

Incentives to Promote Breastfeeding: A Systematic Review

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abstract

BACKGROUND AND OBJECTIVES: Few women in industrialized countries achieve the World Health Organization's recommendation to breastfeed exclusively for 6 months. Governments are increasingly seeking new interventions to address this problem, including the use of incentives. The goal of this study was to assess the evidence regarding the effectiveness of incentive interventions, delivered within or outside of health care settings, to individuals and/or their families seeking to increase and sustain breastfeeding in the first 6 months after birth.

METHODS: Searches of electronic databases, reference lists, and grey literature were conducted to identify relevant reports of published, unpublished, and ongoing studies. All study designs published in English, which met our definition of incentives and that were from a developed country, were eligible for inclusion. Abstract and full-text article review with sequential data extraction were conducted by 2 independent authors.

RESULTS: Sixteen full reports were included in the review. The majority evaluated multicomponent interventions of varying frequency, intensity, and duration. Incentives involved providing access to breast pumps, gifts, vouchers, money, food packages, and help with household tasks, but little consensus in findings was revealed. The lack of high-quality, randomized controlled trials identified by this review and the multicomponent nature of the interventions prohibited meta-analysis.

CONCLUSIONS: This review found that the overall effect of providing incentives for breastfeeding compared with no incentives is unclear due to study heterogeneity and the variation in study quality. Further evidence on breastfeeding incentives offered to women is required to understand the possible effects of these interventions.



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The World Health Organization recommends exclusive breastfeeding (with no other liquids or solids) for 6 months.¹ This recommendation for populations is supported by many governments throughout the world, although few achieve this goal. In the United Kingdom, for example, 17% of women exclusively provide breast milk to their infant at 3 months and <1% do so at 6 months.² In the United States, 38% of women breastfeed exclusively at 3 months, falling to 16% by 6 months' postpartum.³ Governments are increasingly seeking new interventions to address this problem, including financial incentives. For lifestyle behavior change in general, a recent systematic review⁴ found that even small financial incentives show promise; however, this review did not include any studies investigating breastfeeding as an outcome. Most of the evidence supporting the use of financial incentives relates to stopping a harmful behavior or to one off attendances for health benefit (eg, immunization or screening),^{5,6} whereas breastfeeding involves attempting and sustaining a new beneficial behavior; therefore, the generalizability of evidence is uncertain.

A recent systematic review of the evidence regarding interventions to increase the initiation and duration of breastfeeding did not include any studies with financial incentives.⁷ It concluded that increased professional and lay support is effective, particularly if this support spans pregnancy and postnatal care; multifaceted interventions (which could include incentives) were reportedly more likely to be effective. Qualitative studies suggest that current support is not meeting women's needs, particularly in the early weeks after birth,⁸ and qualitative evidence synthesis emphasizes the importance of person-centered communication skills, trust, and continuing

relationships in supporting a woman to breastfeed.⁹

The present systemic review addressed the question: What is the evidence for the effectiveness of incentive interventions, delivered within or outside of health care settings, to individuals and/or their families seeking to increase and sustain breastfeeding in the first 6 months after birth? This article reports part of the BIBS (Benefits of Incentives for Breastfeeding and Smoking Cessation) study, which aimed to inform the design of incentive intervention trials for smoking cessation in pregnancy and breastfeeding and provides further background information.¹⁰

METHODS

Search Strategy

Electronic searches were conducted to identify reports of published, unpublished, and ongoing studies that report data on the benefits of incentives initiating and/or sustaining breastfeeding within the first 6 months after birth. The search strategy was designed to be highly sensitive, incorporating appropriate subject headings and text word terms (Supplemental Information).

The databases searched (from inception to May 2012) were Medline, Embase, CINAHL, Science Citation Index, Social Sciences Citation Index, Applied Social Sciences Index and Abstracts, PsycINFO, Maternity and Infant Care, Trials Register of Promoting Health Interventions, Cochrane Central Register of Controlled Trials, NHS Economic Evaluations Database, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effectiveness, and the Health Technology Assessment database. Relevant Web sites were also consulted, including those of the World Health Organization, UNICEF, the King's Fund, the National Institute for Health and Care Excellence, and

the Royal College of Midwives. Coapplicants involved in the study also used their professional networks and personal databases to identify other relevant studies.

Eligibility Criteria

The populations of interest were women who were pregnant or those who had given birth within 6 months at the time of the intervention and/or those who were family members/partners of these women. Interventions could benefit 1 or both of these population groups.

Our definition of incentives included financial (provision or deduction) and nonfinancial but tangible incentives or rewards. Tangible incentives were defined as either free or reduced cost items that have a monetary value (eg, refreshments, infant products) or services with a monetary value (eg, child care, ironing). These incentives could be delivered directly or indirectly at the local, regional, or national level by health care or other community and/or commercial providers. Solely supportive, persuasive, or motivational relationships with service providers or peers, or providing educational materials such as information leaflets or noncommercial DVDs that reinforce verbal persuasive advice, were excluded. However, when interventions included both an incentive/reward component and a psychosocial component (eg, support/motivational counseling), studies were included regardless of the relative size of each component. In these studies, the incentive could be contingent on breastfeeding and/or the incentive could be for attending a preparatory or support intervention (eg, pregnancy or postnatal group sessions). Multifaceted programs providing incentives to women as part of usual care (eg, the Supplemental Nutrition Program for Women, Infants, and Children [WIC] program) were not included unless they provided incentives over and above those

routinely offered as part of the program. Studies using medical devices which assist the target behaviors that were not routinely provided (eg, breast pumps) were included. This design was supported by service users from our coapplicant mother and infant groups who were involved in decisions about the design and conduct of this study. Comparators included any treatments alternative to those of the interventions that were similar to current practice or possible alternative interventions that are realistic options of potential relevance to health care and/or community providers in countries meeting our inclusion criteria.

All study designs published in English, which met our definition of incentives and that were from a developed country as defined by the United Nations,¹¹ were eligible for inclusion. Grey literature identified according to the literature searches was reported separately.¹⁰

Our primary outcomes were the prevalence of exclusive and/or any breast milk feeding. All studies were required to provide data for at least 1 of these outcomes. We also analyzed secondary outcomes relating to the delivery of the intervention (eg, acceptability, sustainability, costs of incentives).

Review Process

Titles and abstracts were screened independently by 5 reviewers (H.M., K.R., D.T., N.C., G.T.). Full-text articles of potentially relevant reports were obtained and independently assessed for inclusion by 2 reviewers (H.M., K.R.). Differences of opinion were resolved through review team discussion. Authors of individual articles were contacted for additional information when further clarification of reported data were required. An electronic mixed methods data extraction form was developed and agreed through review team discussion, informed by the Cochrane

Public Health Guidance.¹² One reviewer (K.R.) first extracted quantitative data from the included full-text articles, and a second reviewer (H.M.) then checked the data extraction and extracted qualitative data.

Three reviewers (H.M., K.R., and V.H.M.) independently appraised the quality of studies using the Cochrane Collaboration's Risk of Bias tool¹³ for randomized controlled trials (RCTs) or an 18-question checklist for nonrandomized studies and case series that was adapted from several sources.¹⁴⁻¹⁷ This tool has been used previously for systematic reviews that have included nonrandomized evidence.

Data Synthesis

Included studies and their participants were described by using appropriate summary statistics

where relevant. For dichotomous outcome data, the relative risk and 95% confidence intervals were calculated where data were available by using Stata version 13 (2013; Stata Corp, College Station, TX). Summary data for continuous outcomes and study characteristics were reported as the median (interquartile range) or mean \pm SD where appropriate. Due to large variations among the intervention components, a meta-analysis was not possible, and the findings are reported narratively.

RESULTS

A total of 5408 records were identified from the primary searches; 316 records were selected for full-text assessment and an additional 10 studies were identified from other sources. A total of 326 full-text articles were thus screened (Fig 1).

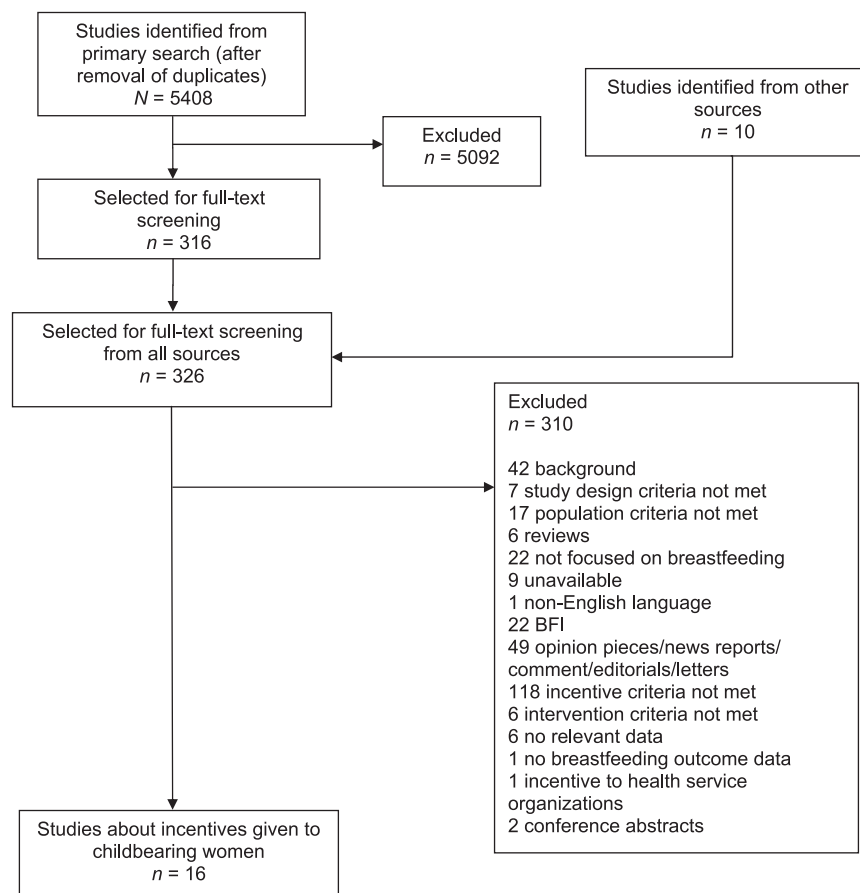


FIGURE 1 Flowchart outlining the screening process.

TABLE 1 Quality Assessment

Study	Were the inclusion/exclusion criteria clearly described?	Was data collection undertaken prospectively?	Were participants a representative sample selected from a relevant patient population?	Was the allocation sequence adequately generated?	Was allocation adequately concealed?	Were participants blinded to treatment status?	Were the groups comparable on demographic characteristics and clinical features?	Were participants entering the study at a similar point in their disease progression?	Was the intervention (and comparison) clearly defined?	Was follow-up long enough to detect important effects on outcomes of interest?	Was length of follow-up similar between comparison groups?
Bliss et al, 1997 ¹⁸	Y	Y	Y	N	U	NA	U	Y	Y	Y	Y
Hayes et al, 2008 ²³	Y	Y	Y	U	NA	NA	Y	Y	Y	Y	Y
Dungy et al, 1992 ²¹	Y	Y	N	U	U	N	U	Y	Y	Y	Y
Rasmussen et al, 2011 ²⁶	Y	Y	Y	U	NA	Y	Y	Y	Y	Y	Y
Chamberlain et al, 2006 ¹⁹	N	N	U	Y	NA	NA	U	Y	Y	Y	Y
Cohen and Mrtek, 1994 ²⁰	Y	Y	U	U	NA	NA	NA	Y	Y	Y	NA
Sciacca et al, 1995 ^{28,29}	Y	Y	Y	U	U	N	N	Y	N	Y	Y
Finch and Daniel, 2002 ²²	Y	Y	Y	U	U	N	U	Y	N	Y	Y
Zimmerman, 1999 ³³	Y	N	Y	U	NA	NA	N	Y	Y	Y	Y
Tuttle and Dewey, 1995 ²⁷	Y	N	Y	U	NA	NA	U	Y	N	Y	Y
Volpe and Bear, 2000 ³¹	N	U	Y	U	NA	NA	Y	Y	Y	Y	Y
Thomson et al, 2012 ³⁰	N	N	Y	U	NA	NA	Y	U	Y	Y	Y
Pugh and Milligan, 1998 ²⁵	Y	Y	Y	U	U	NA	Y	Y	Y	Y	Y
Wolfberg et al, 2004 ³²	Y	Y	Y	U	U	N	Y	Y	Y	Y	Y
Hill, 1987 ²⁴	Y	Y	Y	U	U	N	N	U	Y	Y	Y
% Yes	79	64	79	7	0	7	43	86	79	100	93
% No	21	29	7	0	0	36	21	0	21	0	0
% Unclear	0	7	14	93	43	0	29	14	0	0	0
% NA	0	0	0	0	57	57	7	0	0	0	7

N, no; NA, not applicable; U, unclear; Y, yes.

Sixteen full reports^{18–33} were included in the review. Two conference abstracts were excluded because of their limited information.^{34,35} The data from 1 study were extracted from 2 published articles reporting the same study.^{28,29} One case study was excluded because it did not provide the required breastfeeding outcome data,³⁶ and 1 study was excluded because it described incentives to health service organizations to improve breastfeeding outcomes³⁷; details of both studies are reported elsewhere.¹⁰

Quality Assessment

The quality assessment is reported in Table 1. Studies were not included or excluded on the basis of their quality assessment; rather, the assessment of study quality provides a context for interpreting the reported effect sizes. Most studies recruited women at the same gestational period (86%), had similar follow-up periods (93%), and all were long enough to detect

important effects on outcomes of interest. Few studies, however, described participants lost to follow-up (29%), conducted intention-to-treat analyses,^{24,26} or were considered adequate for reporting on randomization and recruitment.¹⁹ Due to the nature of the interventions, none of the participants was blinded to treatment status, and only 1 study included blinded outcome assessors.²⁶

Study Characteristics

Data regarding demographic characteristics are summarized in Table 2. The demographic data varied in quantity and in categorization, making comparisons across studies difficult. The mean age of participants varied between 16.2 and 31.6 years, and studies tended to focus on women of specific ethnicity, such as white,^{21,24,25,28,31} black,^{19,22,32} Hawaiian,²³ or Hmong.²⁷ In 5 of the 6 studies that reported relationship status, the majority of participants were married or living with their

partner.^{21,24–26,32} Few studies provided clarification of participants’ parity, mode of birth, or baseline infant feeding method. Fourteen studies were conducted in the United States and 1 in the United Kingdom³⁰ (Table 3). Eleven studies compared intervention groups receiving incentives versus control groups receiving no incentives, a very small incentive, or a disincentive (gift packs including formula milk).^{18–21,25–28,30,31,33} Two studies evaluated those receiving incentives but had no control group.^{20,23} Two other studies provided both intervention and control groups with the same incentive, and these studies were therefore comparing other intervention components.^{24,32} In studies comparing intervention incentives with control groups, breastfeeding rates at initiation or at hospital discharge ranged from 38.1% to 88.5% in incentivized groups and 14.6% to 55.2% in nonincentivized groups.^{19,27,28,31,33} Average duration of any

TABLE 1: Continued

Were the groups treated identically other than for the named intervention?	Was the intervention undertaken by someone experienced at performing the procedure?	Were the staff, place, and facilities where the patients were treated appropriate for performing the procedure?	Were health care providers blinded to treatment status?	Were all the important outcomes considered?	Were all outcomes reported?	Were objective (valid and reliable) outcome measure/s used?	Was the assessment of the main outcomes blind?	Was there a description of withdrawals, dropouts, and those lost to follow-up?	Was the analysis on intention-to-treat trial results reported for everyone who entered the trial?	Was the analysis on intention-to-treat participants were analyzed in the groups they were originally allocated to?	Were participants lost to follow up likely to introduce bias?
Y	Y	Y	NA	Y	Y	Y	U	Y	U	Y	U
Y	Y	Y	NA	Y	Y	U	U	N	N	Y	U
Y	Y	Y	Y	Y	Y	U	U	Y	N	Y	Y
Y	Y	Y	Y	Y	U	Y	Y	N	Y	U	U
U	Y	Y	NA	Y	N	U	NA	NA	NA	NA	U
NA	Y	Y	NA	Y	Y	Y	NA	N	NA	NA	U
Y	Y	Y	N	Y	Y	U	U	N	N	Y	U
Y	Y	Y	N	Y	Y	U	U	N	N	Y	Y
U	Y	Y	NA	Y	Y	U	NA	Y	NA	NA	U
Y	Y	Y	NA	Y	Y	U	NA	N	NA	NA	U
Y	Y	Y	NA	Y	N	U	NA	NA	NA	NA	U
U	Y	Y	NA	Y	Y	Y	NA	Y	NA	NA	U
Y	Y	Y	NA	Y	Y	U	U	N	U	U	U
Y	Y	Y	N	Y	Y	U	U	Y	N	Y	Y
Y	U	Y	N	Y	Y	U	U	N	Y	Y	U
71	93	100	14	100	79	21	7	29	14	43	21
0	0	0	29	0	14	0	0	57	36	0	0
21	7	0	0	0	7	79	50	0	7	14	79
7	0	0	57	0	0	0	43	14	43	43	0

breastfeeding ranged from 4 to 136.3 weeks for incentivized groups to 15.7 to 88.3 weeks for nonincentivized groups.^{18,22,25,26}

The majority (9 of 16) of studies evaluated multicomponent interventions, with interventions (or even individual components within the intervention) being provided with varying frequency, intensity, and duration. Two studies were considered to have >1 incentive intervention arm for the outcome of interest (ie, breastfeeding).^{18,26} The incentive components varied across the studies and ranged from a breast pump,^{19,23,26} a combination of a breast pump with feeding-related items^{18,20,21} or with vouchers, gifts, and entry to a raffle for both parents,²⁸ to enhanced food packages in the context of WIC,²² gifts, vouchers,^{27,30,31,33} or cash.^{24,32} One study provided nonmaterial incentives, such as a home help service for nonnursing tasks.²⁵

Feeding outcomes were self-reported and not validated (no biochemical

test is available to confirm feeding status). Studies varied in their selection and definition of feeding outcomes, and there was poor consistency in outcome reporting, as noted by Hector.³⁸ None of the studies reported recall time (eg, reporting breastfeeding within the last 24 hours) as recommended by Hector. Frequency, volume of expression, and feeding ratio (at breast or by using expressed breast milk) were also not reported. Studies varied in their data collection points and follow-up times, making comparisons difficult.

All studies used a comparator group to compare breastfeeding outcomes, although these outcomes varied. Six studies used a historical control group within the setting in which the subsequent intervention took place. These ranged from control data collected in the 6 to 12 months before the start of the intervention^{27,30,31,33} to data collected up to 4 years before the initiative in 1 pre-post BFI (Baby Friendly Initiative) implementation study.¹⁹ Cohen et al²⁰ compared

6-month breastfeeding rates over a 5-year work-based lactation program at population level.

Attrition rates were reported (or calculable) for 7 of 16 included studies^{21,22,26,28,30,32,33} and ranged from 0% to 61%. Many studies did not provide reasons for dropout, and none attempted to compare the demographic characteristics of those who completed the study with those who did not.

Effectiveness of Incentives

Breastfeeding outcomes for various time points are provided in Tables 4, 5, and 6, and effect sizes were calculated where data were available. Studies were categorized according to type of incentive to maximize the potential for the narrative evidence synthesis.

A study using enhanced WIC food packages found no evidence of a difference between the control and intervention groups in the number of women initiating breastfeeding.²² Of 4 studies evaluating the influence

TABLE 2 Baseline and Demographic Characteristics of Participants

Study	Age, y		Ethnicity						Relationship Status			
			White		Black		Other		Married and/or Living With Partner		Other	
	Mean	SD	N	%	n	%	N	%	N	%	n	%
Bliss et al, 1997 ¹⁸												
Hayes et al, 2008 ²³									95	39	149	61
Dungy et al, 1992 ²¹	29		135	91.8	2	1.4	9	6	139	94.6	8	5.4
Rasmussen et al, 2011 ²⁶	29.1								24	71	10	29
Chamberlain et al, 2006 ¹⁹					100							
Cohen and Mrtek, 1994 ²⁰	31.4		94	50.3	31	16.6	62	33.2				
Sciacca et al, 1995 ^{28,29}			36	65.5								
Finch and Daniel, 2002 ²²			2	4.2	32	66.7	14	29.1				
Zimmerman, 1999 ³³			28	15	88	47	72	38				
Tuttle and Dewey, 1995 ^{27a}	25.9	6.8					412	100				
Volpe and Bear, 2000 ³¹	16.2		57	62.6	24	26.4	10	11.0				
Thomson et al, 2012 ³⁰	29.1											
Pugh and Milligan, 1998 ²⁵	24.4		55	93					47	78	13	22
Wolfberg et al, 2004 ^{32b}					50	84.7			35	59.3		
Hill 1987 ²⁴			61	95					44	69		

SES, socioeconomic status.

^a Mean age of intervention group only.

^b Data for female participants.

of providing gift incentives on breastfeeding outcomes,^{27,30,31,33} 3 reported improvements in breastfeeding outcomes after the intervention.^{27,31,33} These studies varied widely with regard to the nature and value of the gifts provided, and all were delivered within other intervention components, making conclusions difficult. One RCT²⁵ that provided help with domestic tasks as an incentive to continue breastfeeding found no evidence of any differences between the intervention and control groups.

Two RCT studies^{24,32} provided financial incentives to both intervention and control groups for the purpose of increasing adherence to group education and support. An RCT that provided fathers with \$25 for attending a prenatal breastfeeding promotion class and pregnant women an additional \$25 if they completed a series of interviews found that women whose partners attended the breastfeeding classes were more likely to initiate breastfeeding (74% [20 of 27]) than those whose partners attended the control class (41% [13 of 32]; $P = .02$, no effect size given), but no evidence of effect was found for breastfeeding duration.³² An RCT

that provided \$5 to pregnant women attending a prenatal breastfeeding education program, or a control group with no education program, found no significant differences in breastfeeding outcome.²⁴

Six US studies evaluated the effect of breast pump provision on breastfeeding outcomes,^{18-21,23,26} and 1 study combined breast pumps with other gifts.²⁸ Two RCTs^{18,21} compared the provision of breast pumps (an incentive according to our definition) versus infant formula in discharge packs (a disincentive) on breastfeeding outcomes. Such trial designs increase the difference between active intervention arms, and they potentially inflate the effect size of the incentive compared with trials with a usual care or nonactive comparison group. The largest RCT¹⁸ reported no evidence of effect of type of discharge pack on feeding method and breastfeeding duration. By contrast, Dungy et al²¹ revealed that breast pump provision was associated with longer duration of exclusive breastfeeding compared with those given infant formula (mean: 4.18 and 2.78 weeks, respectively). When women were randomized to receive either ‘prizes’

(breast pumps, gifts and vouchers) for participation in breastfeeding classes or to a control group receiving usual care and low-value gifts,²⁸ a significantly higher proportion of women in the intervention group reported exclusively breastfeeding at each measurement point (hospital discharge [$z = -2.714$], 2 weeks [$z = -3.456$], 6 weeks [$z = -1.991$] and 3 months [$z = -2.043$] after birth; all $P < .05$). No significant differences were reported in RCTs that compared the effectiveness of manual versus electric pumps on breastfeeding duration²³ or in a group of obese women who were given electric pumps, manual pumps, or no pump.²⁶ Two observational studies evaluated the effect of breast pump provision on breastfeeding outcomes. A case series study²⁰ providing women returning to work with breast pumps and facilities to express and store milk reported a larger proportion of women breastfeeding for at least 6 months compared with national average data (74.3% vs 10%). Chamberlain et al¹⁹ provided free electric breast pumps at the time of implementing the BFI standards and compared breastfeeding rates before and after

TABLE 2: Continued

Type of Pregnancy/Mode of Birth				Type of Feeding Method at Baseline						Education Level				SES							
Primiparous		Multiparous		Vaginal		Cesarean Delivery		Breast Milk		Formula		Both		Completed High School		Less than High School		College or Higher		Income (monthly or yearly)	
N	%	n	%	n	%	n	%	N	%	N	%	n	%	N	%	N	%	n	%	Mean	%
126	51	116	47					140	95.9			6	4.1	46	31.3	5	3.4	96	39		
15	44.1	19	55.9	24	70.6	10	29.4											24	70.6	96	65.8
68	100																				US \$30 000/y
65	35			146	78			67	36	95	51	26	14								
60	100			60	100									58	97						
27	42	37	58													16	27.1				0

BFI accreditation. They found that breastfeeding rates rose from 16% to 74% among US-born black women and from 43% to 96% in non-US-born black women.

Secondary Outcomes

Data on the acceptability of incentive interventions are limited. Thomson et al³⁰ reported qualitative findings, suggesting that the program support had enabled participants to breastfeed for longer and that the weekly receipt of gifts reinforced and recognized their breastfeeding achievements. Dungy et al²¹ reported that providing breast pumps helped to change attitudes regarding the ease of breastfeeding, and Finch and Daniel²² reported that 88% (16 of 18) of women valued incentives. Chamberlain et al¹⁹ reported that insurance companies favored including breast pumps on their list of items that can be claimed because it enabled them to gain more clients. Eight studies^{19–22,24,30,32,33} reported data related to the costs of implementing the incentive, but no studies reported cost-effectiveness. There were no data relevant to the sustainability of the incentive interventions in terms of the long-term benefits outweighing the costs or to the unintended consequences

once the research had been completed. Although provider changes may need to be implemented to improve the success of an incentives program, it was concluded among several studies that programs could be most effectively implemented and delivered through enhancing or intensifying usual care contacts and engaging staff through raising awareness or increased training.^{27,33}

DISCUSSION

Because of the heterogeneity of the interventions and poor study quality, there is insufficient evidence to formulate conclusions regarding the effectiveness of providing incentives to improve breastfeeding outcomes. In summary, a significant effect of breast pumps, when given with other gifts and vouchers, was observed on breastfeeding initiation and duration up to 6 weeks postpartum.²⁸ A significant effect of gifts and vouchers was found on initiation of breastfeeding,³¹ breastfeeding at 3 to 6 weeks' postpartum,²⁷ and on exclusive and any breastfeeding at discharge and at 2 weeks' postpartum.³³ A small effect size was observed for the provision of electric breast pumps on partial breastfeeding at 30 days' postpartum.²⁶

The most commonly used incentive involved providing access to breast pumps. Of 6 studies that investigated breast pumps, 3 RCTs,^{18,21,23} ranging in size from 34 to 1625 women, provided little consensus. Because evidence of effectiveness was only identified when women given breast pumps were compared with those given infant formula,^{18,21} it is not possible to ascertain whether it was the incentive of a breast pump to breastfeed or the incentive of infant formula to formula feed that produced the observed effect. When breast pumps were provided with a number of other incentives, such as gift items, vouchers, and raffle prizes in a small RCT of 55 women,²⁸ the proportion of women who exclusively breast fed was significantly higher in the intervention group compared with the control group (who received usual care and small incentives). The remaining studies evaluating breast pumps were 2 observational studies^{19,20} whose results should be treated with caution. A Cochrane review conducted in 2000³⁹ (currently withdrawn) investigated the provision of incentives to promote infant formula feeding by using commercial discharge packs that included free samples and/or

TABLE 3 Summary of Included Studies for Incentives Provided to Encourage Breastfeeding

Study	Country	Study Design	N Randomized/ Recruited	Incentive Value	Incentive	Incentive Contingent on	Primary Outcome	Follow-up	Main Outcomes Reported
Breast pump incentives Dungy et al, 1992 ^{21a}	US	RCT	146	\$15	Manual breast pump + gift items (breast pads, breast cream). Control group received formula discharge pack	Breastfeeding initiation	Breastfeeding continuation rates	2, 4, 6, 8 wk	Prevalence of exclusive breastfeeding (weeks): Intervention: 2 wk 72.7% (32/44); 4 wk 54.5% (24/44); 6 wk 45.5% (20/44); 8 wk 36.4% (16/44) Control: 2 wk 53.5% (23/43); 4 wk 34.9% (15/43); 6 wk 30.2% (13/43); 8 wk 23.3% (10/43)
Sciaccia et al, 1995 ^{28,29}	US	RCT	68	NS	Breast pump (type unspecified), vouchers (for haircut, lunch, clothing, infant carrier), gifts (baby powder, nappies, baby wipes, tickets to a football game), and raffle for both parents (prizes included trip to Grand Canyon, \$100 grocery voucher, tool kit)	Participation and continuation of breastfeeding	Exclusive and any breastfeeding rates at hospital discharge and continuation rates	2, 6 wk, 3 mo	Exclusive breastfeeding: At discharge: intervention 23/26 (88.5%); control 16/29 (55.2%) At 2 wk: intervention 21/26 (80.8%); control 10/29 (34.5%) At 6 wk: intervention 13/26 (50%); control 7/29 (24.1%) At 3 mo: intervention 11/26 (42.3%); control 5/29 (17.2%) Any breastfeeding: At discharge: intervention 3/26 (11.5%); control 7/29 (24.1%) At 2weeks: intervention 4/26 (15.4%); control 6/29 (20.7%) At 6 wk: intervention 8/26 (30.8%); control 2/29 (6.9%) At 3 mo: intervention 5/26 (19.2.3%); control 2/29 (6.9%)
Bliss et al, 1997 ^{18b}	US	RCT	1625	NS	Manual breast pump and formula discharge pack (2 intervention arms). Control group received neither pump nor formula	Breastfeeding initiation	Breastfeeding duration	6 wk, 4 mo, 6 mo	Mean duration (weeks) of any breastfeeding: Intervention (pump only): 16.0 wk Intervention (pump + formula): 15.7 wk Control: 15.7 wk

TABLE 3 Continued

Study	Country	Study Design	N Randomized/ Recruited	Incentive Value	Incentive	Incentive Contingent on	Primary Outcome	Follow-up	Main Outcomes Reported
Hayes et al, 2008 ²³	US	RCT	280	NS	Electric or manual breast pump (given as loan)	Participation in the study	Breastfeeding duration	6, 12 mo	Breastfeeding for ≥ 6 mo: Electric: 72.3% (94/139) Manual: 76.8% (76/107) Median duration (months) of any breastfeeding: Electric: 12 mo (95% CI 8–12 mo) Manual: 11 mo (95% CI: 9–14)
Rasmussen et al, 2011 ²⁶	US	RCT	34	NS	Electric or manual breast pump (2 intervention arms). Electric pump given on loan for 10–14 d	Participation in the study	Breastfeeding continuation rates	7, 30, 90 d	Median duration (weeks) of exclusive breastfeeding (IQR): Electric: 0.7 wk (0.1, 2.7) Manual: 2.3 wk (0.4, 4.4) Control: 4.4 wk (1.1, 9.4) Median duration (weeks) of any breastfeeding (IQR): Electric: 4.0 wk (2.4, 8.4) Manual: 13.4 wk (2.1, 36.0) Control: 26.6 wk (9.4, 44.6)
Chamberlain et al, 2006 ¹⁹	US	Historically controlled study	Unclear	\$175–\$320	Breast pump (type unspecified)	Participation in the study	Breastfeeding initiation rates	Initiation	Breastfeeding initiation: Intervention: general 74%, NICU 64% Control: general 16%, NICU 34.5%
Cohen and Mrttek, 1994 ²⁰	US	Case series	187	\$500 per employee	Electric breast pump + gift items (expressing kit)	Breastfeeding initiation	Breastfeeding duration and behavior	Unclear	Average duration (months) of any breastfeeding: 8.1 mo. Since program inception (4-y period) 74% (n = 139) of mothers who returned to work breastfeeding continued to breast feed for a least 6 mo compared with a national average of 10%

TABLE 3 Continued

Study	Country	Study Design	N Randomized/ Recruited	Incentive Value	Incentive	Incentive Contingent on	Primary Outcome	Follow-up	Main Outcomes Reported
Food package incentives Finch and Daniel, 2002 ²²	US	RCT	60	\$75	Food packages+ voucher	Initiation, continuation, exclusivity of breastfeeding	Exclusive and partial breastfeeding initiation and continuation rates	Initiation, 8 wk	Breastfeeding initiation: No significant difference between the 2 groups Median duration (weeks) exclusive breastfeeding (min/max): Intervention 12 wk (7/12+) <i>n</i> = 9/19 Control 12 wk (5/12+) <i>n</i> = 5/29 Median duration (weeks) partial breastfeeding (min/max): Intervention 5 wk (1/12+) <i>n</i> = 6/19 Control 12 wk (1/12+) <i>n</i> = 15/29
Gift item incentives Zimmerman, 1999 ³³	US	Historically controlled study	737	\$8	Gift items: nursing pads, t-shirt, refrigerator magnet, safety plug guard	Participation in the study	Exclusive and partial breastfeeding rates	Hospital discharge and 2 wk	Exclusive breastfeeding at discharge: Baseline, 67 (36%) Year 1, 74 (51%) Year 2, 222 (55%) At 2 wk: Baseline, 37 (20%) Year 1, 44 (24%) Year 2, 115 (30%) Partial breastfeeding at discharge: Baseline 26 (14%) Year 1 14 (10%) Year 2, 47 (12%) At 2 wk: Baseline 28 (15%) Year 1, 35 (24%) Year 2, 105 (27%)
Tuttle and Dewey, 1995 ²⁷	US	Historically controlled study	412	NS	Vouchers + gift items: infant care products, certificate with infant photograph	Participation, initiation, and continuation of breastfeeding	Breastfeeding initiation rates and continuation rates	By day 3 and at 3–6 wk	Breastfeeding at initiation: Intervention: 24/63 (38.1%) Control: N/R At 3–6 wk: Intervention: 11/63(17.5%) Control: 19/349 (5.4%)

TABLE 3 Continued

Study	Country	Study Design	N Randomized/ Recruited	Incentive Value	Incentive	Incentive Contingent on	Primary Outcome	Follow-up	Main Outcomes Reported
Volpe and Bear, 2000 ³¹	US	Historically controlled study	91	NS	Gift items: chocolate, safety plug guard, perfume	Participation in the study	Breastfeeding initiation rates defined as at least once a day for at least 3 d	Initiation	Breastfeeding at initiation: Intervention 28/43 (65.1%) Control: 7/48 (14.6%)
Thomson et al, 2012 ³⁰	UK	Qualitative and historically controlled study	266 in historic controlled arm	£71.99	Vouchers + gift items: picture frame, healthy treats, swimming vouchers, magazine, cakes/hot drinks	Initiation and continuation of breastfeeding	Breastfeeding at 6–8 wk in historic controlled arm	6–8 wk	Any breastfeeding at 6–8 wk: Intervention: 57/94 (60.6%) Control: 119/172 (69.2%)
Nonmaterial incentives									
Pugh and Milligan, 1998 ²⁵	US	RCT	60	NS	Non-breastfeeding tasks, including housework or child care	Initiation and continuation of breastfeeding	Breastfeeding duration and breastfeeding continuation rate	Initiation, 6 mo	Mean breastfeeding duration (days): Intervention 136.3 d Control 88.3 d Breastfeeding at 6 mo: Intervention 50% Control 27%
Cash incentives									
Wolfberg et al, 2004 ^{32c}	US	RCT	59 couples	\$25 for fathers and \$25 for mothers (total per couple \$50)	Cash	Participation in the study	Breastfeeding initiation rates and continuation rates	Initiation, 4, 6, 8 wk	Breastfeeding initiation: Intervention 20/27 (74%) Control 13/32 (41%) At week 4: Intervention 10/26 (38%) Control 11/31 (35%) At weeks 6 and 8: Intervention 9/26 (35%) Control 6/31 (19%) Breastfeeding at ≥6 wk: Intervention 12/31 (39%) Control 10/33 (30%)
Hill, 1987 ^{24c}	US	RCT	64	\$5	Cash	Participation in the study	Breastfeeding continuation rates	≥6 wk	

CI, confidence interval; IQR, interquartile range; NS, not stated.

^a Control group received infant formula (a potential disincentive to breastfeed).

^b Included a comparator group that received formula but control group received neither formula nor pumps.

^c Both arms received cash incentives as part of multifaceted interventions.

TABLE 4 Breastfeeding Outcomes: Initiation to Hospital Discharge

Study	Category	Type of Breastfeeding	Time Point	Intervention		Control		RR (95% CI); <i>P</i>
				<i>n/N</i>	%	<i>n/N</i>	%	
Sciacca et al, 1995 ^{28,29}	Breast pumps, gifts, vouchers, football tickets, and raffle gifts	Exclusive	Discharge	23/26	88.5	16/29	55.2	1.60 (1.12–2.29); .007
Sciacca et al, 1995 ^{28,29}	Breast pumps, gifts, vouchers, football tickets, and raffle gifts	Any	Discharge	26/26	100.0	23/29	79.3	1.26 (1.05–1.52); .014
Rasmussen et al, 2011 ²⁶	Breast pump, electric	Unclear	4 d postpartum	12/13	92.3	12/12	100	0.92 (0.79–1.08); .33
Rasmussen et al, 2011 ²⁶	Breast pump, manual	Unclear	4 d postpartum	7/9	77.8	12/12	100	0.78 (0.55–1.10); .086
Chamberlain et al, 2006, ¹⁹ US-born black	Breast pumps and implementing BFI	Unclear	Initiation	NR	74	NR	16	
Chamberlain et al, 2006 ¹⁹ non-US-born black	Breast pumps and implementing BFI	Unclear	Initiation	NR	96	NR	43	
Zimmerman 1999 ³³ year 1 ^a	Gifts and vouchers	Exclusive	Discharge	74/144	51.4	67/188	35.6	1.44 (1.12–1.85); .004
Zimmerman 1999 ³³ year 1 ^a	Gifts and vouchers	Any	Discharge	88/144	61.1	93/188	49.5	1.24 (1.02–1.50); .035
Zimmerman 1999 ³³ year 2 ^a	Gifts and vouchers	Exclusive	Discharge	222/405	54.8	67/188	35.6	1.54 (1.24–1.90); <.001
Zimmerman 1999 ³³ year 2 ^a	Gifts and vouchers	Any	Discharge	269/405	66.4	93/188	49.5	1.34 (1.14–1.58); <.001
Tuttle and Dewey, 1995 ²⁷	Gifts and vouchers	Unclear	Initiation	24/63	38.1	NR	NR	
Volpe and Bear, 2000 ³¹	Gifts and vouchers	Unclear	Initiation	28/43	65.1	7/48	14.6	4.47 (2.18–9.16); <.001

CI, confidence interval; NR, not reported; RR, relative risk.

^a The study collected outcomes data from 2 consecutive years and compared these with baseline data.

promotional materials to mothers. Commercial discharge packs reduced the number of women exclusively breastfeeding at all times from zero to 6 months but had no significant effect on nonexclusive breastfeeding. There are also ethical issues concerning the provision of infant formula incentives, which would contravene the World Health Organization’s International Code for Marketing Breast-Milk Substitutes.⁴⁰ Given the reported problems with intervention fidelity,²⁶ adequately powered RCTs are needed comparing breast pump provision with usual care to clarify its impact on breastfeeding rates. In addition, the evidence on how

expressing milk by any method affects breastfeeding duration and exclusivity is unclear.⁴¹ Offering incentives is controversial, and there was a paucity of qualitative research to understand the perspectives of those receiving and delivering incentive interventions and their acceptability for improving breastfeeding outcomes. However, incentive acceptability is likely to affect recruitment, engagement, and attrition and is a potential explanation for the reporting of small sample sizes. The public acceptability of financial incentives for breastfeeding in Great Britain is mixed,^{42,43,44} with stronger agreement among those aged

≤44 years compared with those aged ≥65 years and among ethnic minority groups compared with white British groups.⁴² Women are more likely to disagree with shopping voucher incentives for breastfeeding compared with men because they dislike feeling pressured and because they value autonomy.¹⁰ However, acceptability would be expected to increase if incentives are shown to be effective, as reported for incentives for smoking cessation.⁴⁵ Neither the sustainability nor the unintended consequences of the incentive interventions were considered, and although the costs of delivering the intervention

TABLE 5 Breastfeeding Outcomes at 2 Weeks

Study	Category	Type of Breastfeeding	Time Point	Intervention		Control		RR (95% CI); <i>P</i>
				<i>n/N</i>	%	<i>n/N</i>	%	
Dungy et al, 1992 ^{21a}	Breast pumps	Unclear	2 wk	32/44	72.7	23/43	53.5	1.36 (0.98–1.90); .063
Sciacca et al, 1995 ^{28,29}	Breast pumps, gifts, vouchers, football tickets, and raffle gifts	Exclusive	2 wk	21/26	80.8	10/29	34.5	2.34 (1.37–4.00); <.001
Sciacca et al, 1995 ^{28,29}	Breast pumps, gifts, vouchers, football tickets, and raffle gifts	Any	2 wk	25/26	96.2	23/29	79.3	1.21 (0.99–1.48); .061
Zimmerman, 1999, ³³ year 1	Gift items and vouchers	Exclusive	2 wk	44/154	28.6	37/186	19.9	1.44 (0.98–2.10); .061
Zimmerman, 1999, ³³ year 1	Gift items and vouchers	Any	2 wk	79/154	51.3	65/186	34.9	1.47 (1.14–1.88); .002
Zimmerman, 1999, ³³ year 2	Gift items and vouchers	Exclusive	2 wk	115/389	29.6	37/186	19.9	1.49 (1.07–2.06); .014
Zimmerman, 1999, ³³ year 2	Gift items and vouchers	Any	2 wk	220/389	56.6	65/186	34.9	1.62 (1.31–2.01); <.001

CI, confidence interval; RR, relative risk.

^a Control group received infant formula (a potential disincentive to breastfeed).

TABLE 6 Breastfeeding Outcomes at 3 Weeks to 6 Months

Study	Category	Type of Breastfeeding	Time Point	Intervention		Control		RR (95% CI); <i>P</i>
				<i>n/N</i>	%	<i>n/N</i>	%	
Sciacca et al, 1995 ^{28,29}	Breast pumps, gifts, vouchers, football tickets, and raffle gifts	Exclusive	6 wk	13/26	50.0	7/29	24.1	2.07 (0.98–4.39); .047
Sciacca et al, 1995 ^{28,29}	Breast pumps, gifts, vouchers, football tickets, and raffle gifts	Any	6 wk	21/26	80.8	9/29	31.0	2.60 (1.47– 4.62); <.001
Bliss et al, 1997 ^{18a}	Breast pumps	Exclusive	6 wk	240/419	57.3	196/360	54.4	1.05 (0.93–1.19); .43
Bliss et al, 1997 ^{18a}	Breast pumps	Partial	6 wk	87/419	20.8	88/360	24.4	0.85 (0.65–1.10); .22
Bliss et al, 1997 ^{18a}	Breast pumps	Exclusive	4 mo	141/403	35.0	123/346	35.6	0.98 (0.81–1.20); .87
Bliss et al, 1997 ^{18a}	Breast pumps	Partial	4 mo	79/403	19.6	53/346	15.3	1.28 (0.93–1.76) ; .12
Bliss et al, 1997 ^{18a}	Breast pumps	Exclusive	6 mo	90/388	23.3	79/331	23.9	0.97 (0.75–1.27); .83
Bliss et al, 1997 ^{18a}	Breast pumps	Partial	6 mo	59/388	15.2	42/331	12.7	1.20 (0.83–1.73); .33
Dungy et al, 1992 ^{21a}	Breast pumps	Unclear	4 wk	24/44	54.5	15/43	34.9	1.56 (0.96–2.55); .065
Dungy et al, 1992 ^{21a}	Breast pumps	Unclear	6 wk	20/44	45.5	13/43	30.2	1.50 (0.86–2.63); .14
Dungy et al, 1992 ^{21a}	Breast pumps	Unclear	8 wk	16/44	36.4	10/43	23.3	1.56 (0.80–3.05); .18
Rasmussen et al, 2011 ²⁶	Breast pumps, electric	Exclusive	30 d	2/13	15	5/12	42	0.37 (0.09–1.56); .14
Rasmussen et al, 2011 ²⁶	Breast pumps, manual	Exclusive	30 d	3/9	33	5/12	42	0.80 (0.26–2.50); .70
Rasmussen et al, 2011 ²⁶	Breast pumps, electric	Partial	30 d	3/13	23	8/12	67	0.35 (0.12–1.01); .028
Tuttle and Dewey, 1995 ²⁷	Gift items and vouchers	Unclear	3–6 wk	11/63	17.5	19/349	5.4	3.21 (1.60–6.41); <.001
Thomson et al, 2012 ³⁰	Gift items and vouchers	Any	6–8 wk	57/94	60.6	119/172	69.2	0.88 (0.72–1.06); .16
Pugh and Milligan, 1998 ²⁵	Household tasks	Unclear	6 mo	15/30	50.0	8/30	26.7	1.88 (0.94–3.75); .063

CI, confidence interval; RR, relative risk.

^a Control group received infant formula (a potential disincentive to breastfeed).

were included in some studies, no cost-effectiveness analyses were identified.

This systematic review is the first to evaluate the effectiveness of breastfeeding incentives on breastfeeding outcomes. This review was comprehensive, underpinned by a highly sensitive literature search, covering a wide range of intervention designs and types of study. However, it is possible that some multicomponent interventions that included incentive components may have been missed due to how they were reported. The inclusion criteria were broad enough to capture all possible kinds of incentives being provided and study designs. Incentives are a new and emerging research field, and it is important to avoid premature conceptual closure when the evidence base is so uncertain. For this reason, a decision was made to include all full reports of intervention studies meeting our inclusion criteria regardless of quality.

Our definition of incentive was deliberately broad, and we worked closely with our coapplicant service

user mother and infant groups who guided decisions about which incentives to include in the review. The decision to include breast pumps was recommended by the service users; in a later stage of the study, this decision was endorsed by a survey of the British public as the most acceptable of 7 promising incentive strategies.⁴² However, it was not always clear in the study reports whether the breast pump provision was considered as an incentive by the authors. It should also be noted that some studies^{18,21,24} had control groups that were provided with formula packs at discharge. This breastfeeding disincentive for the control group may have inflated the effect size for the intervention groups in these studies.

The lack of high-quality RCTs identified by the present review prohibited meta-analysis, and the heterogeneity of the studies limits comparisons. Meta-analysis was also hampered by the multicomponent nature of the interventions. For example, the majority of studies incorporated an education and/or support element in which the

incentive was either provided to encourage continuation in the program or as a reward for breastfeeding continuation.^{22,24,25,27,28,31–33} It was not always possible to identify the active components of the intervention or whether synergy or opposition was occurring. Furthermore, 2 studies^{24,32} met our inclusion criteria by virtue of having provided token participation incentives to both groups, therefore comparing a facet of the intervention other than the incentive. As a result, both the intervention and “control” groups in studies had to be treated as multiple intervention groups (because both received incentives). Incentives for participation have evidence of effectiveness for attrition in studies⁴⁶ and are likely to interact with nonincentive components of the intervention, such as additional breastfeeding support. Assessment of effectiveness was also limited by inadequate comparator (nonincentivized) groups. Some studies either did not include a nonincentivized control group^{20,23} or used historical control groups, which may be subject to strong selection bias.^{19,27,30,31,33} The absence of a biochemical or other

suitable method for validating breastfeeding outcomes meant that studies relied on self-report, with the inherent and underreported risks of gaming.⁴⁷ In the general literature on incentives to target populations for behavior change, gaming and cheating are a concern, particularly when there is a reliance on self-report as opposed to objective verification of behaviors.^{48–50}

As with all complex intervention studies, there was much variation in the other intervention components being provided; for smoking cessation, questions have been raised about whether the incentive or the additional support is responsible for effectiveness.⁵¹ The underreporting of intervention delivery processes for included studies, the absence of reported observations or recordings of interactions, and the sparse qualitative data on patient experiences are potentially important.¹⁰ For example,

relationships and communication with incentive intervention providers could be crucial in terms of empowering and encouraging women or, conversely, providers could be perceived as functional or disempowering.

CONCLUSIONS

This comprehensive review of the role of incentives for breastfeeding found that the overall effect of providing such incentives compared with no incentives is unclear, due to study heterogeneity and the variation in study quality. The most common incentive used was a breast pump, either alone or combined with other gifts or vouchers. However, before further research into a breast pump as an incentive is undertaken, evidence is required regarding the effect and acceptability of using breast pumps on breastfeeding duration and exclusivity, which is currently uncertain.⁴² We also do not

understand the mediating or moderating effects of the timing, frequency, and type of breast pump, or the optimal nature of skilled assistance required, on infant feeding outcomes. Head-to-head comparisons of different incentive strategies are required to understand the possible effects and variation in effects of providing different types or combinations of incentives, with or without other behavior change technique components. In addition, the frequency and timing of contacts (dose of support) are likely confounders. This factor is of crucial importance to multicenter trial design because routine care is variable, and it is unrealistic to expect usual care to change substantially to accommodate an incentive intervention. Incentives do show some promise, but implementation at either the policy or practice level should wait until more robust evidence is available because the unintended consequences could be considerable.

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