

4-1-2018

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he Journal of Perinatal & Neonatal Nursing, Vol. 32, No. 2 (April/June 2018): 116-126. [DOI](#). This article is © Wolters Kluwer Health and permission has been granted for this version to appear in [e-Publications@Marquette](#). Wolters Kluwer Health does not grant permission for this article to be further copied/distributed or hosted elsewhere without the express permission from Wolters Kluwer Health.

Effectiveness of CenteringPregnancy on Breastfeeding Initiation Among African Americans: A Systematic Review and Meta-analysis

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We would like to acknowledge Laura McNabb, BSN, RN, for her valuable contribution to this study.

Disclosure: The authors have disclosed that they have no significant relationships with, or financial interest in, any commercial companies pertaining to this article.

Abstract

While breastfeeding initiation rates for African American mothers are low, an innovative model of group prenatal care, CenteringPregnancy, holds promise to increase breastfeeding rates. The aim of this systematic review and meta-analysis was to examine the effects of CenteringPregnancy versus individual prenatal care on breastfeeding initiation among African American mothers. Using a systematic approach and PRISMA guidelines, 4 electronic databases were used to search the literature. English-language studies, comparing CenteringPregnancy and individual prenatal care, including African American participants, and specifying breastfeeding initiation as an outcome were screened for inclusion. Study strength and quality were assessed and 7 studies were systematically reviewed and meta-analyzed. Participation in CenteringPregnancy increased the probability of breastfeeding initiation by 53% (95% confidence interval = 29%-81%) (n = 8047). A subgroup analysis of breastfeeding initiation among only African American participants was performed on 4 studies where data were available. Participation in CenteringPregnancy increased the probability of breastfeeding initiation by 71% (95% confidence interval = 27%-131%) (n = 1458) for African American participants. CenteringPregnancy is an effective intervention to increase breastfeeding initiation for participants, especially for African Americans. To close the racial gap in breastfeeding initiation, high-quality research providing specific outcomes for African American participants in CenteringPregnancy are needed.

According to the American Academy of Pediatrics, breast milk is the ideal food for infants during the first year of life.¹ Infants who are breastfed exclusively (no supplementation of formula, water, juice, etc) until 6 months of age have decreased incidences of ear infections, respiratory illnesses, and diarrhea.¹⁻³ Antibodies (in particular, IgA) present in breast milk provide passive immunity to the breastfed infant by working within the newborn's gastrointestinal track.^{1,4} Breast milk is symbiotic providing both prebiotics and healthy probiotic bacteria that help establish the newborn's immune system.⁵ As breastfed children age, they are less likely to become obese, develop asthma, diabetes, or die from sudden infant death syndrome when compared with formula-fed children.¹⁻³ Beyond the physical health benefits to the newborn, breastfeeding also offers psychosocial and economic advantages. The skin to skin contact during breastfeeding promotes bonding between mother and infant.^{6,7} Early initiation (within 60 minutes of birth) of breastfeeding and skin to skin contact promotes breastfeeding initiation and continuation.^{6,8} In addition, when compared with formula feeding, breastfeeding is more cost-effective for individual families. For example, the United States Breastfeeding Committee reported that purchasing infant formula typically costs a family \$1200 annually, an important consideration for low-income populations.⁹ Low rates of breastfeeding, particularly among African American and Hispanic mothers, lead to increased economic costs due to higher rates of hospitalization and readmissions for common infant illnesses.¹⁰

The benefits of breastfeeding extend across all races and ethnicities, but may have a dramatic impact on African American infants, who are disproportionately affected by adverse health outcomes, especially infant mortality.³ Despite an overall increase in national breastfeeding rates, racial disparities persist. Breastfeeding initiation is defined as any breastfeeding at the time of hospital discharge.¹¹ Breastfeeding initiation does not preclude formula supplementation (also referred to as mixed-feeding). Overall, American women met the *Healthy People 2010 objective* of

75% for breastfeeding initiation.¹² At 63.3% initiation, African American women fell well below this national objective.¹² Efforts to increase breastfeeding initiation have focused on the prenatal period as an opportune time for educational interventions.^{13,14} The type of prenatal care received (individual vs group) may impact infant feeding decisions. An innovative model of group prenatal care, CenteringPregnancy (CP), holds promise to increase breastfeeding rates. Yet, the impact of CP on African American women's breastfeeding initiation remains unknown. Therefore, the purpose of this systematic review and meta-analysis is to determine the effectiveness of CP on breastfeeding initiation among African American women.

BACKGROUND

In the United States, most women experience individual prenatal care (IPC) visits with a primary prenatal provider (eg, certified nurse midwife [CNM], family practice physician, or obstetrician).¹⁵ These structured visits are geared toward physical assessments (eg, fundal height, maternal weight, and blood pressure) and education typically with the provider leading the visit.¹⁶ Women receiving IPC have, on average, 10 to 15 visits, lasting 10 to 15 minutes, resulting in approximately 2.5 hours of one-on-one contact with the provider for the entire pregnancy.¹⁵⁻¹⁷ Educational topics are portioned out over these visits to address the anticipated needs of the woman, gestational age-related prenatal testing, education, and/or risks and health promotion, with considerable variability in time and attention to various topics.¹⁸ Formal childbirth education and breastfeeding classes are used to supplement IPC. Women with prenatal complications (eg, gestational diabetes and preeclampsia) may experience more prenatal appointments and perinatal testing visits.

Group prenatal care has been offered in various settings for decades.¹⁹ Since the 1990s, the CP model of group prenatal care has been widely utilized and studied in randomized controlled trials. Developed by a CNM, CP provides approximately 15 hours of interaction between women and the provider.²⁰ Groups of 6 to 10 women of similar gestational ages are grouped together to become a cohort for the remainder of the pregnancies and immediate postpartum period. The cohort meets 10 to 16 times throughout the prenatal period for 120-minute sessions that are conducted by the primary care provider (CNM, physician, or nurse) and additional facilitators such as the lactation consultant or social worker.²⁰ The providers facilitate the groups but do not serve as didactic instructors; rather the group members interact sharing questions and experiences.²¹ The Centering Healthcare organization offers training for group facilitators, providing group materials, evaluation, and accreditation.²² These features make CP a standardized intervention that can be studied.

CP has been shown to improve perinatal outcomes, especially among low-income African American women.²³⁻²⁵ Women participating in CP have lower rates of low-birth-weight infants and preterm deliveries when compared with IPC.²⁴ CP provides more time spent with providers, more information received by participants, and a larger support system that may continue for group participants following birth.^{21,25-27}

In 2 randomized control trials (RCTs), researchers compared the outcome of breastfeeding initiation between CP and IPC groups.^{28,29} In 2007, Ickovics and colleagues²⁸ found that CP significantly increased breastfeeding initiation in participants. In a later study, Ickovics and colleagues²⁹ found no significant difference between groups. Researchers in 2 systematic reviews also found no significant difference in breastfeeding initiation between CP and IPC participants.^{15,30}

METHODS

This systematic review and meta-analysis was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.³¹ [Figure 1](#) contains the PRISMA flow diagram. To systematically search the literature, the PICO model (Population, Intervention, Comparison, Outcome, and Studies) was used.³² The population (P) to be examined was African American women, receiving CP as the intervention (I) compared (C) with receiving IPC; breastfeeding initiation was the targeted outcome (O). English-language studies published between January 2000 and May 2017 were included in the search of PubMed, Cochrane, EbscoHost, and CINAHL databases. Search terms were as follows: group prenatal care, group antenatal care, CenteringPregnancy, breastfeeding, low income, African American women, and black women. These terms yielded a total of 170 studies. The abstracts of these studies were reviewed by the first author and a research assistant. A search through the reference lists of several articles yielded 1 additional reference. The abstracts of the 171 studies were reviewed. The first and third authors, and the research assistant, independently used the Johns Hopkins Nursing Evidence-Based Practice Rating Scale to determine the strength and quality of evidence from each study.³³ A quality score of 3B or better was considered acceptable. The quality scores of the 3 raters were congruent.

Exclusion and inclusion criteria

Eighteen full-text articles were reviewed. Three articles were excluded because the study samples did not include African American women.^{16,25,34} Six articles were excluded because breastfeeding initiation was not a study outcome measure.³⁵⁻⁴⁰ Two articles were literature reviews and therefore excluded from the analysis.^{41,42} Seven research studies^{28,29,43-47} met the inclusion criteria, thus, were included in the systematic review and meta-analysis. Data were extracted by the first and third authors.

Meta-analysis

Data analyses including descriptive statistics and meta-analysis were completed in the software platform R⁴⁸ and with the R package metafor.⁴⁹ Using log odds ratio (OR) to calculate the effect size demonstrates the difference between the control (IPC) and intervention groups (CP) in the prevalence of breastfeeding initiation. The ORs were estimated from the random-effects (RE) model, inferring that there is a population distribution of effect sizes and the selected studies represent samples of this distribution.⁵⁰ The random-effect OR and 95% confidence interval (CI) were meta-analyzed across the 7 studies. Statistical heterogeneity in each meta-analysis was assessed using Cochrane's Q [tau]², and I² statistics.⁴⁹

For subgroup analysis of breastfeeding outcomes specific to African American participants, data were sought for only these participants in the 7 studies. One study included only African American participants.⁴³ E-mail requests for raw data on breastfeeding initiation among African American participants in CP and IPC groups were sent to the authors of the 6 remaining studies. Subgroup data were submitted by 3 researchers.^{28,29,46} Therefore, a subanalysis on 4^{28,29,43,46} of the 7 studies was conducted.

RESULTS

As noted [Table 1](#), the 7 studies were systematically reviewed for study design, sample, the description of CP as the intervention, and findings. The synthesis of these findings is presented followed by the results of the meta-analysis to determine the effect of CP on breastfeeding initiation

among study participants. Finally, a subgroup analysis of the impact of CP on African American participants' breastfeeding initiation is presented.

Study designs

The purpose of each of the studies included in this systematic review and meta-analysis was to determine the effect of CP on perinatal outcomes including breastfeeding initiation. Two of the studies were RCTs.^{28,29} In these studies, data collection occurred at multiple time points: upon enrollment in the study, third trimester, and postdelivery. The others were quasiexperiments with retrospective chart reviews,⁴⁶ 3 were retrospective cohort analyses,^{43,45,47} and 1 used mixed-methods including retrospective chart reviews and focus group analyses.⁴⁴

Study samples

A total of 8047 women participated in the 7 research studies. The sample sizes for individual studies ranged from 268 to 4083 participants. The racial compositions of study participants varied. Within the samples, the percent of African American participants ranged from 16% to 100%. Researchers in 2 studies targeted recruitment efforts toward African American women.^{28,43} The average age of the study participants ranged from 15.9 to 26.4 years. Adolescent participants were included in 4 studies,^{28,29,43,44} which lowered the overall mean age of the samples.

Women were recruited from a variety of healthcare centers, hospitals, and clinics in both rural and urban settings. Three of the studies were conducted using multiple sites.^{28,29,46} Ickovics and colleagues²⁹ recruited participants from 14 clinical sites (10 hospitals and 4 health centers). In an earlier study, Ickovics and colleagues²⁸ gathered data from 2 hospitals associated with universities in the community. Tanner-Smith and colleagues⁴⁶ collected data from 4 sites: community health center, rural birthing center, large hospital, and a community hospital. The remaining 4 studies were conducted using data from the researchers' clinical practice settings.^{43-45,47}

Prenatal participants in 4 studies^{28,29,44,45} were defined low risk by the primary provider (certified nurse-midwife, nurse practitioner, or physician). Low-risk pregnancy was described in the studies as follows: singleton pregnancies without physical (eg, diabetes, hypertension, and obesity) and psychological (eg, drug, alcohol, and other mental issues) complications affecting the pregnancies. Grady and Bloom⁴³ included high-risk (eg, multiple gestation) participants. The prenatal risk status was not specified in 2 studies.^{46,47} Five of the studies included nulliparous and multiparous participants.^{28,29,45-47} However 2 studies provided no information on this descriptor.^{43,44}

In 5 of the studies, participants were described as low income or having limited financial resources receiving Medicaid for insurance.^{28,29,44-46} In the 2 remaining studies, the researchers did not specify socioeconomic status.^{43,47} The amount of reporting of other demographics varied between the studies. Most study participants were single and either were enrolled in or had completed at least high school.

The assignment of women to either CP or IPC varied between studies. In all of the studies with the exception of the 2 RCTs,^{28,29} participants either chose or were assigned to CP and were compared with women who received IPC.⁴³⁻⁴⁷ Using patient medical records including progress notes, Grady and Bloom⁴³ collected data retrospectively from a CP program in 2003 and compared it with data from IPC received at 2 separate time points: 1998 and 2001. Likewise, Tanner-Smith and colleagues⁴⁶ used retrospective data collection from medical records at 4 sites for all women

receiving IPC or CP. Picklesimer and colleagues⁴⁵ retrospectively collected data from electronic birth certificate records maintained by the hospital and compared records of women selecting IPC or CP. All of the studies reviewed included care by certified nurse midwives in the intervention group and the control or compassion groups.

CenteringPregnancy and individual prenatal care

The CP intervention was initiated in the second trimester and implemented consistently across all studies.^{28,29,43-47} CP was provided every 2 weeks for 10 to 12 weeks, with each session lasting approximately 2 hours. The CP cohorts in each study consisted of 8 to 10 women per cohort, with similar estimated due dates (eg, within the same month). In addition to the physical assessments performed at each session, educational modules were conducted. Breastfeeding education was specifically mentioned in only one study.⁴⁶ The same researchers reported that 2 sessions on breastfeeding education are the standard in CP. However, they were unable to determine the specific number of sessions that included breastfeeding education in either intervention or control groups.⁴⁶ IPC in these studies followed the standard for prenatal care delineated by the American Academy of Pediatrics and American College of Obstetricians and Gynecologist.⁵¹ The adequacy in the number of prenatal visits was addressed in 6 of the 7 studies.^{28,29,43-46} The Kotelchuck Adequacy of Prenatal Care Utilization Index was used to measure prenatal care initiation and attendance.^{28,29,45} Using this index, prenatal care was scored inadequate if care began after 4-month gestation or if the woman attended less than 50% of the recommended number of visits. Tanner-Smith and colleagues⁴⁶ excluded study participants from the analysis if the women attended fewer than 5 scheduled CP sessions.

Findings

The researchers in all 7 studies examined the effects of the type of prenatal care received (IPC vs CP) on breastfeeding initiation.^{28,29,43-47} [Table 2](#) contains the prenatal care type and breastfeeding initiation rates for the 8047 participants. Researchers in 3 of the 7 studies found no difference in breastfeeding initiation among groups.^{29,45,47} Using OR with 95% CI, the findings of 4 of the studies demonstrated that breastfeeding initiation was significantly improved among CP group participants compared with those in IPC groups.^{28,43,44,46} Grady and Bloom⁴³ reported that the percentage of adolescents initiating breastfeeding nearly doubled among those receiving CP compared with IPC participants (46% vs 28%, respectively, $P < .02$). Ickovics and colleagues²⁸ also found that breastfeeding initiation was significantly increased among adolescents CP participants (66.5% vs 54.6%, $P < .001$) (OR, 1.73, 95% CI = 1.28-2.35). Analyzing breastfeeding findings from 4 sites, Tanner-Smith and colleagues⁴⁶ reported that CP groups at 2 sites (B and C) were significantly more likely to report breastfeeding initiation compared with the IPC control groups: site B (OR, 12.74, 95% CI = 2.28-71.02; $P = .004$), site C (OR, 8.00, 95% CI = 1.82-35.10; $P = .006$). Overall, breastfeeding initiation was significantly increased for CP participants in all 4 sites (OR, 2.08, 95% CI = 1.32-3.26; $P < .001$) compared with those in IPC.⁴⁶ In a study with exclusively African American participants, Klima and colleagues⁴⁴ found that breastfeeding initiation was significantly increased among CP participants (59%) compared with those in IPC (43.6%) ($P < .05$). Because there was consistency in the definition of breastfeeding initiation (eg, breastfeeding at the time of discharge) between the studies, a comparable outcome analysis was feasible.

Overall, there was significant homogeneity between studies: Cochrane's Q ($df = 6$) = 11.11, $P = .09$, $[\tau]^2 = 0.021$, $se = 0.028$. Based on the meta-analysis, CP significantly increased breastfeeding initiation (OR, 1.53, 95% CI = 1.29-1.81). Participation in CP increased the probability of breastfeeding initiation by 53% (95% CI = 29%-81%). The random-effects test for the meta-analysis

indicated that the overall effect is different from zero (estimate = 0.43, se = 0.086, $P < .0001$, 95% CI = 0.26-0.59). In [Figure 2](#), a forest plot, with the OR and 95% CI, the percent weight contribution for each study, and RE model summarizing the results are presented. The forest plot contains the mean effect size (OR) and error bars for each estimated effect size (representing the variability). Finally, the RE model including variability is also presented in the forest plot.

Subgroup analysis of African American participants

[Table 3](#) contains the prenatal care type and breastfeeding initiation rates for the 1458 African American participants. Overall, there was not significant heterogeneity among studies- Q ($df = 3$) = 4.43, $P = .218$, $[\tau]^2 = 0.028$, se = 0.08, and the $I^2 = 30.19\%$. A forest plot, with the OR and 95% CI, and the percent weight contribution for each study and RE model summarizing the subanalysis results are presented in [Figure 3](#). The random-effects test for the meta-analysis indicated that the overall effect is different from zero (estimate = 0.54, se = 0.15, $P < .0004$, 95% CI = 0.24-0.84). On the basis of the meta-analysis, CP significantly increased breastfeeding initiation among African American women (OR, 1.71, 95% CI = 1.27-2.31). Participation in CP increased the probability of breastfeeding initiation by 71% (95% CI = 27%-131%).

DISCUSSION

The inclusion of studies with only African American participants within the sample makes this systematic review and meta-analysis unique. Overall, 7 studies that compared breastfeeding initiation outcomes for women who received IPC versus CP were summarized and analyzed. The results of this meta-analysis provide evidence that participation in CP significantly increased breastfeeding initiation. Women in CP were 56% more likely to initiate breastfeeding than women in IPC. Although the percent weight contributions varied between studies, the 2 RCTs^{28,29} contributed substantially (39.9%) to the meta-analysis.

To more explicitly measure the specific impact of CP on the African American participants, a subgroup analysis of 4 studies where raw data were available was performed. The findings of the subgroup analysis demonstrated that participation in CP by African American women significantly increased breastfeeding initiation. African American women in CP were 71% more likely to initiate breastfeeding than those in IPC. In the subgroup analysis, the 2 RCTs^{28,29} contributed half of the percent weight (50%).

In a recent systematic review, Lathrop¹⁹ reviewed 5 studies comparing breastfeeding initiation between CP and IPC participants. However, the author included 2 studies with exclusively Latina participants.^{16,38} Trudnak and colleagues³⁸ found that CP participation did not increase breastfeeding initiation and actually increased the odds of formula feeding. Robertson and colleagues¹⁶ found no difference in breastfeeding initiation between groups. Carter and colleagues¹⁵ conducted a systematic review and meta-analysis comparing a broad range of perinatal outcomes (eg, preterm birth and low birth weight) between CP and IPC participants. They found no significance difference in breastfeeding rates between women receiving either form of prenatal care.¹⁵ Although this analysis included fewer studies, it focused on African American women, a population less likely to initiate breastfeeding.

This systematic review and meta-analysis has several strengths including adherence to the PRISMA guidelines and independent and congruent researcher assessment of study strength and quality. Robust statistical analysis allowed for the initial meta-analysis and sub-group analysis and ensured the assessment of heterogeneity among the studies as well as the percent weight contribution across studies to the overall effect of CP on breastfeeding initiation. This study also has several

limitations. Only 2 of the studies included were RCTs with evidence levels of 1A.^{28,29} Therefore, the risk of bias in the remaining studies was increased. For example, participants in the 5 retrospective studies were not randomized and women self-selected the type of care they received, which increased the risk of selection bias.⁴³⁻⁴⁷ The variation in sample size between the studies (268-4083) and the wide variation in African American participants (16%-100%) are additional limitations. Finally, the content and amount of breastfeeding education provided in both CP and IPC was not specified in the studies. Depending on the desire of the CP cohort, it is possible that breastfeeding could have been a topic of discussion for more than 2 of the required sessions.⁴⁶ The subanalysis of breastfeeding initiation for African American participants was dependent on e-mail communication with authors, some of whom had changed institutions. Therefore, raw data from 3 studies were missing.

RECOMMENDATIONS

More high-quality studies, such as randomized controlled trials or quasiexperiments, are needed to generate knowledge of the impact of CP care on breastfeeding initiation rates. The availability of more detailed outcomes data is needed for subpopulations such as African American participants. The use of RCTs eliminates selection bias and strengthens the ability to generalize findings beyond the sample. However, participants must accept randomization to either type of prenatal care. In addition to quantitative methods, qualitative research designs would help identify what specific aspects of CP are perceived most beneficial for outcomes such as breastfeeding initiation. The relationship between timing and adequacy of prenatal care and breastfeeding initiation remains unclear. In future studies, the use of instruments, such as the Kotelchuck Index, will strengthen measures of prenatal care adequacy important to perinatal outcomes including breastfeeding initiation. Qualitative or mixed-methods studies are needed to provide a deeper understanding of the mechanisms in which CP contributes to breastfeeding initiation for African American women. Future research comparing topics and content included by providers who facilitate CP is needed to determine whether the type of facilitator or frequency of breastfeeding discussions has an impact on breastfeeding initiation among African American women.

CONCLUSIONS

While national breastfeeding rates continue to increase, only 68% of African American mothers initiate breastfeeding.⁵² This falls short of the *People 2020* objective for breastfeeding initiation (81.9%).⁵³ The findings from this systematic review and meta-analysis demonstrate that participation in CP significantly increases the likelihood of breastfeeding initiation for women in general and African Americans particularly. These findings verify the effectiveness of CP in providing education and social support for women during pregnancy.⁵⁴ Changing the paradigm of how prenatal care is delivered (from IPC to CP) may be an important approach to impact infant feeding decisions (eg, choosing to breastfeed) among all mothers, especially African American.

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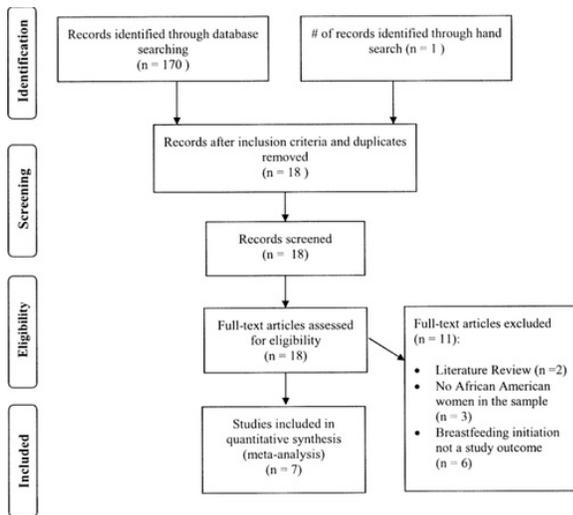


Figure 1. PRISMA flow diagram for the process of identification and screening of articles for inclusion in a systematic review and meta-analysis. From Moher et al.[31](#)

Table 1. Characteristics and findings of the included studies

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Authors	Study Design	Setting	Sample	Data collection specific to breastfeeding initiation	Breastfeeding initiation findings	Strength and quality of the evidence
Idovics et al ²⁸	Randomized controlled trial	Multiple (2): • University-affiliated hospitals	N = 1047 • AAW 11% • Latina 8%	Structured interviews: • Study enrollment • Third trimester • PP	Women enrolled in CP had significantly higher rates of BF P < .001	1A
Idovics et al ²⁹	Cluster randomized controlled trial	Multiple (14): • 10 hospitals • 4 health centers	N = 1145 • White or other 58% • Latina 34% • AAW 8% • White or other	Structured interviews: • Second trimester • Third trimester • 6-mo PP • 12-mo PP	No significant difference: 88.8% = CP 87.7% = traditional PNC	1A
Grady and Bloom ⁴³	Retrospective cohort	Teen pregnancy center based in a metropolitan-area hospital	N = 357 • AAW 6% • White 1% • Other	Medical chart review • Breastfeeding noted at hospital discharge	Adolescents selecting CP had significantly higher rates of BF P < .02	3B
Klima et al ⁴⁴	Mixed-method: focus groups and retrospective cohort	Urban public health clinic	N = 268 • AAW	Review of medical records	Women enrolled in CP had significantly higher rates of BF P < .05	3B
Picklesimer et al ⁴⁵	Retrospective cohort	Metropolitan-area hospital	N = 4083 • White 26% • AAW 22% • Hispanic 7% • Other	Review electronic certificate database	No significant difference 65% = CP 60% = traditional PNC	3B
Tanner-Smith et al ⁴⁶	Quasiexperimental retrospective cohort	Multiple (4): • Faith-based community health center (site A) • Rural birth center (site B) • Metropolitan-area hospital (site C) • Community health center (site D)	N = 794 • AAW 27% • White 17% • Hispanic 3% • Other	Medical record review • Breastfeeding noted at hospital discharge	Combined, women opting for CP at all 4 sites had higher rates of BF P < .001 Individually, sites B and C had significant findings (site B: P = .004; site C: P = .006)	2B

Abbreviations: AAW, African American Woman; BF, breastfeeding; CP, Centering Pregnancy; IPC, individual prenatal care; PNC, prenatal care; PP, postpartum.
 *Strength and quality of evidence rating scale: 3B definitions: level 1 = randomized controlled trial, level 2 = quasiexperimental study, level 3 = nonexperimental study. Quality ratings: A = high, B = good.

Table 1. Characteristics and findings of the included studies

Authors	Study Design	Setting	Sample		Data collection specific to breastfeeding initiation	Breastfeeding initiation findings	Strength and quality of the evidence ^a
Ickovics et al ²⁸	Randomized controlled trial	Multisite (2): <ul style="list-style-type: none"> Universityaffiliated hospitals 	N = 1047 <ul style="list-style-type: none"> AAW Latina White or other 	81% 11% 8%	Structured interviews: <ul style="list-style-type: none"> Study enrollment Third trimester PP 	Women enrolled in CP had significantly higher rates of BF P < .001	1A
Ickovics et al ²⁹	Cluster Randomized controlled trial	Multisite (14): <ul style="list-style-type: none"> 10 hospitals 4 health centers 	N = 1148 <ul style="list-style-type: none"> Latina AAW White or other 	58% 34% 8%	Structured interviews: <ul style="list-style-type: none"> Second trimester Third trimester 6-mo PP 12-mo PP 	No significant difference: 88.8% = CP 87.7% = traditional PNC	1A
Grady and Bloom ⁴³	Retrospective cohort	Teen pregnancy center based in a metropolitanarea hospital	N = 357 <ul style="list-style-type: none"> AAW White Other 	93% 6% 1%	<ul style="list-style-type: none"> Medical chart review Breastfeeding noted at hospital discharge 	Adolescents selecting CP had significantly higher rates of BF P < .02	3B
Klima et al ⁴⁴	Mixed-method: focus groups and retrospective cohort	Urban public health clinic	N = 268 <ul style="list-style-type: none"> AAW 	100%	<ul style="list-style-type: none"> Review of medical records 	Women enrolled in CP had significantly higher rates of BF P < .05	3B
Picklesimer et al ⁴⁵	Retrospective cohort	Metropolitan area hospital	N=4083 <ul style="list-style-type: none"> White AAW Hispanic Other 	45% 26% 22% 7%	<ul style="list-style-type: none"> Review of electronic birth certificate database 	No significant difference P = .099 65% = CP 60% = traditional PNC	3B
Tanner-Smith et al ⁴⁶	Quasiexperimental retrospective cohort	Multisite (4): <ul style="list-style-type: none"> Faith-based community health center (site A) Rural birth center (site B) 	N = 794 <ul style="list-style-type: none"> AAW White Hispanic Other 	53% 27% 17% 3%	<ul style="list-style-type: none"> Medical record review Breastfeeding noted at hospital discharge 	Combined, women for CP at all 4 sites had higher rates of BF P < .001	2B

		<ul style="list-style-type: none"> • Metropolitan area hospital (site C) • Community health center (site D) 				Individually, sites B and C had significant findings (site B: P=.004; site C: P=.006)	
Walton et al ⁴⁷	Retrospective cohort	Naval medical center	N = 404 <ul style="list-style-type: none"> • White 48% • AAW 16% • Asian 11% • Not reported 25% 		<ul style="list-style-type: none"> • Electronic medical records 	No significant difference P=.786 88.1%=CP 88.6%=IPC	3B

Abbreviations: AAW, African American Women; BF, breastfeeding; CP, Centering Pregnancy; IPC, individual prenatal care; PNC, prenatal care; PP, postpartum. ^aStrength and quality of evidence rating scale³³ definitions: level 1 = randomized controlled trial; level 2 = quasiexperimental study; level 3 = nonexperimental study. Quality ratings: A=high B=good.

Figure 2. Forest plot showing the effect of CenteringPregnancy versus individual prenatal care on breastfeeding initiation.

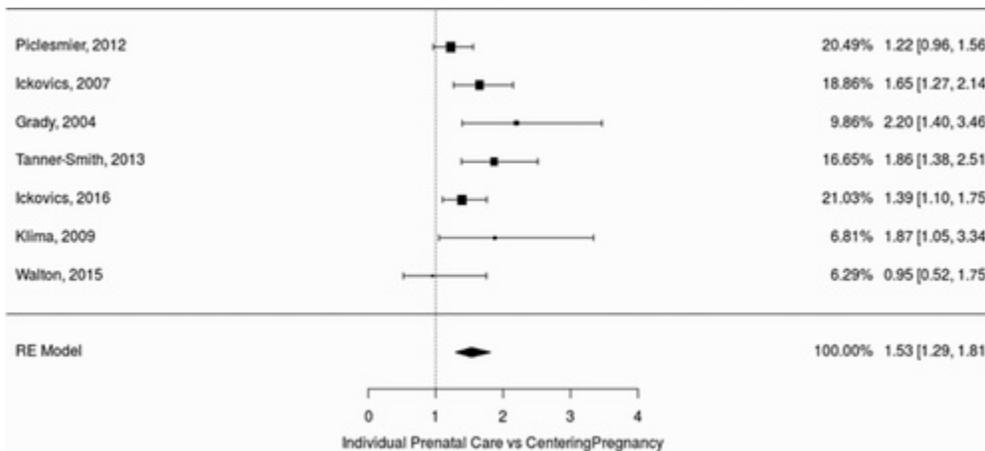


Figure 3. Forest plot showing the effect of individual prenatal care versus CenteringPregnancy on breastfeeding initiation on a subgroup of African American participants.

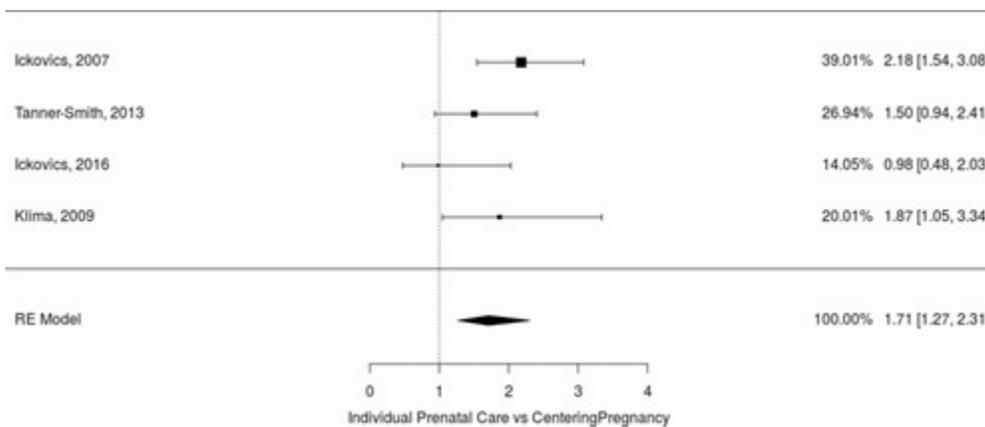


Table 3. Subgroup analysis^a

Prenatal care group	Initiated breastfeeding		Total study sample
	Yes	No	
<i>CenteringPregnancy</i>	470	269	739
<i>Individual prenatal care</i>	342	377	719
<i>Total</i>	812	646	1458