

# **Benefits of Incentives for Breastfeeding and Smoking cessation in pregnancy (BIBS): a mixed-methods study to inform trial design**

Heather Morgan,<sup>1</sup> Pat Hoddinott,<sup>1,2\*</sup> Gill Thomson,<sup>3</sup>  
Nicola Crossland,<sup>3</sup> Shelley Farrar,<sup>4</sup> Deokhee Yi,<sup>4</sup>  
Jenni Hislop,<sup>1,5</sup> Victoria Hall Moran,<sup>3</sup>  
Graeme MacLennan,<sup>1</sup> Stephan U Dombrowski,<sup>5,6</sup>  
Kieran Rothnie,<sup>1,7</sup> Fiona Stewart,<sup>1,8</sup> Linda Bauld,<sup>9</sup>  
Anne Ludbrook,<sup>4</sup> Fiona Dykes,<sup>3</sup> Falko F Sniehotta,<sup>5</sup>  
David Tappin<sup>10</sup> and Marion Campbell<sup>1</sup>

<sup>1</sup>Health Services Research Unit, University of Aberdeen, Aberdeen, UK

<sup>2</sup>Nursing, Midwifery and Allied Health Professions Research Unit, University of Stirling, Stirling, UK

<sup>3</sup>Maternal and Infant Nutrition and Nurture Unit, University of Central Lancashire, Preston, UK

<sup>4</sup>Health Economics Research Unit, University of Aberdeen, Aberdeen, UK

<sup>5</sup>Institute of Health and Society, University of Newcastle, Newcastle, UK

<sup>6</sup>Psychology, University of Stirling, Stirling, UK

<sup>7</sup>London School of Hygiene and Tropical Medicine, London, UK

<sup>8</sup>Academic Urology, University of Aberdeen, Aberdeen, UK

<sup>9</sup>The Institute of Social Marketing, University of Stirling, Stirling, UK

<sup>10</sup>Perinatal Epidemiology and Child Health Unit, School of Medicine, University of Glasgow, Glasgow, UK

\*Corresponding author

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## Scientific summary

### Incentives for breastfeeding and smoking cessation in pregnancy

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# Scientific summary

## Background

Smoking in pregnancy and/or not breastfeeding both have considerable negative health outcomes for mother and baby, as well as costs to the NHS; thus, effective and cost-effective interventions to encourage smoking cessation and breastfeeding are required. Current evidence on financial incentives suggests effectiveness for short and simple, rather than long-term, behaviour change.

## Study definition of incentives

Financial (positive or negative) and non-financial tangible incentives or rewards, such as free or reduced-cost items or services that have a monetary or an exchange value.

## Aim

To conduct evidence syntheses, primary qualitative and survey research and a discrete choice experiment (DCE) to develop an incentive taxonomy and inform the identification of promising (also acceptable and feasible) incentive interventions for improving smoking cessation in pregnancy and/or breastfeeding outcomes.

## Objectives

1. To investigate the evidence for the effectiveness of incentive interventions delivered within or outside the NHS to (a) individuals and families or (b) organisations that aim to increase and sustain smoking cessation and breastfeeding.
2. To investigate the evidence for effective incentive delivery processes and how they increase and sustain smoking cessation and breastfeeding, including their acceptability and how they fit with existing barriers, facilitators and intrinsic and extrinsic motivators to behaviour change.
3. To systematically search for and identify incentive interventions in systematic reviews from other areas of health improvement, particularly for women of childbearing age, to (a) assess fit with our evidence synthesis; (b) inform the development of a shortlist of promising incentive strategies; and (c) identify research gaps where effective incentives for other behaviours have not been tested for smoking cessation and breastfeeding.
4. To investigate the acceptability and feasibility of a shortlist of promising incentive strategies and potential adverse consequences from the perspectives of (a) women and partners; (b) health professionals, experts, decision-makers and relevant stakeholders; and (c) the general public.
5. To develop an incentive taxonomy.
6. To inform the design for possible future trials including the target population, active components, mechanisms of action, the control group, the recruitment and delivery strategy, monitoring, outcome measurement and the effect size.

## Methods

Three evidence syntheses were integrated with primary qualitative and survey research to investigate diverse perspectives using multidisciplinary, mixed methods. Uniquely, researchers collaborated with two mother-and-baby groups in disadvantaged areas (study co-applicants) who provided dynamic, hard-to-reach patient and public involvement (PPI) throughout.

## Evidence syntheses

Systematic evidence syntheses of (1) incentive intervention effectiveness and delivery processes for smoking cessation in pregnancy or breastfeeding; (2) qualitative evidence reviews of the barriers to and facilitators of smoking cessation and breastfeeding; and (3) scoping review of reviews of effectiveness for other lifestyle behaviours followed Cochrane public health guidance:

- Detailed searches were carried out in MEDLINE, MEDLINE-In-Process & Other Non-Indexed Citations, EMBASE, Cumulative Index to Nursing and Allied Health Literature, PsycINFO, Web of Science, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects, Health Technology Assessment (HTA) database, Midwives Information and Resource Service, Applied Social Sciences Index and Abstracts and the Trials Register of Promoting Health Interventions.
- Quality assessment was carried out using the Cochrane risk of bias tool and guidance from the Centre for Reviews and Dissemination and the Critical Appraisal Skills Programme for qualitative studies.
- Outcomes were smoking cessation, prolonged abstinence and exclusive or any breast milk.
- Abstract and full-text screening and data extraction were undertaken by two researchers, including a general taxonomy of behaviour change techniques (BCTs) and a specifically modified taxonomy for incentive/reward behaviour change techniques (IRBCTs).
- Novel patient journey maps through the intervention illustrate the complexity of components, timing and intensity. This was possible only in the intervention arms because of poor reporting in the comparison arms.
- For the narrative synthesis of qualitative reviews of barriers and facilitators (both behaviours), themes were identified according to a logic model to understand the mechanisms of action of incentive interventions and intrinsic and extrinsic influences.
- For the review of systematic reviews of incentive interventions for other lifestyle behaviours, obesity, drug/alcohol addiction, exercise and smoking (all populations) were included.

## Primary research

Purposive, theoretical and snowball sampling of sociodemographically diverse participants was undertaken by five interviewers at three sites – one with no incentive schemes, one with a concurrent smoking cessation Phase II incentive trial and one with previous incentive schemes (both behaviours). Grounded theory informed the investigation of the mechanisms of action of incentives, and a framework approach was applied to understand intervention components and delivery to inform trial design. Transcribed interviews were entered into NVivo10 software (QSR International, Warrington, UK). Thematic analysis, topic guide refinement and search for disconfirming data were iteratively undertaken.

A shortlist of promising incentive strategies emerged from the above analyses and acceptability was investigated by a Ipsos Market & Opinion Research International (MORI) Computer Aided Personal Interviewing (face-to-face omnibus) (CAPIBUS) survey of the UK general public, with randomisation of question order. NHS research and development networks and a private company distributed e-mails linked to Survey Monkey (see [www.surveymonkey.com](http://www.surveymonkey.com)) to maternity and early years staff. Survey analysis used multivariable ordered logit models.

A DCE investigated five attributes of a smoking cessation incentive service: initial visit to set a quit date (constant); frequency of face-to-face support from a quitting expert; method of support in first week after quitting; involvement of a quit pal; monthly financial incentives in the form of a voucher. Analysis used a conditional logit regression model and model performance was compared using the log-likelihood ratio test.

## Results

### *Effective interventions*

- Out of 1469 smoking cessation and 5408 breastfeeding multicomponent studies identified, 21 smoking cessation studies of incentives for pregnant women and two for providers and 18 breastfeeding studies of incentives for women and one for providers were included in the review.
- Meta-analysis of four studies (332 participants) showed that providing vouchers contingent on biochemically proven smoking cessation was effective in late pregnancy compared with non-contingent incentives for participation [relative risk 2.58, 95% confidence interval (CI) 1.63 to 4.07]. Effects continued until 3 months after birth.
- In 13 studies in which incentives for breastfeeding were compared with no incentive or a smaller incentive, study heterogeneity precluded meta-analysis or the drawing of conclusions about effectiveness.
- The effectiveness of breast pumps remains uncertain (seven studies) because of study heterogeneity, contamination between intervention and control groups and comparisons with formula incentives.
- For smoking cessation, the mean number of BCTs per incentive intervention was 6.62 [standard deviation (SD) 3.1], most commonly information and carbon monoxide monitoring. For breastfeeding, the mean number of BCTs per incentive intervention was 4.34 (SD 2.8), most commonly social support. Attributing effect size to the incentive requires caution.
- Intervention intensity ranged from one to 36 contacts for smoking and from one to eight contacts for breastfeeding. This is a potential confounder.
- Small trials and variable attrition rates raise questions about intervention reach, and insufficient data were reported to assess health inequalities.
- Qualitative data on smoking cessation suggest that incentives work best for 'enthusiastic amateurs' who have more stable lifestyles. Those with more chaotic lives tended to cut down or relapse as smoking is central to their lives. Some 'non-contemplators' increase consumption and some 'do-it-aloners' do not engage.
- The effectiveness of provider incentives for smoking cessation in pregnancy is unknown.
- Provider commitment contract awards for meeting quality criteria or financial penalties for not meeting self-set breastfeeding targets (one study) show promise.

### *Barriers and facilitators*

We identified three qualitative evidence syntheses for smoking cessation in pregnancy and 10 for breastfeeding and applied a logic model to understand how incentives and behaviours interact with the following barrier and facilitator themes:

- the centrality of smoking (e.g. enjoyment, coping with stress, addiction) to women's everyday lives
- for breastfeeding, external support was the dominant theme in terms of learning a new skill; mother–baby well-being was central to feeding decisions
- 'me time' and constructive relationships with partners, family, friends and health professionals
- negotiating the private–public interface for performing both behaviours.

### **Incentives for other lifestyle behaviours**

This evidence synthesis included 17 studies on consumer and/or provider incentives:

- there was short-term (< 12 weeks) effectiveness of contingent financial incentives for substance addictions compared with non-contingent incentives for participation; consistent with our meta-analysis
- effectiveness was inconsistent across behaviours
- incentives can increase engagement in behaviour-change programmes
- the benefits of targeting and incentives beyond the individual are uncertain
- most provider incentive evidence relates to behaviour process measures (e.g. advice documentation and referral)
- provider incentives in the form of commitment contracts to meet quality standards can change behaviour in the short term but effects diminish with time
- provider incentives can do harm through neglect of non-incentivised behaviours and adverse effects on relationships
- the optimal level of the incentive dose–response relationship or ceiling effects are unknown.

### **Qualitative sample**

In total, 16 focus groups, 55 face-to-face interviews and 19 telephone interviews were carried out with 88 pregnant women/recent mothers, 53 service providers, 24 experts/decision-makers, 63 conference attendees and 12 co-applicant group attendees and we obtained 432 out of 497 (86.9%) health professional responses to open survey questions on incentive consequences.

### **Incentive ‘ladder’ logic model**

A typology of incentives with meanings and the IRBCT taxonomy were developed over the course of the study through synthesis of all data. The typology and IRBCT taxonomy did not fit the data complexity. Data suggest that an incentive in isolation would be unlikely to change or maintain behaviour as the interaction and fit with other life factors/context is likely to affect engagement and effectiveness. Interventions that are rigid, are prescriptive or place the onus on individuals to behave in a ‘healthy’ way risk women feeling judged and pressurised. To avoid losing face, women may disengage with services and feel demoralised.

We produced an incentive logic model and this was facilitated by the use of a ‘ladder’ metaphor. Two interacting ladders with complete, missing or broken rungs were joined by a platform representing sustained behaviour change. The rungs in one ladder address the assets, barriers and facilitators for individuals, families, social networks, the environment and other services. The rungs in the other ladder represent incentives/rewards, BCTs and other intervention facets. These would benefit from being individually tailored and delivered by specialist teams to enable women to bolster their individual capabilities. Monitoring to set short-term goals, visual outcome verification (albeit problematic for breastfeeding) and multiple community locations were valued.

Autonomy, motivation and control through providing general shopping vouchers that maximise well-being value in addition to financial value are important for smokers, particularly those with few choice opportunities. Gift deliveries, raffles and breast pumps (to share feeding) that operate as connectors to social support are valued for breastfeeding.

## Shortlist of promising incentive strategies

The acceptability of promising incentive strategies was assessed through (1) MORI CAPIBUS general public ( $n = 1144$ ) and maternity and early years health professional ( $n = 497$ ) surveys and (2) qualitative data. Framing effects were observed, with breastfeeding incentives deemed more acceptable when asked about first. Those aged  $\leq 44$  years were more likely to agree with all seven incentive strategies than those aged  $\geq 65$  years.

1. *Shopping vouchers for women who prove that they have stopped smoking during pregnancy.* General public net disagreement was 42.3% (484/1144) and net agreement was 40.5% (463/1144). Those less likely to agree were women [odds ratio (OR) 0.71, 95% CI 0.57 to 0.88;  $p = 0.002$ ] and those less educated. Those more likely to agree were current smokers who had tried quitting (OR 1.65, 95% CI 1.18 to 2.12;  $p = 0.003$ ) and ethnic minorities. The attributes of this strategy were assessed with a DCE including 320 women aged  $\leq 44$  years with a smoking history. The DCE found that  $> £20.00$  per month is required, with higher values up to  $£80.00$  increasing the likelihood of quitting but at a decreasing rate. Initial daily text/telephone support and a quitting pal increase the likelihood of smoking cessation but the effect of the incentive seems greater.
2. *Shopping vouchers for women after the birth of their baby for proven smoking quit.* General public net disagreement was 46.4% (531/1144) and net agreement was 36.5% (417/1144). Those less likely to agree were women (OR 0.68, 95% CI 0.55 to 0.85;  $p = 0.001$ ) and the less educated.
3. *Shopping vouchers for women after birth for a smoke-free home.* General public net disagreement was 46.0% (526/1144) and net agreement was 34.4% (394/1144). Those less likely to agree were women (OR 0.72, 95% CI 0.58 to 0.90;  $p = 0.003$ ) and the less educated. Those more likely to agree were current smokers who had tried quitting and ethnic minorities.
4. *Shopping vouchers for women who prove that they are breastfeeding for the first 6 months after birth.* General public net disagreement was 39.1% (447/1144) and net agreement was 34.2% (391/1144). Those less likely to agree were women (OR 0.77, 95% CI 0.62 to 0.95;  $p = 0.003$ ). Those who had a breastfed child (OR 1.67, 95% CI 1.24 to 2.25;  $p = 0.001$ ) or ethnic minorities were more likely to agree.
5. *A breast pump costing around £40.00 provided for free on the NHS.* General public net disagreement was 27.3% (312/1144) and net agreement was 45.8% (524/1144). Those more likely to agree had a breastfed child (OR 1.84, 95% CI 1.36 to 2.49;  $p < 0.001$ ). Those less likely to agree were less educated. This was the most agreeable incentive strategy for health professionals: net disagreement 21.9% (109/497) and net agreement 67.8% (337/497). The cost was considered prohibitive by younger, more disadvantaged women. Breast pumps address women's barriers to and facilitators of breastfeeding, from intrinsic physiological/emotional to extrinsic factors, particularly at the private–public interface. They provide more ladder 'rungs' than shopping vouchers. Health professionals expressed concern about endorsement as a breastfeeding prerequisite and uncertainty about effects on feeding outcomes.
6. *Additional funding for local health services if they reach smoking cessation targets.* General public net disagreement was 37.2% (426/1144) and net agreement was 39.4% (451/1144). Midwives/health visitors/maternity care staff were more likely to agree than doctors (OR 2.35, 95% CI 1.51 to 3.64;  $p < 0.001$ ).
7. *Additional funding for local health services if they reach breastfeeding targets.* General public net disagreement was 38.5% (441/1144) and net agreement was 36.4% (416/1144). Ethnic minorities were more likely to agree. Women professionals (OR 1.81, 95% CI 1.09 to 3.00;  $p = 0.023$ ) and midwives/health visitors/maternity care staff (OR 2.54, 95% CI 1.65 to 3.91;  $p < 0.001$ ) were more likely to agree than doctors.

Vouchers for up to  $£40.00$  per month were acceptable (general public  $> 85\%$  agreement). Universal provision rather than targeting low-income women was preferred (general public 55% agreement; health professionals 67% agreement). Unintended consequences concern health inequalities, gaming, opportunity costs and positive health and emotional implications.

In the DCE, initial daily text/telephone support, a quitting pal, vouchers for >£20.00 per month and values up to £80.00 increased the likelihood of smoking cessation in pregnancy.

## Conclusions

1. Public opinion is mixed with regard to incentives for smoking cessation in pregnancy and breastfeeding.
2. Shopping vouchers for pregnant women contingent on smoking cessation are effective, but intervention intensity and other BCT components are likely confounders.
3. Participant journeys for the intervention and control arms should be identical and reported to enable the incentive effect size to be determined in a definitive trial.
4. Frequent initial daily text/telephone support and a quitting pal increase the likelihood of smoking cessation. Other valued components include continuity of non-judgemental care, visual carbon monoxide monitoring, short-term goal-setting, feedback, tailoring of support and specialised skilled services.
5. There was most agreement with a free breast pump worth £40.00. This addresses multiple barriers to breastfeeding. A feasibility study is required.
6. Women, those less educated and those living in more disadvantaged areas were independent predictors of disagreeing with voucher incentives. Narratives reveal feelings of blame, pressure and stigma.
7. Commitment contracts for providers and incentives beyond the individual, for example smoke-free homes, show some promise and feasibility studies are required.
8. An incentive 'ladder' logic model, which we developed from the study data, has face validity with target population service users for the design of trial 'rungs' that fit with everyday life 'rungs', as incentives alone were considered unlikely to succeed.

## Study registration

This study is registered as PROSPERO CRD42012001980.

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Editorial contact: [nihredit@southampton.ac.uk](mailto:nihredit@southampton.ac.uk)

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