant [IBCLC], or lay provider) (Table 3). Univariable meta-regression was also conducted

for 3 study characteristics that might affect random-effects estimates: publication year (2010 to 2014 vs 2004 to 2009, since population-level breastfeeding estimates have changed over time), study design (randomized controlled trial [RCT] with allocation concealed or bias minimized, RCT with no allocation concealment, or non-RCT), and breastfeeding intention inclusion criterion (Supplemental Table 5). The small number of trials and clustering of study characteristics prevented our fitting multivariable meta-regression models. Intercooled Stata (version 11, Stata Corp., College Station, TX) was used for these analyses.

RESULTS

Our initial database search yielded 321 nonduplicate citations (Fig 1). Review of these titles yielded 301 potentially eligible abstracts. From these abstracts, 20 publications met inclusion criteria for full-text review, from which 14 studies describing 17 interventions met inclusion criteria for this systematic review and meta-analysis.^{14,21,22,38–47} References from publications selected for full-text review and from a recent review of breastfeeding interventions for minority women²⁸ yielded no

additional publications meeting eligibility criteria.

Six of the 14 included studies were rated as good quality,^{21,22,38–40} 3 as fair,^{41–43} and 5 as poor^{14,44–47} (quality criteria provided in Supplemental Table 4). Eleven of the 14 studies were RCTs^{21,22,38–43,45,47}; however, 2 of these analyzed only a subgroup of participants owing to application of postrandomization inclusion criteria, which may have minimized the benefits of randomization.^{43,45} Of the 12 RCTs, 4 concealed allocation assignment from study staff during outcome assessment^{22,38,39} and 3 minimized bias by interviewing mothers about intervention contact only after collecting breastfeeding outcome data.^{41,43,47}

Study Characteristics

Table 1 summarizes study characteristics. The 14 included studies were published between 2004 and 2014. All 14 were prospective, controlled studies of a single or multiple-armed breastfeeding intervention initiated in a health care setting and conducted in a majority Latina population. Sample sizes ranged from 30 to 666, totaling 4000 participants overall. Study populations ranged from 56% to 100% Latina. Populations varied by place of birth,

TABLE 3 Meta-regression Results of Trials of the Association Between Breastfeeding Interventions and Breastfeeding Outcomes by Potentially Influential Intervention Characteristics

Study Characteristic	Initiation			1–3 Months			4–6 Months		
	Study <i>n</i>	<i>P</i>	RD (95% CI)	Study <i>n</i>	<i>P</i>	RD (95% CI)	Study <i>n</i>	<i>P</i>	RD (95% CI)
Any breastfeeding, overall	12	<.001	0.09 (0.04 to 0.14)	14	.03	0.10 (0.04 to 0.15)	8	.037	0.08 (0.01 to 0.15)
Timing of intervention									
Prenatal and postpartum	10	<.001	0.09 (0.03 to 0.15)	10	.96	0.13 (0.08 to 0.18)	7	.41	0.10 (0.04 to 0.15)
Postpartum	2	.02	0.12 (–0.03 to 0.26)	2	.56	–0.02 (–0.07 to 0.04)	1	—	–0.09 (–0.25 to 0.06)
Prenatal	0	—	—	2	.5	0.16 (–0.21 to 0.52)	0	—	—
Intervention intensity									
>6 contacts	6	.05	0.06 (–0.01 to 0.14)	6	.08	0.11 (0.04 to 0.18)	5	.01	0.07 (–0.03 to 0.17)
3–6 contacts	5	.004	0.14 (0.05 to 0.23)	5	.93	0.12 (0.04 to 0.20)	3	.56	0.11 (–0.03 to 0.24)
1–2 contacts	1	—	0.04 (–0.12 to 0.20)	3	.5	0.00 (–0.10 to 0.10)	0	—	—
Provider									
Medical provider	5	.11	0.06 (–0.02 to 0.14)	6	.13	0.06 (–0.03 to 0.15)	4	.05	0.04 (–0.06 to 0.14)
IBCLC	3	.03	0.16 (0.05 to 0.27)	4	.84	0.14 (0.04 to 0.25)	3	.65	0.16 (0.03 to 0.29)
Lay provider	4	.02	0.07 (–0.02 to 0.16)	4	.10	0.13 (–0.09 to 0.35)	1	—	0.05 (–0.10 to 0.21)
Exclusive breastfeeding, overall				10	.003	0.04 (0.00 to 0.08)	8	.39	0.01 (–0.01 to 0.02)
Timing of intervention									
Prenatal and postpartum	—	—	—	8	.01	0.05 (–0.01 to 0.11)	6	.74	0.00 (–0.02 to 0.02)
Postpartum	—	—	—	2	.03	0.01 (–0.12 to 0.13)	2	.04	0.01 (–0.04 to 0.07)
Prenatal	—	—	—	0	—	—	0	—	—
Intervention intensity									
>6 contacts	—	—	—	5	.001	0.05 (–0.04 to 0.14)	4	.27	0.01 (–0.02 to 0.03)
3–6 contacts	—	—	—	4	.33	0.03 (–0.07 to 0.12)	3	.49	0.00 (–0.03 to 0.03)
1–2 contacts	—	—	—	1	—	0.06 (–0.12 to 0.25)	1	—	0.03 (–0.03 to 0.09)
Provider									
Medical provider	—	—	—	4	.02	0.03 (–0.06 to 0.13)	5	.30	0.01 (–0.02 to 0.03)
IBCLC	—	—	—	3	.19	0.03 (–0.09 to 0.15)	2	.32	–0.01 (–0.05 to 0.03)
Lay provider	—	—	—	3	.004	0.07 (–0.05 to 0.18)	1	—	0.02 (–0.03 to 0.07)

years of US residence, and language preference, considered proxies for acculturation.⁵⁸ Approximately 70% of studies targeted low-income populations. Although only 2 studies enrolled primiparous women exclusively,^{14,21} almost half of participants in most studies were first-time mothers. One study recruited only overweight or obese participants.⁴¹ Six studies required that participants consider or intend to breastfeed.^{21,22,41,43,44,47} Ten studies recruited from ambulatory prenatal care settings,^{14,38,40–43,45–47} and 4 recruited from labor and delivery units.^{21,22,39,44} Definitions of usual care ranged from no explicit breastfeeding support to Baby-Friendly Hospital standard of care.

Outcome measures were heterogeneously defined. Most studies measured prevalence of

any breastfeeding at varying time points as a proxy for breastfeeding duration. Only 4 studies reported true breastfeeding duration since birth.^{39,40,46,47} Seven studies measured prevalence of exclusive breastfeeding,^{14,22,38,41,42,45} and 1 measured “predominant” breastfeeding, defined as ≤4 oz formula per day, as no participants exclusively breastfed.²¹

Intervention Characteristics

Intervention components included breastfeeding support and education delivered in person or by telephone. Seven interventions used phone calls,^{21,22,39,40,42,43,46} 7 used optional or required home visits,^{38,40,43,45–47} and 13 used clinic or in-hospital visits to provide interpersonal support.^{14,22,38–47} Only 1 intervention provided breastfeeding education

without an interpersonal support component.³⁸ Intervention intensity, defined as the number of intended patient contacts, ranged from 1 to 14, with 1 intervention contacting women weekly until they weaned.⁴⁰ Nine interventions involved both prenatal and postpartum points of contact,^{38,40–43,45,46} 2 were initiated in-hospital after delivery,^{39,44} 2 were initiated in the early postpartum period,^{21,22} and 1 included prenatal contact alone.¹⁴ Duration of follow-up ranged from 1 week to 1 year. Five interventions formally sought any degree of family involvement in the intervention.^{38,41,45,47} All but 1 intervention employed bilingual and/or bicultural staff members and used bilingual materials⁴⁴; additionally, 6 interventions explicitly addressed Latina-specific cultural and social factors in their protocols.^{14,21,39,41,43,46}

Interventions were delivered by IBCLCs,^{38,40,42,46} physicians,³⁸ nurses,^{14,21,44} social workers,³⁹ or lay providers.^{22,41,43,45,47} Interventions using lay providers formally trained peers drawn from the same communities as study subjects, requiring that lay providers have breastfed ≥ 6 months,^{41,43,47} have worked ≥ 1 year in a Special Supplemental Program for Women, Infants, and Children (WIC) clinic,²² or become certified WIC peer counselors.⁴⁵ All 5 interventions with significant increases in any breastfeeding at 1 to 3 months and 4 to 6 months included prenatal and postpartum components delivered by an IBCLC.^{38,40,46} Of these, 4 were rated as good quality^{38,40} and 1 as poor quality.⁴⁶ The 3 interventions with significant increases in exclusive breastfeeding at 1 to 3 months also included both prenatal and postpartum components and >6 intended points of contact with participants.^{38,47} All interventions that significantly increased any or exclusive breastfeeding at 1 to 3 months or any breastfeeding at 4 to 6 months involved ≥ 1 visit by a provider to the participant's home.^{38,40,43,46,47}

Meta-analyses

Crude Analyses

From the 17 interventions described in the 14 included studies, 34 RDs were calculated to estimate the effect of breastfeeding interventions on the risk of any breastfeeding versus no breastfeeding across the 3 time intervals (Fig 2). Cochrane *Q* statistics indicated evidence of heterogeneity among trial-specific effect estimates for all 3 summary estimates ($P < .05$) (Table 2). For both initiation and 1- to 3-month any breastfeeding estimates, there was visual appearance of asymmetry in the funnel plots, reinforced by Egger et al.⁵⁵ and Begg and Mazumdar⁵⁶ tests for small-study effects indicating evidence of publication

bias (Supplemental Figs 4 and 5). A trim-and-fill analysis imputed 6 possibly missing trial results for initiation, reducing the random-effects summary estimate from 0.09 to 0.03 (95% CI -0.02 to 0.08 , 95% PEI -0.20 to 0.26 , 95% PI -0.22 to 0.28) with an NNT of 37. For 1- to 3-month any breastfeeding, 6 possibly missing trial results were imputed, reducing the random-effects summary estimate from 0.10 to 0.04 (95% CI -0.01 to 0.09 , 95% PEI -0.14 to 0.22 , 95% PI -0.15 to 0.23) with an NNT of 24. No evidence of publication bias was found for 4- to 6-month estimates, which resulted in a pooled RD of 0.08 (95% CI 0.01 to 0.15 ; 95% PEI -0.04 to 0.20 ; 95% PI -0.08 to 0.25) with an NNT of 12 (Supplemental Fig 6).

Eleven of the 17 interventions described above reported the effect of interventions on risk of exclusive breastfeeding versus nonexclusive breastfeeding, providing 18 RD estimates (Fig 3). The estimated RD for 1 to 3 months was 0.04 (95% CI -0.01 to 0.10 ; 95% PEI -0.06 to 0.15 ; 95% PI -0.09 to 0.18) and for 4 to 6 months was 0.01 (95% CI -0.01 to 0.02 ; 95% PEI 0.01 to 0.01 ; 95% PI -0.01 to 0.02), resulting in NNTs of 23 and 199, respectively. Cochrane *Q* statistics indicated evidence of heterogeneity only for 1- to 3-month estimates (Table 2). There was no visual evidence of heterogeneity for either estimate, and neither funnel plots nor Egger et al.⁵⁵ and Begg and Mazumdar⁵⁶ tests indicated evidence of bias (Supplemental Figs 7 and 8).

Univariable Meta-regression

Table 3 describes univariable meta-regression results for any breastfeeding and exclusive breastfeeding by strata of clinically relevant intervention characteristics. For any breastfeeding and exclusive breastfeeding at 1 to 3 months and any breastfeeding at 4 to 6 months, interventions with both prenatal and postpartum contact resulted

in larger effect estimates than interventions using postpartum contact alone. Across all time intervals, moderate intervention intensity (defined as 3 to 6 patient contacts) and delivery by an IBCLC showed slightly larger estimates of effect on any breastfeeding versus no breastfeeding. Additionally, interventions delivered by lay providers showed slightly larger estimates of effect on any breastfeeding than interventions delivered by medical providers, and the effect of lay providers was stronger than both IBCLCs and medical providers for exclusive breastfeeding at 1 to 3 months. Because of the small sample size and low overall estimate of effect, the meta-regression results for exclusive breastfeeding did not vary significantly by intervention characteristics.

Supplemental Table 5 describes meta-regression results by study characteristics. Compared with initiation or 1- to 3-month any breastfeeding estimates, 4- to 6-month any breastfeeding estimates and exclusive breastfeeding estimates at either time interval were more likely to be drawn from recent studies with >200 participants and a randomized study design. These study characteristics were all generally associated with smaller effect estimates. Studies reporting exclusive breastfeeding estimates were also more likely to have a breastfeeding intention inclusion criterion compared with studies reporting any breastfeeding estimates.

DISCUSSION

Clinical breastfeeding interventions targeting Latinas appear to increase any breastfeeding and exclusive breastfeeding at varying time points. Although random-effects summary estimates for initiation and 1- to 3-month any breastfeeding were

attenuated and CIs crossed the null after imputation to correct for publication bias, all random-effects summary estimates consistently favored clinical breastfeeding interventions over usual care. However, the published evidence for Latinas is limited, and studies have varying methodologic rigor.

The small magnitude of summary estimates and the substantial heterogeneity across studies are consistent with findings from previous meta-analyses of breastfeeding interventions. Guise et al,²⁶ Chung et al,²⁷ and Renfrew et al⁵⁹ found breastfeeding interventions to be beneficial in the general population, and Ibanez et al⁶⁰ identified benefits specifically among low-income women. These reviews also observed high levels of heterogeneity across intervention characteristics and effect estimates, but similarly concluded that breastfeeding interventions appear more effective than usual care for increasing duration of any breastfeeding.^{26,27,59,60} Unlike previous systematic reviews, our review estimated smaller effects for exclusive breastfeeding, possibly due to a higher prevalence of mixed feeding among Latinas. Given the low exclusive breastfeeding rates in Latina populations, future interventions should aim to reduce barriers to exclusive breastfeeding specific to Latinas, addressing self-efficacy, family and social support, and psychosocial factors.^{10,61}

Whereas strong evidence of publication bias was observed for the literature reporting initiation and 1- to 3-month any breastfeeding estimates, such bias was not observed among studies reporting exclusive breastfeeding or 4- to 6-month any breastfeeding outcomes. These findings are plausible given the generally weaker methodologic rigor of studies reporting shorter-term outcomes, where authors may have been likely to publish

statistically significant results and disregard nonsignificant findings without a major incursion of time and funding. On the other hand, studies either following women longer or aiming to increase breastfeeding exclusivity may have been more likely to report both significant and nonsignificant outcomes owing to their generally larger study sizes and stronger designs, which require more substantial investments. Future studies should report and publish all findings, including null results. Despite the evidence of publication bias for initiation and 1- to 3-month any breastfeeding, effect estimates at each time interval indicate a positive effect of interventions on breastfeeding outcomes among Latinas.

In examining potential methodologic and etiologic factors that modify these effects, we observed that the diversity of study populations, intervention and “usual care” standards, and breastfeeding outcome measures contributed to heterogeneous estimates. RCTs and studies with larger sample sizes produced smaller effect estimates than less rigorous and smaller studies, likely owing to minimization of selection bias and other confounding factors across trial arms. For any breastfeeding at 1 to 3 and 4 to 6 months, interventions with prenatal and postpartum components produced larger effects than interventions targeting only the postpartum period, indicating the importance of providing breastfeeding support during both critical periods. Moderate intervention intensity, defined as 3 to 6 contacts between provider and mother, was associated with larger effects on any breastfeeding than either less or more frequent contact, highlighting the positive effect of only moderately time-intensive breastfeeding interventions and suggesting that highly

resource-intensive interventions may not be necessary to achieve maximal benefit.

Interventions delivered by IBCLCs were associated with the largest effects on any breastfeeding across time intervals, and interventions delivered by lay providers were associated with stronger effects than both IBCLCs and medical providers for exclusive breastfeeding at 1 to 3 months. With the former U.S. Surgeon General's call for integrated lactation support in primary care settings, including improved access to IBCLCs,⁶² these findings reiterate the importance of including affordable and accessible IBCLC and peer counselor services in a variety of clinical settings serving Latinas. We reiterate the recommendation by Chung et al²⁷ for future studies to directly compare providers, including medical providers, IBCLCs, and lay providers, considering both the time and cost associated with these breastfeeding intervention delivery models.

Our review has several strengths, such as the large number of subjects ($n = 4000$) from included studies. Furthermore, all included interventions had comparison groups. Although definitions of breastfeeding interventions and “usual care” varied substantially, in some cases biasing the intervention effect toward the null, these diverse contexts improve generalizability to a wide range of clinical settings and delivery formats. The variety of intervention types and intensities allowed us to identify the most effective interventions as those with moderate intensity, IBCLC or lay providers, prenatal and postpartum components, and a home visit. This suggests that future breastfeeding interventions targeting Latina women should ideally begin in the prenatal setting, involving frequent contact with an IBCLC or lay provider.

Our review was limited by evidence of publication bias among studies reporting initiation and any breastfeeding at 1 to 3 months, resulting in possibly skewed meta-regression results for which data could not be imputed. Our conclusions are further limited by the internal validity of the studies reviewed; common flaws included failure to maintain comparable groups, inadequate allocation concealment, and poor adherence to the intent-to-treat principle. Additionally, our use of the term Latina may have masked important subgroup differences that could contribute to the heterogeneity in effect estimates. The aggregation of diverse ethnic subgroups and the limited data on potentially confounding cultural and medical factors, such as acculturation, language, and family support, reduced our ability to identify homogeneous intervention effects across study populations. Intervention effects were drawn from study populations with varying proportions of Latina women, limiting our ability to draw population-specific conclusions; future studies should be conducted exclusively among Latinas while accounting for subgroup variations, such as acculturation level and immigrant status. Investigators should consider how multidimensional components of acculturation directly or indirectly influence breastfeeding outcomes within and between Latina subgroups. Where study populations

are heterogeneous, subgroup analyses by race/ethnicity should be presented, as Anderson et al⁴⁸ report for their peer counseling intervention, to compare the effect of interventions delivered to women who may share similar barriers. This will require that researchers ensure adequate sample sizes of Latina subgroups to permit detection of stratum-specific statistical associations.

Breastfeeding interventions targeting Latina populations were identified only in studies published since 2004, highlighting a need for continued research. The USPSTF recently proposed a new research plan to review primary care breastfeeding interventions with an explicit focus on variations in effectiveness by racial/ethnic population subgroups.⁶³ This provides an opportunity for future trials to be conducted within homogeneous Latina subgroups, such as women with similar acculturation status and country of origin. Future studies would also benefit from uniformity in defining breastfeeding outcomes, measuring breastfeeding since birth to permit calculation of rates, and reporting outcomes at consistent time points to facilitate comparison across studies. Finally, although it is difficult to blind participants and intervention staff in breastfeeding trials, more robust allocation concealment procedures are needed for study staff to avoid measurement bias. By improving the methodological rigor of interventions, a more accurate estimation of their effect

on breastfeeding duration and exclusivity could be obtained.

CONCLUSIONS

Available evidence suggests a favorable effect of clinical interventions on any breastfeeding and exclusive breastfeeding among Latinas. Strong evidence indicates that improved breastfeeding outcomes benefit both infant and maternal health, and the potential for harm from breastfeeding promotion interventions is low. Continued clinical and policy support is necessary to help Latina mothers achieve their breastfeeding goals and bring population-level breastfeeding recommendations within reach.

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ABBREVIATIONS

CI: confidence interval
IBCLC: international board-certified lactation consultant
NNT: number needed to treat
PEI: population effects interval
PI: prediction interval
RCT: randomized controlled trial
RD: risk difference
WIC: Special Supplemental Program for Women, Infants, and Children

Ms Wouk led data analyses and interpretation of data; Ms Wouk and Dr Lara-Cinisomo approved the final manuscript as submitted; Ms Wouk and Dr McKenney conceptualized and conducted the systematic review (performing search strategies, screening articles, and abstracting data) and drafted the initial manuscript; Ms. Wouk and Drs McKenney, Poole, Petrick, and Lara-Cinisomo reviewed and revised the manuscript; Dr Stuebe provided subject matter expertise for interpreting the clinical significance of breastfeeding interventions and reviewed and revised the manuscript with attention to substantive breastfeeding issues; Drs Poole and Petrick supervised the lead author in meta-analytic methods, advising on presentation of the data; and Dr Lara-Cinisomo assisted with the initial conception of the work, including identifying variables for the meta-analysis and operationalizing the research question, and supervised the conduct of the meta-analysis and systematic review.

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