

Telephone Peer Counseling of Breastfeeding Among WIC Participants: A Randomized Controlled Trial



WHAT'S KNOWN ON THIS SUBJECT: In-person peer counseling to pregnant and new mothers has been shown to improve breastfeeding modestly in three US RCTs. But this level of support for WIC is unlikely to be scaled up nationally in the current fiscal environment.



WHAT THIS STUDY ADDS: We randomly assigned WIC clients to a telephone peer counseling program relative to standard WIC support for breastfeeding. Nonexclusive breastfeeding among Spanish-speakers increased at 1, 3, and 6 months, but the program had much less of an effect on English-speaking clients.

abstract



OBJECTIVE: The US Surgeon General has recommended that peer counseling to support breastfeeding become a core service of the Supplemental Nutrition Program for Women, Infants, and Children (WIC). As of 2008, 50% of WIC clients received services from local WIC agencies that offered peer counseling. Little is known about the effectiveness of these peer counseling programs. Randomized controlled trials of peer counseling interventions among low-income women in the United States showed increases in breastfeeding initiation and duration, but it is doubtful that the level of support provided could be scaled up to service WIC participants nationally. We tested whether a telephone peer counseling program among WIC participants could increase breastfeeding initiation, duration, and exclusivity.

METHODS: We randomly assigned 1948 WIC clients recruited during pregnancy who intended to breastfeed or were considering breastfeeding to 3 study arms: no peer counseling, 4 telephone contacts, or 8 telephone contacts.

RESULTS: We combined 2 treatment arms because there was no difference in the distribution of peer contacts. Nonexclusive breastfeeding duration was greater at 3 months postpartum for all women in the treatment group (adjusted relative risk: 1.22; 95% confidence interval [CI]: 1.10–1.34) but greater at 6 months for Spanish-speaking clients only (adjusted relative risk: 1.29; 95% CI: 1.10–1.51). The likelihood of exclusive breastfeeding cessation was less among Spanish-speaking clients (adjusted odds ratio: 0.78; 95% CI: 0.68–0.89).

CONCLUSIONS: A telephone peer counseling program achieved gains in nonexclusive breastfeeding but modest improvements in exclusive breastfeeding were limited to Spanish-speaking women. *Pediatrics* 2014;134:e700–e709

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KEY WORDS

WIC, breastfeeding, peer counseling

ABBREVIATIONS

CI—confidence interval

LWA—local WIC agency

RCT—randomized controlled trial

RR—relative risk

WIC—Supplemental Nutrition Program for Women, Infants, and Children

Dr Reeder conceptualized and designed the study, organized the collection of the data, conducted many of the initial analyses, and coauthored the manuscript; Dr Joyce organized the analytical data files, performed statistical analyses, and coauthored the manuscript; Dr Sibley contributed to the design and implementation of the peer counseling program used for the study and critically reviewed the manuscript; Ms Arnold organized the original data files, performed initial analyses, and critically reviewed the manuscript; Mr Altindag organized the analytical data files, performed statistical analyses, and critically reviewed the manuscript; and all authors approved the final manuscript as submitted.

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A long-standing programmatic tension within the US Department of Agriculture's Supplemental Program for Women, Infants, and Children (WIC) has been the promotion of breastfeeding coupled with the provision of infant formula to partially or nonbreastfeeding infants. Breastfeeding initiation and duration, for instance, are substantially lower among WIC participants than income-eligible nonparticipants.¹ In an effort to promote breastfeeding among WIC participants, the US Department of Agriculture's Food and Nutrition Service began a national peer counseling initiative in 2004, "Loving Support to Implement Best Practices in Peer Counseling."² The essential idea is that peers, in this case women who have been participating in WIC and have successfully breastfed, provide support and guidance for women during pregnancy and the postpartum period. As of 2008, The Loving Support concept had been implemented by 26% of the 1810 local WIC agencies (LWAs) that serve half of all prenatal WIC participants in the 50 states and the District of Columbia.³

Numerous observational studies have reported increases in breastfeeding initiation and duration associated with peer counseling programs for WIC clients.^{4–12} The common approach in these studies has been to compare the outcomes of WIC clients in LWAs with and without a peer counseling program.^{4,5,6,8,12} A systematic literature review of peer counseling initiatives has characterized many of these observational studies as being of moderate to poor quality.¹³ Reviews limited to randomized controlled trials (RCTs) of peer counseling have found that lay support increases exclusive and nonexclusive breastfeeding duration. Short- and longer-term exclusive breastfeeding is more likely to improve if peer support relative to the standard of care is offered before and after birth, face-to-face compared with exclusively by telephone, and if baseline

prevalence of breastfeeding initiation among the eligible population is high.^{14–16} However, all reviews caution against definitive conclusions given the heterogeneity of the studies examined.

A model of in-person breastfeeding support delivered to participants in the hospital and at home is costly and unlikely to be widely implemented given that WIC is a population-based public health program and operates within fiscal constraints.¹⁷ A telephone peer counseling model is less expensive and more replicable, yet its effectiveness is not well known given limited research. A Canadian RCT of telephone peer counseling reported significant gains in exclusive breastfeeding at 3 months among the treated group relative to controls who received the existing standard of care.¹⁸ However, >74% had a college or graduate education and 90% of the participants were married; therefore, findings are not generalizable to the WIC population. An RCT of telephone peer support among adolescent mothers also showed gains in exclusive breastfeeding, whereas daily telephone calls by nurses to Latina women 2 weeks after giving birth showed no effect.^{19,20} Samples sizes in both studies were small, with ≤ 40 women in the treatment group.

In this study we present results from an evaluation of a telephone peer counseling intervention in which 1948 WIC clients were stratified by language (English or Spanish) and then randomly assigned to 3 study arms in 4 LWAs in the state of Oregon. Oregon has the highest breastfeeding initiation rate in the country, with 90% of WIC mothers reporting that they ever breastfed. However, by 6 months only 43% of women still breastfeed. Thus, the primary goal of the intervention was to test whether a telephone peer counseling program initiated prenatally with continued postpartum support can increase breastfeeding initiation, duration, and exclusivity among WIC clients in both urban and rural settings.

METHODS

The stratified randomized study design was approved by the Department of Human Services–Health Services/Multnomah County Public Health Institutional Review Board of Oregon. We stratified by whether the WIC participant preferred contacts with an English- or a Spanish-speaking peer counselor. Language spoken, as a proxy for acculturation, is strongly and positively correlated with breastfeeding among Hispanics.^{21,22} We then randomly assigned WIC participants to 1 of 3 study arms of the telephone peer counseling program in 4 LWAs. The intervention began during pregnancy and continued postpartum. The goal was to evaluate the impact of the counseling program on breastfeeding initiation, duration, and exclusivity on an intention-to-treat basis. A fuller description of the methods is contained in the Supplemental Information.

Sample Size

We calculated that 523 mother-infant pairs per group ($N = 1569$) would be needed to detect a 10 percentage point difference in breastfeeding given a 2-tailed test with the probability of type 1 error of 0.05 and 90% power. We set out to recruit ~ 1900 women in anticipation of a 20% rate of loss to follow-up. Participant flow is shown in Fig 1.

Enrollment

Four LWAs, 2 in rural and 2 in metropolitan counties, met the criteria and chose to participate (see the Supplemental Information). All English- or Spanish-speaking women attending a new pregnancy appointment for WIC between July 2005 and July 2007 and who indicated that they intended to breastfeed or who were undecided about breastfeeding were offered the opportunity to participate. There were no exclusions on the basis of age, multiple gestations, or previous birth history. As implemented, therefore, essentially all

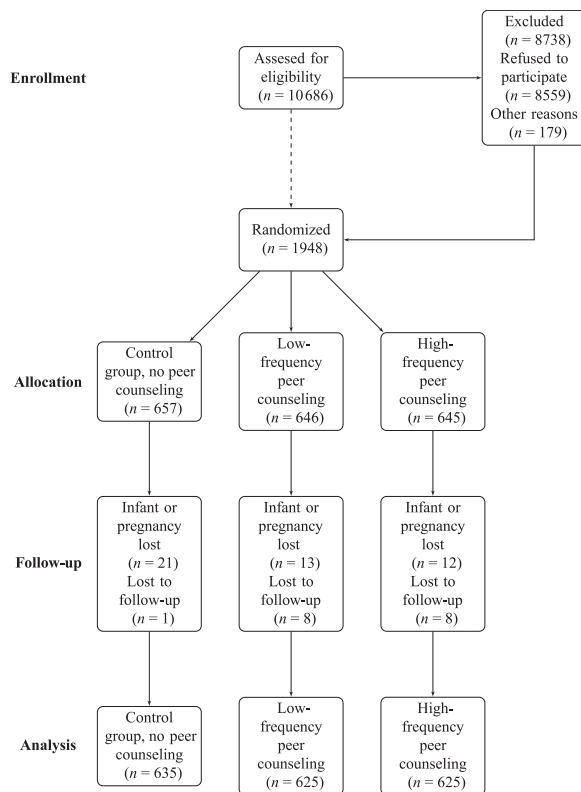


FIGURE 1
Flow of participants through each stage of the RCT.

women presenting for a new pregnancy visit were eligible because 90% of women participating in WIC in Oregon initiate breastfeeding. Recruitment stopped after December 2005 in 1 LWA because of a continued struggle to hire and retain appropriate peer counselor candidates, and thus all women presenting for a new pregnancy visit after that point were not eligible for the study. All women who agreed to participate signed consent forms that were sent to the state's WIC office. The forms were sorted between Spanish- and English-speaking clients, after which they were randomly allocated to 1 of 3 study arms by using a computer-generated random number function.

Peer Counselors

Each LWA hired its own peer counselors if counselors met the following criteria: had personally breastfed at least 1 infant for a minimum of 6 months, were currently or had been a WIC client within

the past 5 years, were able to devote at least 10 hours per week to peer counseling, were able to access transportation to bring them to the clinic several times per week, and were fluent in Spanish if serving Spanish-speaking clients. The training grounded in the Loving Support curriculum covered technical breastfeeding topics, methods of providing peer support, scope of practice, and the benefits of breastfeeding.

Intervention

Women assigned to the control group received the standard WIC breastfeeding promotion and support and did not have contact with a peer counselor. Women assigned to the low-frequency peer counseling group were scheduled to receive 4 planned, peer-initiated contacts: the first after initial prenatal assignment, the second 2 weeks before the expected due date, and the third and fourth at 1 and 2 weeks postpartum.

Women in the higher-frequency treatment group were to receive 8 scheduled calls. The first 4 calls were the same as those in the low-frequency treatment group and the last 4 calls were scheduled at months 1, 2, 3, and four. To assist peers in making timely contacts, a data system-generated report was created that listed calls due for any given time period. Peer counselors were not blinded to the treatment status of their clients, and participants knew how many contacts they were eligible to receive.

Outcomes

Outcomes included breastfeeding initiation as well as dichotomous outcomes of partial or exclusive breastfeeding for at least 1, 3, or 6 months. We also analyzed exclusive and nonexclusive breastfeeding duration. Breastfeeding duration and exclusivity were obtained from information retrieved from the Oregon WIC Information System Tracker (TWIST). At each certification visit until the child turned 2, mothers were queried as to how they were feeding their child. Duration of exclusive and nonexclusive breastfeeding was derived from the first time that the mother reported to WIC that she had stopped breastfeeding or introduced formula and the timing of each. Breastfeeding duration and exclusivity were recorded in weekly intervals for the first month and then at intervals of 5, 9, 13, 18, 22, 26, 31, 35, 39, 43, 47, 52, and >52 weeks. We converted these weeks to months of breastfeeding if a woman breastfed at least 4 weeks (1 month), 13 weeks (3 months), and 26 weeks (6 months). Thus, breastfeeding duration was missing for women who reported breastfeeding at their last WIC recertification visit but then left WIC before their next scheduled recertification appointment. As a check against differential loss of data, we tested for covariate balance across treatment arms for women with known values of exclusive and nonexclusive breastfeeding duration.

Statistical Analyses

We use 1-way analysis of variance to test for balance across the 3 study arms with continuous characteristics of mothers and χ^2 tests of independence for categorical measures. For each dichotomous breastfeeding outcome, we used logistic regression to estimate the relative risk (RR) and risk difference associated with peer counseling. We use the delta method to estimate SEs. Last, we used a discrete time hazard function with a logit link to estimate the risk of breastfeeding cessation. We used dichotomous indicators for each breastfeeding interval to model time nonparametrically in the hazard models. All models were estimated with and without covariates. We included an interaction term of the treatment group indicator with an indicator of whether the mother speaks Spanish so as to estimate separate treatment effects for Spanish and English-speaking clients.

RESULTS

Nineteen hundred forty-eight WIC participants consented to be in the study. Sixty-three miscarried or left the state, leaving 1885 women who were assigned to 1 of the 3 study arms (Fig 1). Characteristics of women by study arm are shown in Tables 1, 2, and 3. There was no evidence of pretreatment covariate imbalance among women assigned to a treatment arm (Table 1). However, the percentages of unknown breastfeeding duration and exclusivity differed significantly between the 3 study arms. In Tables 2 and 3, we show covariate means by each outcome and study arm. There were differences in the proportion of women who spoke Spanish and who gave birth by cesarean delivery in the sample with complete data on breastfeeding duration (Table 2). All covariates were balanced in the sample with complete data on exclusivity (Table 3). The distribution of participants by LWA is shown in Tables 4, 5, and 6. The smallest

TABLE 1 Characteristics of Full Sample of Assigned WIC Participants by Treatment Status

| Covariate | Control | Peer Counseling | | Number of Observations |
|------------------------------------|---------|-----------------|----------------|------------------------|
| | | Low Frequency | High Frequency | |
| Individual characteristics | | | | |
| Age, y | 27.4 | 27.3 | 26.9 | 1884 |
| White and non-Hispanic, % | 34 | 37 | 35 | 1858 |
| White and Hispanic, % | 19 | 19 | 20 | 1858 |
| Native American and Hispanic, % | 40 | 37 | 40 | 1858 |
| All other races and ethnicities, % | 7 | 7 | 5 | 1858 |
| Spanish speaker, % | 43 | 45 | 47 | 1885 |
| Married/partner, % | 64 | 69 | 65 | 1827 |
| High school diploma, % | 59 | 59 | 57 | 1813 |
| Monthly family income, \$ | 1390 | 1451 | 1420 | 1847 |
| Pregnancy | | | | |
| Pregnancy month in WIC | 3.9 | 3.8 | 3.9 | 1858 |
| Cesarean delivery, % | 30 | 31 | 26 | 1676 |
| Breastfeeding duration, % | | | | |
| Duration unknown | 26 | 17 | 12 | 1885 |
| Exclusive duration unknown | 12 | 11 | 6 | 1885 |

N = 1885. The low-frequency peer counseling group was provided with up to 4 peer counseling telephone contacts and the high-frequency group with 8 contacts.

TABLE 2 Characteristics of Subsample With Nonmissing Data on Nonexclusive Breastfeeding Duration by Treatment Status

| Covariate | Control | Peer Counseling | | Number of Observations |
|------------------------------------|---------|-----------------|----------------|------------------------|
| | | Low Frequency | High Frequency | |
| Individual characteristics | | | | |
| Age, y | 27.3 | 27.3 | 27.0 | 1536 |
| White and non-Hispanic, % | 36 | 35 | 33 | 1514 |
| White and Hispanic, % | 18 | 19 | 20 | 1514 |
| Native American and Hispanic, % | 39 | 40 | 42 | 1514 |
| All other races and ethnicities, % | 7 | 7 | 5 | 1514 |
| Spanish speaker, % | 40 | 48 | 50 | 1536 |
| Married/partner, % | 65 | 68 | 65 | 1483 |
| High school diploma, % | 58 | 58 | 56 | 1479 |
| Monthly family income, \$ | 1406 | 1467 | 1423 | 1505 |
| Pregnancy | | | | |
| Pregnancy month in WIC | 3.8 | 3.8 | 3.9 | 1513 |
| Cesarean delivery, % | 30 | 33 | 25 | 1433 |

N = 1536. The low-frequency peer counseling group was provided with up to 4 peer counseling telephone contacts and the high-frequency group with 8 contacts.

LWA discontinued participation in the study due to staffing issues. Balance across the study arms was preserved for all women (Table 4) and for those with complete data on exclusive breastfeeding (Table 6).

The number of peer counselor contacts for those with complete data on exclusive breastfeeding in the 2 treatment arms is shown in Fig 2. Of the 1012 women who were successfully reached at least once after their infant's birth, 525 (52%) were reached within 1 week after delivery and 732 (72%) by 2 weeks postpartum. Eight hundred ninety-three

women or 78% of all women in the treatment group had multiple telephone contacts with a peer counselor with at least 1 prenatal and 1 postpartum call. There was no difference in the number of contacts between the high- and low-frequency treatment groups for women with nonmissing data on breastfeeding outcomes (see Fig 2). Nor did we find any difference in breastfeeding outcomes between those in the high- and low-frequency treatment groups (results available upon request). As a result we combined the 2 peer counseling treatment arms into a single category.

TABLE 3 Characteristics of Subsample With Nonmissing Data on Exclusive Breastfeeding Duration by Treatment Status

| Covariate | Control | Peer Counseling | | Number of Observations |
|------------------------------------|---------|-----------------|----------------|------------------------|
| | | Low Frequency | High Frequency | |
| Individual characteristics | | | | |
| Age, y | 27.5 | 27.5 | 27.0 | 1704 |
| White and non-Hispanic, % | 32 | 33 | 34 | 1680 |
| White and Hispanic, % | 20 | 20 | 20 | 1680 |
| Native American and Hispanic, % | 40 | 41 | 41 | 1680 |
| All other races and ethnicities, % | 7 | 6 | 5 | 1514 |
| Spanish speaker, % | 45 | 49 | 49 | 1704 |
| Married/partner, % | 65 | 69 | 66 | 1650 |
| High school diploma, % | 57 | 58 | 56 | 1640 |
| Monthly family income, % | 1388 | 1490 | 1431 | 1673 |
| Pregnancy | | | | |
| Pregnancy month in WIC | 3.9 | 3.8 | 3.9 | 1680 |
| Cesarean delivery, % | 30 | 31 | 26 | 1597 |

N = 1704. The low-frequency peer counseling group was provided with up to 4 peer counseling telephone contacts and the high-frequency group with 8 contacts.

TABLE 4 Distribution of Full Sample of Assigned Participants by LWA and Treatment Status

| LWA | Control, % | Peer Counseling, % | | All Groups, % | Number of Observations |
|-------|------------|--------------------|----------------|---------------|------------------------|
| | | Low Frequency | High Frequency | | |
| 1 | 2 | 2 | 2 | 2 | 34 |
| 2 | 22 | 20 | 19 | 20 | 382 |
| 3 | 17 | 15 | 18 | 16 | 309 |
| 4 | 59 | 63 | 62 | 62 | 1160 |
| Total | 100 | 100 | 100 | 100 | 1885 |

N = 1885. The low-frequency peer counseling group was provided with up to 4 peer counseling telephone contacts and the high-frequency group with 8 contacts. Probability values are based on a χ^2 test of independence for qualitative characteristics. *P* = .61 (joint χ^2 test).

TABLE 5 Distribution of Subsample with Nonmissing Data on Nonexclusive Breastfeeding Duration by LWA and Treatment Status

| LWA | Control, % | Peer Counseling, % | | All Groups, % | Number of Observations |
|-------|------------|--------------------|----------------|---------------|------------------------|
| | | Low Frequency | High Frequency | | |
| 1 | 2 | 1 | 2 | 2 | 30 |
| 2 | 24 | 20 | 18 | 21 | 315 |
| 3 | 20 | 17 | 19 | 19 | 284 |
| 4 | 54 | 62 | 61 | 59 | 907 |
| Total | 100 | 100 | 100 | 100 | 1536 |

N = 1536. The low-frequency peer counseling group was provided with up to 4 peer counseling telephone contacts and the high-frequency group with 8 contacts. Probability values are based on a χ^2 test of independence for qualitative characteristics. *P* = .09 (joint χ^2 test).

Multivariate Analysis

There was no association between peer counseling and breastfeeding initiation among all women or among Spanish- and English-speaking subgroups (results not shown). Peer counseling increased nonexclusive breastfeeding for at least 3 months among all women by 22% (adjusted RR: 1.22; 95% confidence interval [CI]: 1.10–1.34), an increase in the

probability of nonexclusive breastfeeding of 11.0 percentage points relative to a mean outcome of 59% (Tables 7 and 8, column 4). Increases were greater among Spanish-speaking participants (adjusted RR: 1.29; 95% CI: 1.13–1.48) than were increases between English-speaking participants and their controls (adjusted RR: 1.19; 95% CI: 1.02–1.38).

Increases in nonexclusive breastfeeding for at least 6 months associated with peer counseling were limited to participants who spoke Spanish (adjusted RR: 1.29; 95% CI: 1.10–1.51). This finding represents an increase of 14 percentage points in the risk difference relative to an overall mean in nonexclusive breastfeeding of 45% (Tables 7 and 8, column 6).

The effect of peer counseling on exclusive breastfeeding was limited to Spanish speakers. The probability of exclusive breastfeeding for at least 3 months was 20% greater among Spanish speakers in the treatment group than their Spanish-speaking controls (adjusted RR: 1.20; 95% CI: 1.02–1.42), a risk difference of 8.0 percentage points (*P* < .05).

Duration Analysis

The observed and predicted survival functions for nonexclusive breastfeeding among Spanish and English speakers by treatment status are displayed in the top panels of Fig 3. The predicted survival functions were adjusted for covariates. There was a substantial gap in the estimated survival functions between the peer counseling treatment group and controls among all women and Spanish speakers, but there was no separation in the estimated survival functions between the treatment group and controls among English speakers. The same pattern held for the survival functions of exclusive breastfeeding as shown in the bottom panels of Fig 3, although the gap narrowed among Spanish speakers compared with nonexclusive breastfeeding. Estimates of the RR and risk difference from the hazard of nonexclusive and exclusive breastfeeding cessation are shown in Table 9. Peer counseling lowers the RR of nonexclusive breastfeeding cessation among all women (adjusted RR: 0.85; 95% CI: 0.75–0.95), but the results were driven by Spanish speakers (adjusted RR: 0.63; 95% CI: 0.53–0.79) because there was no association among English-speaking clients (adjusted RR:

TABLE 6 Distribution of Subsample with Nonmissing Data on Exclusive Breastfeeding Duration by LWA and Treatment Status

| LWA | Control, % | Peer Counseling, % | | All Groups, % | Number of Observations |
|-------|------------|--------------------|----------------|---------------|------------------------|
| | | Low Frequency | High Frequency | | |
| 1 | 2 | 2 | 2 | 2 | 32 |
| 2 | 22 | 20 | 19 | 20 | 343 |
| 3 | 17 | 16 | 18 | 17 | 286 |
| 4 | 59 | 63 | 62 | 61 | 1043 |
| Total | 100 | 100 | 100 | 100 | 1704 |

N = 1704. The low-frequency peer counseling group was provided with up to 4 peer counseling telephone contacts and the high-frequency group with 8 contacts. Probability values are based on a χ^2 test of independence for qualitative characteristics. *P* = .74 (joint χ^2 test).

0.98; 95% CI: 0.82–1.10). Peer counseling also lowered the risk of exclusive breastfeeding cessation but only among Spanish speakers (adjusted RR: 0.78; 95% CI: 0.68–0.89).

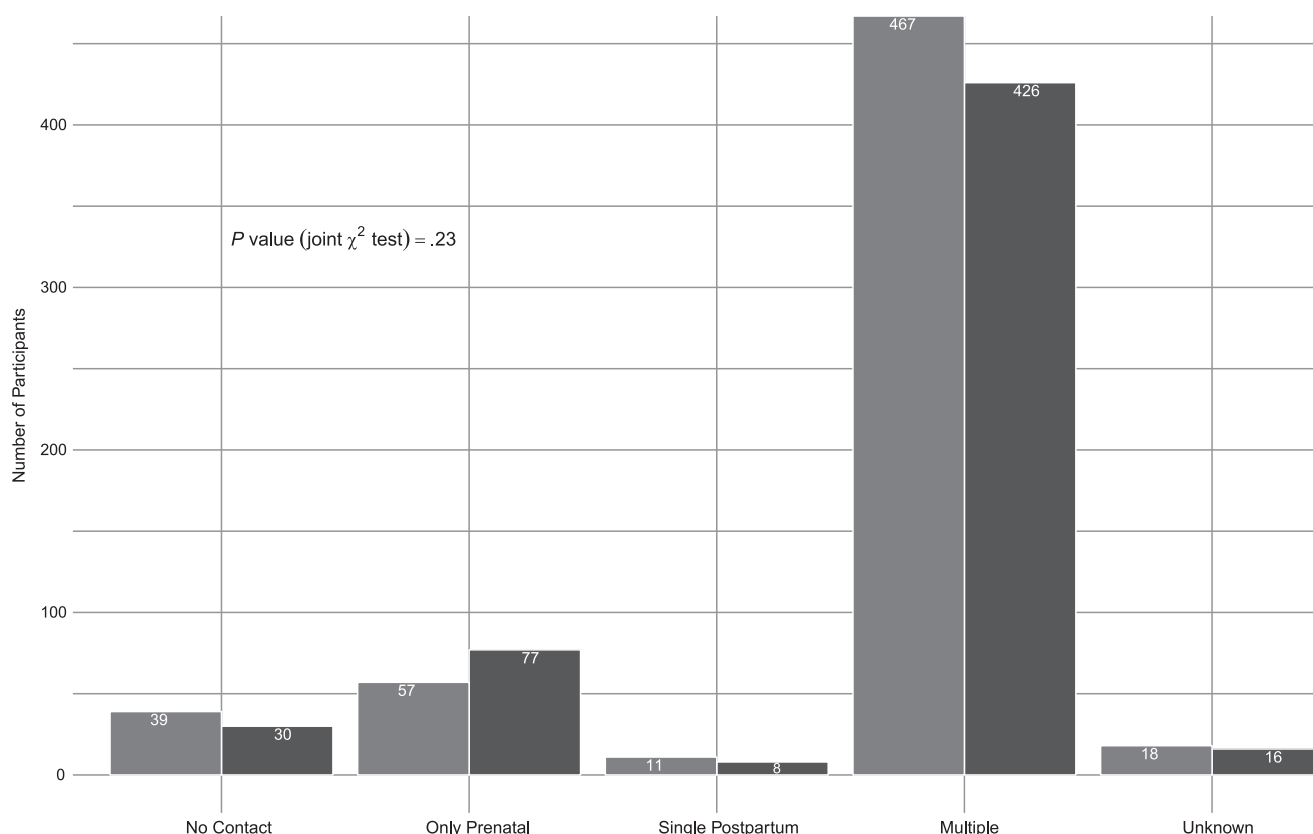
DISCUSSION

We evaluated the effect of a telephone peer counseling program to support

breastfeeding among Spanish- and English-speaking WIC clients in Oregon. Clients were stratified by language and then randomly assigned to 1 control group and 2 treatment groups. Given the high rate of breastfeeding initiation in the state, the goal was to increase exclusive breastfeeding for at least 6 months, which was not achieved.

Nevertheless, the RR that women in the treatment group breastfed nonexclusively for at least 3 months was 22% greater than for women in the control group and 29% greater among Spanish speakers. Nonexclusive breastfeeding for at least 6 months increased by 14 percentage points among Spanish-speaking women in the treatment group relative to Spanish-speaking controls. Peer counseling was also associated with decreases in any and exclusive breastfeeding cessation, but these gains also were limited to Spanish speakers only.

Our findings for Spanish-speaking WIC participants are broadly consistent with findings from RCTs in the United States that also evaluated peer counseling interventions. In 2 of the RCTs, 80% of participants were Hispanic, with approximately half designating Spanish

**FIGURE 2**

Number and timing of contacts with WIC participants by treatment status. Note: The low-frequency peer counseling group (dark-gray bars) was provided with up to 4 peer counseling telephone contacts and the high-frequency group (light-gray bars) with 8 contacts. The probability value is based on a χ^2 test of difference in contact distributions between the 2 groups for women with nonmissing exclusive breastfeeding outcomes. The results were similar when we restricted the sample to only women with nonexclusive breastfeeding outcomes ($\chi^2 = 4.40$, *P* = .35).

TABLE 7 Unadjusted and Adjusted RRs and Risk Differences of Non-exclusive Breastfeeding Associated With Peer Counseling Among All Women Enrolled in WIC, Spanish Speakers Only and English Speakers Only

| | Nonexclusive Breastfeeding for at Least | | | | | |
|--------------------------------------|---|-------------|-------------|-------------|-------------|-------------|
| | 1 Month | | 3 Months | | 6 Months | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Treatment, all women | 1.16 | 1.19 | 1.19 | 1.22 | 1.16 | 1.18 |
| (95% CI) | (1.08–1.25) | (1.10–1.27) | (1.07–1.31) | (1.10–1.34) | (1.02–1.32) | (1.03–1.34) |
| Risk difference | 0.11*** | 0.12*** | 0.10*** | 0.11*** | 0.06*** | 0.07*** |
| Treatment, Spanish only ^a | 1.17 | 1.16 | 1.28 | 1.29 | 1.30 | 1.29 |
| (95% CI) | (1.06–1.28) | (1.06–1.28) | (1.13–1.45) | (1.13–1.48) | (1.12–1.52) | (1.10–1.51) |
| Risk difference | 0.12*** | 0.12*** | 0.17*** | 0.17*** | 0.16*** | 0.14*** |
| Treatment, English only | 1.17 | 1.22 | 1.13 | 1.19 | 1.05 | 1.10 |
| (95% CI) | (1.05–1.30) | (1.09–1.36) | (0.97–1.32) | (1.02–1.38) | (0.84–1.32) | (0.88–1.37) |
| Risk difference | 0.11*** | 0.13*** | 0.06 | 0.08** | 0.01 | 0.03 |
| Adjusted for covariates | No | Yes | No | Yes | No | Yes |

Estimates adjusted for age, education, race, language, marital status, month in pregnancy enrolled, family income, cesarean delivery, and LWA. ** $P < .05$, *** $P < .01$.

^a The reference category is Spanish speakers in the control group.

TABLE 8 Unadjusted and Adjusted RRs and Risk Differences of Exclusive Breastfeeding Associated With Peer Counseling Among All Women Enrolled in WIC, Spanish Speakers and English Speakers Only

| | Exclusive Breastfeeding for at Least | | | | | |
|--------------------------------------|--------------------------------------|-------------|-------------|-------------|-------------|-------------|
| | 1 Month | | 3 Months | | 6 Months | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Treatment, all women | 1.07 | 1.07 | 1.10 | 1.09 | 0.99 | 1.01 |
| (95% CI) | (0.97–1.18) | (0.97–1.18) | (0.97–1.26) | (0.95–1.24) | (0.83–1.18) | (0.85–1.20) |
| Risk difference | 0.04 | 0.04 | 0.04 | 0.03 | 0.00 | 0.00 |
| Treatment, Spanish only ^a | 1.12 | 1.13 | 1.19 | 1.20 | 1.19 | 1.17 |
| (95% CI) | (0.98–1.29) | (1.00–1.29) | (1.00–1.42) | (1.02–1.42) | (0.96–1.47) | (0.94–1.44) |
| Risk difference | 0.06* | 0.07** | 0.08** | 0.08** | 0.06* | 0.05 |
| Treatment, English only | 1.04 | 1.04 | 1.06 | 1.02 | 0.86 | 0.91 |
| (95% CI) | (0.92–1.18) | (0.90–1.19) | (0.88–1.27) | (0.84–1.24) | (0.66–1.12) | (0.70–1.19) |
| Risk difference | 0.02 | 0.02 | 0.02 | 0.01 | –0.03 | –0.02 |
| Adjusted for covariates | No | Yes | No | Yes | No | Yes |

Estimates adjusted for age, education, race, language, marital status, month in pregnancy enrolled, family income, cesarean delivery, and LWA. * $P < .10$, ** $P < .05$.

^a The reference category is Spanish speakers in the control group.

as their preferred language, and at least 70% participated in WIC.^{23,24} The third RCT had a smaller proportion of Hispanics.¹⁷ Two of the RCTs found that peer counseling positively affected nonexclusive breastfeeding, but only 1 of the 3 studies reported gains in exclusive breastfeeding at 3 months.¹⁵ Another RCT that used daily telephone support in the first 2 weeks after delivery to a group who was 88% Hispanic reported no increases in breastfeeding duration or exclusivity.²⁰ The lack of any improvement may be related to the absence of prenatal support as noted by the authors.

The most important difference between the previous RCTs conducted in the United States and this study was the extent of support.^{17,23,24} Each of the 3 RCTs provided in-home and in-hospital visits in both the prenatal and postpartum periods. The 1 study that reported increases in exclusive breastfeeding offered 3 prenatal visits, daily hospital visits, and 9 postpartum visits.²⁴ By contrast, the intervention in our study was based almost exclusively on telephone peer support with at most 8 contacts from pregnancy to 4 months postpartum for the high-frequency group only. The modal frequency was 1

prenatal and ≥ 1 postpartum telephone contacts. An important difference between the participants in our study compared with the 3 US RCTs was the much higher rate of breastfeeding initiation among WIC clients in our control group (94%) compared with the controls in each of 3 US RCTs.^{17,23,24}

Although this intervention was less intensive than other peer counseling experiments in the United States, the model in this study is not representative of peer counseling as practiced in many LWAs across the nation. Peer counselor activities were more closely controlled and monitored than what would occur in a nonstudy setting. Peer counselors kept detailed written logs of each attempted and successful call. These call logs were sent monthly to the state office where they were read by project staff, and their peers' success at reaching participants was noted. The LWA in the study also had monthly enrollment rate updates and were strongly encouraged to stay on target and not lose contact with women already enrolled. Even with the careful monitoring of the program, a telephone peer counseling program is less costly than the home and hospital visitation as used in 3 US RCTs. Nevertheless, we reported notable gains in nonexclusive breastfeeding at 6 months and increases in exclusive breastfeeding duration but only among Spanish speakers. In Oregon, 75% of WIC participants speak English. Thus, the lack of any effect of peer counseling on English-speaking clients is a significant limitation. In addition, 90% of WIC clients in Oregon initiate breastfeeding. Breastfeeding interventions are more effective in populations with high initiation rates.¹⁶ Thus, our findings may not generalize to other groups or settings in which breastfeeding initiation is less prevalent.

We can only speculate as to why Spanish-speaking clients were more responsive to peer counseling than were English speakers. Peer counselors reported that

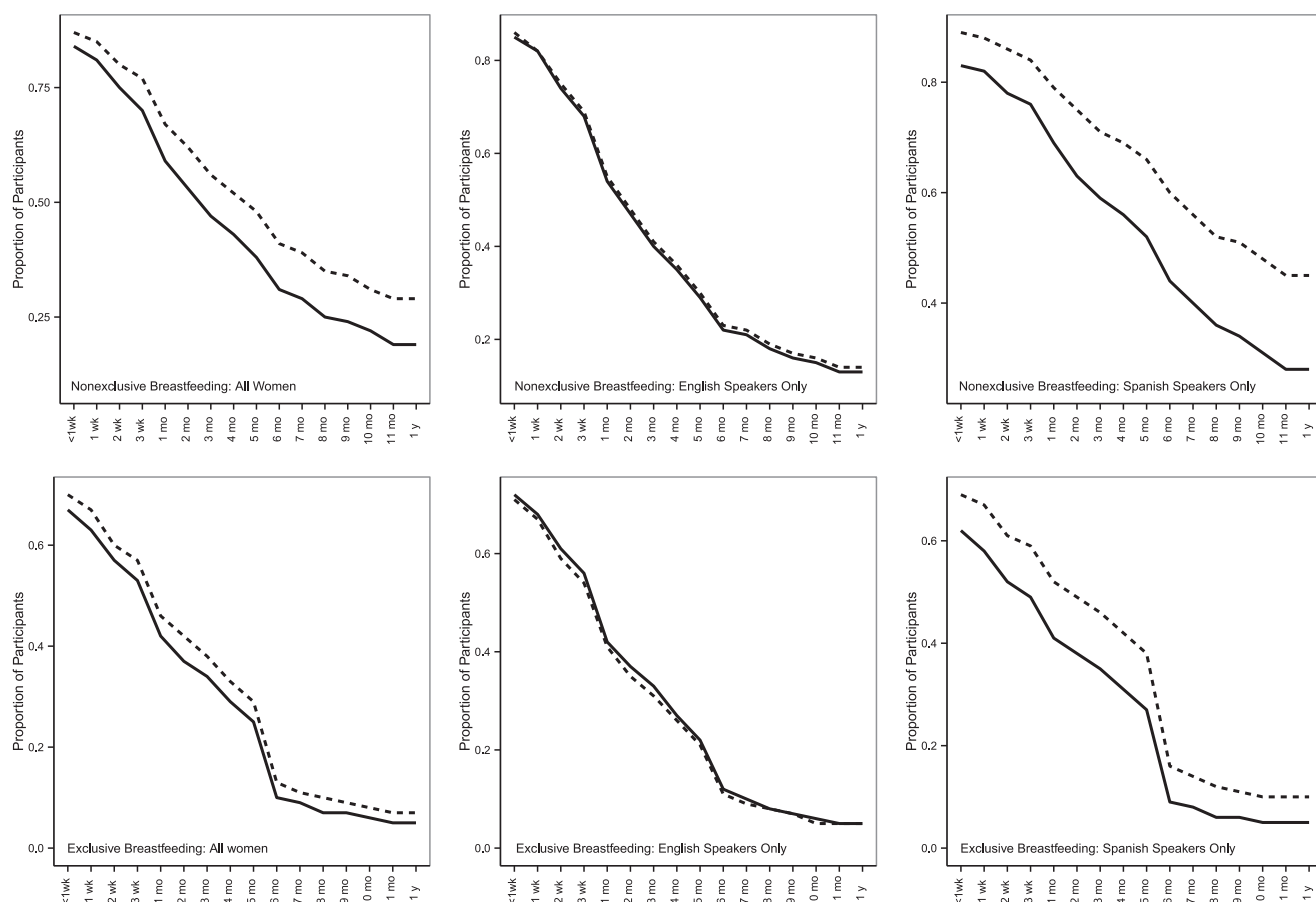


FIGURE 3

Survival functions for nonexclusive and exclusive breastfeeding by treatment status and language. Predicted survival functions: solid lines, no peer counseling; dashed lines, peer counseling.

Spanish-speaking participants were more likely to answer their calls. Data from the peer counselors' logs indicate that the median number of attempted calls

per successful contact was 1.4 for Spanish speakers (interquartile range: 1.0–2.0) and 2.2 for English speakers (interquartile range: 1.6–3.7).

There were also notable differences in breastfeeding within ethnicity. For example, the percentage of women who exclusively breastfed for at least 3 months was 26.1% ($n = 253$) among those who self-identified as Hispanic but who did not speak Spanish and 45.5% ($n = 804$) among Spanish-speaking Hispanics. The rate of exclusive breastfeeding at 3 months among non-Hispanics was 40.4% ($n = 604$). As noted above, this is a common finding.^{21,22} Indeed, differences in breastfeeding rates by language among Hispanics exist nationally. Data from the National Immunization Survey for the years 2005–2007 indicate that 48% of Hispanics who conducted their interviews in Spanish and whose child was ever enrolled in WIC exclusively breastfed for at least 3 months ($n = 7107$) compared with 25%

TABLE 9 Unadjusted and Adjusted RRs and Risk Differences From Discrete Time Hazards Functions of Breastfeeding Cessation Associated With Peer Counseling Among All Women, Spanish Speakers and English Speakers Only

| | Nonexclusive Breastfeeding | | Exclusive Breastfeeding | |
|--------------------------------------|----------------------------|-------------|-------------------------|-------------|
| | 1 | 2 | 3 | 4 |
| Treatment, all women | 0.86 | 0.85 | 0.95 | 0.96 |
| (95% CI) | (0.76–0.97) | (0.75–0.95) | (0.86–1.04) | (0.88–1.05) |
| Risk difference | –0.01** | –0.02*** | –0.01 | –0.01 |
| Treatment, Spanish only ^a | 0.63 | 0.65 | 0.78 | 0.78 |
| (95% CI) | (0.52–0.77) | (0.53–0.79) | (0.69–0.90) | (0.68–0.89) |
| Risk difference | –0.03*** | –0.03*** | –0.04*** | –0.04*** |
| Treatment, English only | 0.98 | 0.95 | 1.04 | 1.07 |
| (95% CI) | (0.85–1.13) | (0.82–1.10) | (0.93–1.18) | (0.95–1.21) |
| Risk difference | 0.00 | –0.01 | 0.01 | 0.01 |
| Adjusted for covariates | No | Yes | No | Yes |

Estimates adjusted for age, education, race, language, marital status, month in pregnancy enrolled, family income, cesarean delivery, and LWA. All models include dichotomous indicators for each time interval. ** $P < .05$, *** $P < .01$.

^a The reference category is Spanish speakers in the control group.

of Hispanics whose child was ever enrolled in WIC and who conducted their interviews in English ($n = 5417$). Details as to these tabulations by the authors are contained in the Supplemental Information. The striking similarity in breastfeeding rates by language between our study sample and nationally representative data suggests that our findings may generalize to low-income Spanish-speaking women in communities with high rates of breastfeeding. Why recent Spanish-speaking immigrant may be more receptive to breastfeeding support provided by counselors who speak their language needs further analysis.

Our study has important strengths and limitations. First, we were able to randomly assign >1900 women from rural and more urban settings, which gave us sufficient statistical power for subgroup analysis. We were also not limited to a single site, which increased the representativeness of the sample. One limitation is that we relied on recertification visits to update information on breastfeeding duration and exclusivity. The more serious issue was nonrandom exit from WIC and the loss of data on breastfeeding duration. However, we do not believe these missing data biased our results because there was relatively little

difference between the unadjusted and adjusted estimates of RR and breastfeeding duration regressions (Tables 7, 8, and 9). It should also be noted that because study participants were primarily white and Hispanic, our findings may not be applicable to WIC programs with more diverse populations. In addition, 90% of WIC participants in Oregon initiate breastfeeding. The inclusion criterion for the study was an interest in breastfeeding. As a result, practically all prenatal WIC participants were eligible for the study. Breastfeeding initiation is lower among WIC participants in many other WIC agencies, which also limits the generalizability of the findings. Last, Oregon's focus on using peer counselors to increase long-term exclusive breastfeeding differs from WIC programs in many other parts of the country in which increasing breastfeeding initiation is the primary goal.

We believe that interactions between participants in each LWA were not a significant source of contamination. In Oregon, visits to an LWA are by appointment, which minimizes exchanges between participants in crowded waiting rooms. In addition, all peer counseling took place over the telephone and not at the LWA. Last, all peer counselors worked from home and not from the LWA among

other counselors or with exposure to WIC participants.

Our study has important implications for the US Department of Agriculture's Loving Support initiative. The support provided in our study and especially the support provided in the 3 US RCTs appear to be more intense and more consistently applied than peer counseling services currently provided in LWAs through the Loving Support initiative.⁵ Thus, many more resources would have to be allocated to LWAs if peer counseling is to have even the potential to become an effective core service of WIC as suggested in the US Surgeon General's Call to Action.²⁵ Such expansion is unlikely in the current fiscal climate. In the meantime, state WIC programs should be encouraged to identify the specific strengths and barriers to breastfeeding within their participant populations at the individual, family, and community levels. With this knowledge, peer counseling programs can be modified to deliver targeted, intensive support with the potential to decrease the disparities in breastfeeding historically experienced by WIC participants.

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