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Effectiveness of Mobile Phone Interventions in Improving Breastfeeding: Systematic Review of Randomized Control Trials

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Abstract

Background

Current international best practice recommendations urge breastfeeding for infants to be exclusively breastfed until six months of age, with recognition that any breastfeeding for as long as possible affords benefits. Babies that are not exclusively breastfed are subject to infectious, atopic and metabolic diseases. In fact, several factors are associated with lack of exclusive breastfeeding such as nulliparity, delivery by caesarean section, the neonate not being put on the mother's chest after delivery, multiple births, male gender, low birth weight and in case when neonate was resuscitated. Adequate interventions should be undertaken to overcome those barriers. This study reviewed the impact of mobile phone interventions in improve exclusive breastfeeding.

Objectives

To assess the effectiveness of mobile phone in improving exclusive breastfeeding.

Search methods

Randomized control trials were searched from January 2016 until February 2017. We searched through: CENTRAL, MEDLINE via PUBMED, CINHAL, Scorpus, Web of science, handsearches of journals and the proceedings of major conferences

Selection criteria

We selected randomized controlled trials (RCTs) assessing mobile phone intervention for improving breastfeeding. There was no language restriction.

Data collection and analysis

Two authors (JLT and LMM) independently identified and assessed all studies that met inclusion criteria. Study design, characteristics of study populations, interventions and controls and study results were extracted by JLT and LMM. Also, the risk of bias of included studies was assessed independently by two JLT and LMM. We reported the overall results for each outcome after meta-analysis. We reported the odds ratio with 95% confidence intervals for the different outcomes.

Main results

Based on the exclusive breastfeeding results, within one month, mobile phone interventions increased exclusive breastfeeding by 52% compared to the standard care (OR 1.52, 95%CI 1.25 to 1.84, 2130 participants, 7 RCTs). This result was statistically significant (P < 0.0001). The evidence was graded as high. As well as in two to three months postpartum, mobile phone intervention improved highly exclusive breastfeeding by 49% compared to the control group (OR 1.49, 95%CI 1.28 to 1.74, 3519 participants, 12 RCTs, p< 0.00001). Therefore, mobile phone intervention did not impact on exclusive breastfeeding within six months (OR 1.11, 95%CI 0.99 to 1.29, 3978 participants, 8 studies, p=0.17).

In the other hand, formula feeding was more likely to be increased the standard care group compared to mobile phone intervention group in one month post-partum (OR 1.12 95%CI 0.85 to 1.47, 5 RCTs, 1358 participants, p-value=0.44). Even though, the result was not statistically significant. Therefore, within three months, formula feeding was significantly increased 27% compared to mobile phone group (OR 1.27 95%CI 1.05 to 1.54, 7 RCTS, 2359 participants, P=0.01). Lastly, formula feeding did not increase statistically after six months (OR 1.16 95%CI 0.99 to 1.35, 3066 participants, 5 RCTs, P = 0.06). Considering formula feeding, the overall evidence was moderate.

Authors' conclusions

Our findings have shown the importance of mobile phone intervention in promoting exclusive breastfeeding. However, mobile phone intervention could not improve exclusive from four to six months. Further interventions should be studied to enforce exclusive breastfeeding within this specific period.

Key words: mobile phone; exclusive breastfeeding; interventions

Background

Description of the condition

The WHO recommends that infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health (WHO 2017). In fact, exclusive breastfeeding means that the infant should receive only breast milk (WHO 2017). No other liquids or solids should be given (WHO 2017). Not even water with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines (WHO 2017). Effective interventions such as initiation of breastfeeding within the first hour of life without giving pre-lacteal feeds and maintaining exclusive breastfeeding until six

months could decrease significantly infant morbidity and mortality. Meanwhile, breastfeeding is universally acknowledged as the optimal method for feeding infants with well-established short and long term benefits (Kramer 2012; Horta 2013). Current international best practice recommendations urge breastfeeding for infants to be exclusively breastfed until six months of age, with recognition that any breastfeeding for as long as possible affords benefits (Kramer 2012). Breast milk, recommended as the best feeding option for neonates and young infants, provides many immunological, psychological, social, economic and environmental benefits (Patel 2013). The global recommendations of the World Health Organization (WHO) are that all infants should start breastfeeding within one hour of birth (early initiation of breastfeeding, EIBF) and be exclusively breastfed (Patel 2013). Therefore, exclusive breastfeeding constitutes a challenge worldwide. In general, breastfeeding rates globally remain low (Sankar 2015). Only 43% of the world's newborns are breastfed within one hour of birth and 40% of infants aged 6 months or less are exclusively breastfed (WHO 2014; Sankar 2015). Reviewing the literature, systematic reviews have shown that babies who are not breastfed exclusively for the first three to four months are in risk of suffering health problems such as gastroenteritis (Howie 1990; Ip 2007; Kramer 2001; Quigley 2006; Quigley 2007), respiratory infection (Ip 2007; Kramer 2001;Victora 1989; Wright 1989), otitis media (Aniansson 1994; Duncan 1993; Ip 2007), urinary tract infections (Marild 1990; Pisacane 1992), necrotizing enterocolitis (Ip 2007; Lucas 1990a), atopic disease if a family history of atopy is present (Burr 1989; Lucas 1990; Saarinen 1995) and diabetes mellitus (Karjalainen 1992; Mayer 1988; Virtanen 1991). Mechanisms for why breast milk is an 'individualized medicine' for the infant encompass stimulation of the infant immune system, maintenance of the microbial changes in the infant's gastrointestinal system, and stimulation of the epigenetic programming of the infant (Mickleson 1982; Trivedi 2015; Ogbo 2017). Research also indicates a positive relationship between having been breastfed and the bone health of the child (Lucas 1990) and with improved cognitive development (Kramer 2008). Recently, studies have confirmed several factors generally associated with lack of exclusive breastfeeding such as nulliparity, delivery by caesarean section, the neonate not being put on the mother's chest after delivery, multiple births, male gender (Africa and Latin America), low birth weight, and if the neonate was resuscitated (Patel 2013). The main goal of this systematic review is to evaluate short message reminder could improve exclusive breastfeeding until six months post natal.

Description of the intervention

Nowadays, mobile phone ownership is estimated more than 7 billion worldwide (The world in 2015; Tamuzi 2017). The World Health Organization (WHO) has defined mHealth as 'Medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices' WHO 2011; Hall 2014 .

Mobile phones and SMS-based systems are increasingly used in the developed and developing world to promote health outcomes and have proven successful in increasing appointment attendance;

increasing treatment compliance for a variety of conditions; disseminating public health information; mobilizing attendance at vaccination programmes (Lester 2010; Zurovac 2011; Gibson 2017). Several projects have shown promising results of the potential for using SMS-based systems to improve health services and in turn, contribute towards improving health outcomes. This review will evaluate the effectiveness of mobile phone in improving exclusive breastfeeding. Short message service (SMS) is a promising tool for gathering data for research and clinical purposes. Automated text messages are sent to mobile phones and text responses recorded electronically. The method is cheap and simple and allows rapid communication with people involving minimum disturbance.

How the intervention might work

Mobile phone messaging may help to address some preventive health challenges by enabling remote delivery of care, facilitating timely access to health advice and medications, prompting self-monitoring and medication adherence, and educating patients (Demiris 2009; Vodopivec-Jamsek 2012). Mobile phone messaging interventions can be used to improve self-efficacy (such as feedback on treatment success) (de Jongh 2012; Vodopivec-Jamsek 2012), to provide a form of social support (from peers and health professionals), or to establish social networks (support groups, peer-to-peer networks). By augmenting self-efficacy (Bandura 1977; Bandura 1982; Vodopivec-Jamsek 2012) and providing support mechanisms (Christakis 2004; Cobb 2002; Vodopivec-Jamsek 2012), these interventions may influence health behaviours and enhance exclusive breastfeeding in short or long term postpartum.

Why it is important to do this review

Increasing rates of initiation of breastfeeding is the cornerstone towards meeting WHO recommendations for breastfeeding and realizing the potential of breastfeeding in improving health, reducing the economic burden of ill health, and reducing health inequalities. In fact, postpartum period encompasses several barriers that use to decrease exclusive breastfeeding. Several studies have shown the effectiveness of mobile phone interventions to improve health outcomes. This review finds out how those barriers could be overcome in using mobile phone intervention. Moreover, this study highlights the importance of telephone based interventions in improving exclusive breastfeeding in six months.

Objectives

To assess the effectiveness of mobile phone in improving exclusive breastfeeding.

Methods

Criteria for considering studies for this review

Types of studies

We included only randomized control trials in which mobile phone interventions were used to improve breastfeeding.

Types of participants

We included breastfeeding women from postpartum until 12 months

Types of interventions

Mobile phone calls reminders, SMS reminders (one way or two ways), SMS monitoring

Types of outcome measures

Primary outcomes

- Exclusive breastfeeding within 1 month
- Exclusive breastfeeding from 2 to 3 months
- Exclusive breastfeeding until 6 months

Secondary outcomes

- formula feeding within 1 month
- Any feeding from 2 to 3 months
- Any feeding from 6 to 12 months

Search methods for identification of studies

(Cellular phone) OR (telephone) OR (mobile phone) OR (text messag*) OR (testing) OR (short messag*) OR (cell phones) OR (SMS) OR (short message service) OR (text) OR (mobile health) OR (telemedicine) OR (health) OR (health communication) OR (health education) OR (behavior) OR (ehealth)

AND

(Feeding) OR (Breastfeeding) OR (Exclusive Breast Feeding) OR (Exclusive Breastfeeding) OR (breast-feeding) OR (breastfed breast milk) OR (infant feeding)

AND

(Randomized controlled trial) OR (controlled clinical trial) OR (randomized controlled trials) OR (random allocation) OR (double-blind method) OR (single-blind method) OR (clinical trial) OR (trial) OR (clinical trials) OR (clinical trial) OR (singl* OR doubl*)

AND

(mask* OR blind*) OR (placebos) OR (placebo*) OR (random*)

Electronic searches

Randomized control trials were search from January 2016 until February 2017

1. CENTRAL

2. MEDLINE via PUBMED;

3. CINHAL

4. Scorpus

5. Web of science

6. Handsearches of journals and the proceedings of major conferences

Searching other resources

We scanned reference lists of all relevant papers retrieved. We did not apply any language or date restrictions.

Data collection and analysis

Selection of studies

Data extraction and management

We used the Cochrane form to extract data. For eligible studies, two authors (J.T and L.M) extracted the data. Any discrepancy in data extraction was discussed or by consulting the other authors if necessary. The data extraction form included that information:

- Trial information: title, authors, contact address, published/ unpublished, duplicate publication, language of publication, year of publication, setting.
- intervention: description, duration, comparisons, co-interventions;
- patients: exclusion criteria, inclusion criteria, total number and number in comparison groups, sex, age, socioeconomic distribution, ethnicity, educational status, losses to follow-up and subgroups.
- outcomes: outcomes specified above, any other outcomes assessed and length of follow-up
- Results: for outcomes and times of assessment (including a measure of variation), if necessary converted to measures of effect specified below and intention-to-treat analysis.
- Power calculation
- Risk of bias assessment

Assessment of risk of bias in included studies

Risk of bias was assessed in included studies using the Cochrane Collaboration's Risk of Bias tool (Higgins 2009). This tool includes assessment of risk of bias includes: random sequence generation; allocation concealment; blinding of participants and personnel; blinding of outcome assessment; incomplete outcome data; selective reporting; and other sources of bias. Studies will be quoted as at 'high risk', 'low risk' or 'unclear risk' of bias. Risk of bias was assessed by J.T and L.M. Any disagreement between authors was resolved by discussion, and if necessary, a third author was consulted as arbiter.

Measures of treatment effect

All Outcome measures were binary data, then the odd ratio and its 95% confidence intervals (CI) were used.

Unit of analysis issues

The unit of analysis for almost all RCTs was the individual. We adjusted data derived from the only one cluster randomized controlled trial (Fu 2014) to allow for the clustered design.

Dealing with missing data

During data extraction, we found one study with missing data, and we contacted the authors for further clarification.

Assessment of heterogeneity

We assessed clinical heterogeneity for all included studies. In case where studies were sufficiently homogenous, we conducted to meta-analysis and then test for statistical heterogeneity was used, respectively the Chi-square test(alpha= 0.1) and the I^2 statistic(Higgins 2011).

Assessment of reporting biases

Included studies were fifteen; we assessed publication bias by looking at the funnel plot which was symmetric (Figure 9).

Data synthesis

We carried out statistical analysis using the Review Manager software (RevMan 2014). We used fixed-effect meta-analysis for combining data where it was reasonable to assume that studies are estimating the same underlying intervention effect. In fact, clinical heterogeneity was less common between randomized control trials. In all analysis, the I^2 was less than 60%, by the way fixed-effect model was suitable to produce the overall summary. The results were presented as the average intervention effect with its 95% confidence interval, and the estimates of Tau-squared and I-squared.

Subgroup analysis and investigation of heterogeneity

Subgroups groups will be conducted to investigate whether the intervention affects differently the outcomes according to:

Studies conducted in low income countries compared to high income countries.

Results

We found a total of 1444 studies in different databases. 1232 remained after removing duplicates. Only 201 records were screened and 1031 studies were excluded. Among studies that were screened, 33 full texts were assessed for eligible criteria. 13 studies were excluded with reasons (see table of exclusion studies) and 20 RCTs were included in qualitative synthesis and 15 RCTs were included in meta-analysis (figure 1).

Description of studies

Results of the search

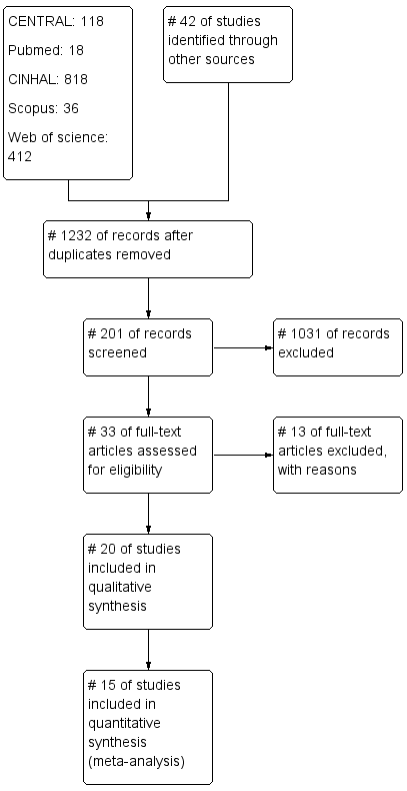

Figure 1: Study flow diagram.

Included studies

We included fifteen randomized control trials among them Bonuck 2005; Bunik 2010; Carlsen 2013; Dennis 2002; Efrat 2015; Flax 2014; Fu 2014; Gallegos 2014; Hoddinott 2012; Maslowsky 2016; McDonald 2010; Meglio 2010; Reeder 2014; Simonetti 2012; Tahir 2013 Their details are in Characteristics of included studies.

Excluded studies

We excluded thirteem studies with reasons Agostino 2012; Bruun 2016; Chen 1993; Demirci 2016; Du 2013; Flax 2016; Hmone 2016; Jiang 2014; Labarere 2005; McLachlan 2014; Moniz 2015; Parrilla-Rodriguez 2001; Whitford 2012.

Risk of bias in included studies

Allocation (selection bias)

We found that Bonuck 2005; Bunik 2010; Carlsen 2013; Dennis 2002; Efrat 2015; Fu 2014; Hoddinott 2012; Maslowsky 2016; McDonald 2010; Meglio 2010; Reeder 2014; Tahir 2013 were low risk of bias, Flax 2014 ; Simonetti 2012 were unclear and Gallegos 2014 was high risk of bias.

Allocation concealment was unclear in Flax 2014; Maslowsky 2016; Reeder 2014; Simonetti 2012 and low risk of bias in Bonuck 2005; Bunik 2010; Carlsen 2013; Dennis 2002; Efrat 2015; Fu 2014; Gallegos 2014; McDonald 2010; Meglio 2010; Tahir 2013

Blinding (performance bias and detection bias)

Performance bias was unclear in Carlsen 2013; Fu 2014; Gallegos 2014; Maslowsky 2016; McDonald 2010; Reeder 2014; Simonetti 2012 high risk of bias in Bonuck 2005; Bunik 2010; Efrat 2015 and low risk of bias in other trials. Only two RCTs were low risk of detection bias Dennis 2002; Reeder 2014, Carlsen 2013 was unclear and other RCTs included high risk of detection bias.

Incomplete outcome data (attrition bias)

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Attrition bias was minimized in Bonuck 2005; Bunik 2010; Dennis 2002; Efrat 2015; Flax 2014; Fu 2014; Gallegos 2014; Hoddinott 2012; Maslowsky 2016; McDonald 2010; Meglio 2010; Reeder 2014; Simonetti 2012; Tahir 2013 and high in Carlsen 2013.

Selective reporting (reporting bias)

All trials reported low risk of bias

Other potential sources of bias

Dennis 2002; Efrat 2015; Gallegos 2014; Simonetti 2012; Reeder 2014 reported other types of bias, Flax 2014 was unclear and other studies were low risk of other sources of bias.

Summary of main results

Based on the results, mobile phone intervention increases exclusive breastfeeding in 4 weeks post-partum compared to the standard care (OR 1.52, 95%CI 1.25 to 1.84, 2130 participants, 7 RCTs). This result was statistically significant. Test for overall effect: Z = 4.22 (P < 0.0001) Heterogeneity: Chi² = 10.18, df = 6 (P = 0.12); I² = 41% (figure 2)

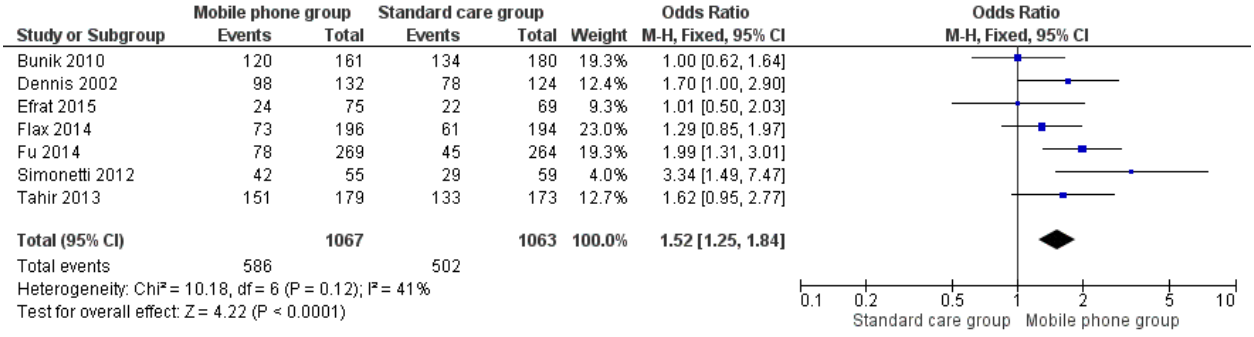

Figure 2: Forest plot compared mobile phone intervention versus standard care: outcome: exclusive breastfeeding within 4 weeks.

The evidence was high in considering the impact of mobile phone intervention on 2 to 3 months exclusive breastfeeding. The result was statistically significant comparing mobile phone intervention to the standard care (OR 1.49, 95%CI 1.28 to 1.74, 3519 participants, 12 RCTs, p-value< 0.00001).). Test for overall effect: Z = 5.21 (P < 0.00001). Heterogeneity: Chi² = 15.36, df = 11 (P = 0.17); I² = 28%

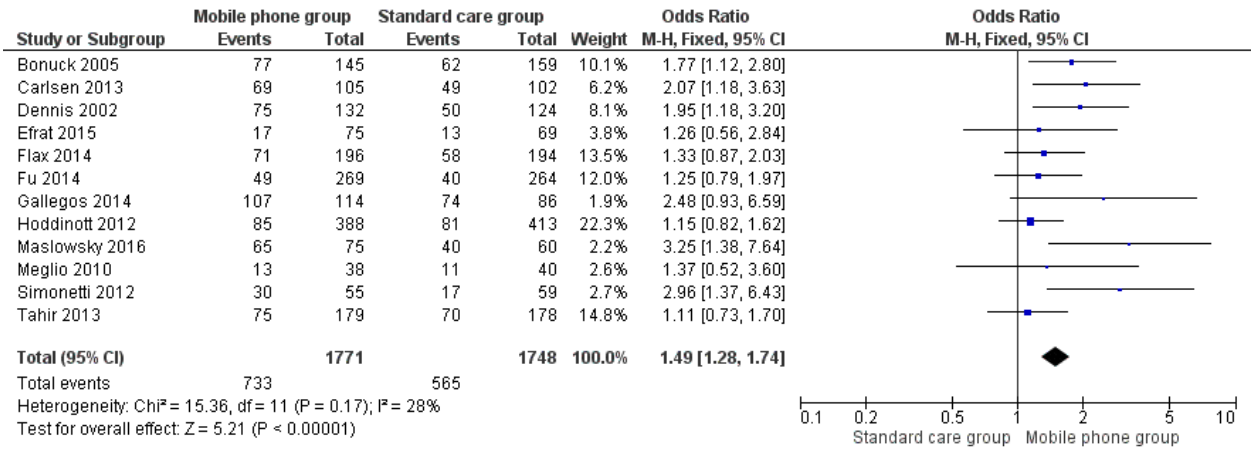

Figure 3: Forest plot compared mobile phone intervention versus standard care: outcome: exclusive breastfeeding from 2 to 3 months.

Therefore, mobile phone intervention did not improve exclusive breastfeeding in 6 months (OR 1.11, 95%CI 0.99 to 1.29, 3978 participants, 8 studies). Test for overall effect: Z = 1.36 (P = 0.17). Heterogeneity: $Chi^2 = 15.55$, df = 7 (P = 0.03); $I^2 = 55\%$

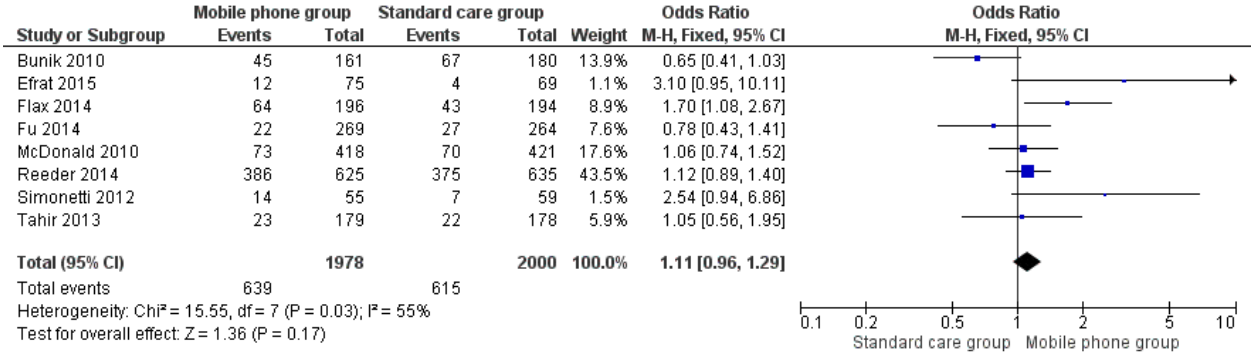

Figure 4: Forest plot compared mobile phone intervention versus standard care: outcome: exclusive breastfeeding within 6 months.

Formula feeding was increased the standard care group compared to mobile phone intervention group in 1 month post-partum (OR 1.12 95%CI 0.85 to 1.47, 5 RCTs, 1358 participants, p-value=0.44). This result was not statistically significant. Heterogeneity: $Chi^2 = 4.40$, df = 4 (P = 0.35); $I^2 = 9\%$

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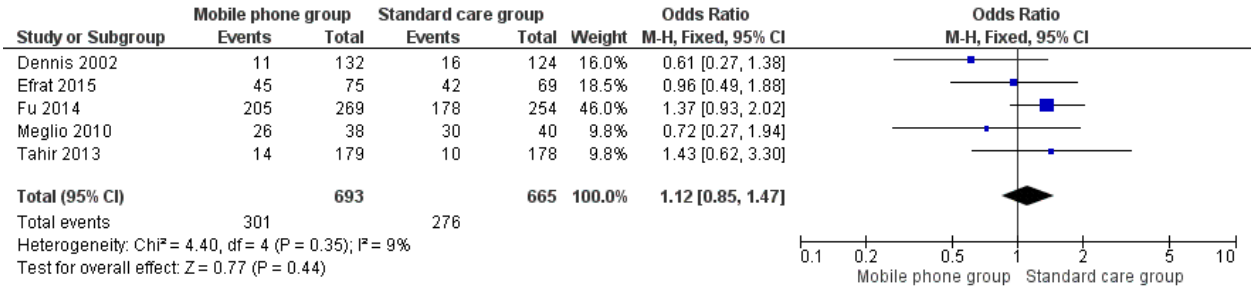

Figure 5: Forest plot compared mobile phone intervention versus standard care: outcome: formula breastfeeding within 4 weeks.

In 3 months, formula feeding was significantly increased compared to mobile phone group (OR 1.27 95%CI 1.05 to 1.54, 7 RCTS, 2359 participants, p-value=0.01). Heterogeneity: $Chi^2 = 12.71$, df = 6 (P = 0.05); $I^2 = 53\%$

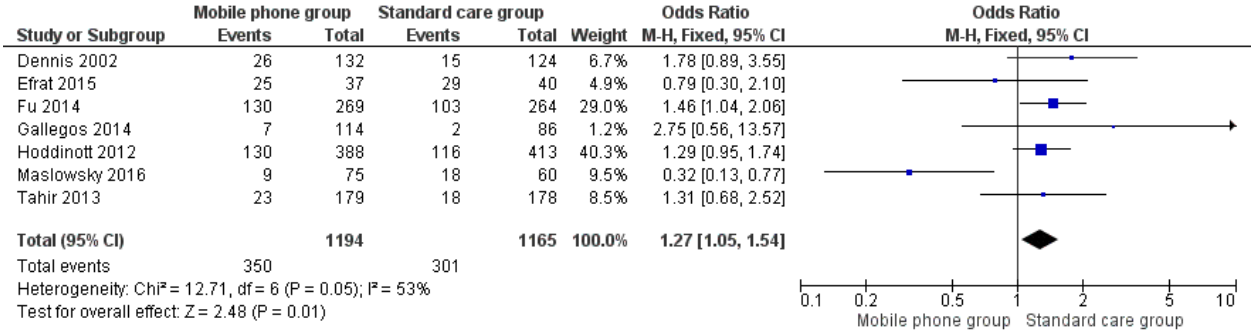

Figure 6: Forest plot compared mobile phone intervention versus standard care: outcome: formula breastfeeding within 3 months.

Formula feeding was not statistically improved in the control group compared to mobile phone group within 6 months of intervention (OR 1.16 95%CI 0.99 to 1.35, 3066 participants, 5 RCTs, Test for overall effect: Z = 1.89 (P = 0.06). Heterogeneity: $Chi^2 = 8.96$, df = 4 (P = 0.06); $I^2 = 55\%$

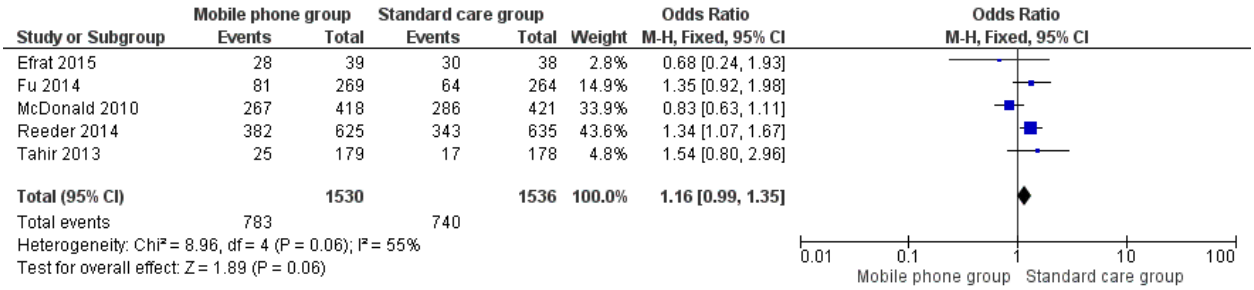

Figure 7: Forest plot compared mobile phone intervention versus standard care: outcome: formula breastfeeding within 6 months.

Subgroup analysis comparing studies conducted in developed versus developing countries revealed there was not statistically different results in exclusive breastfeeding from 2 to 3 months(test for subgroup differences: chi^2= 1.08, df=1, P=0.30) (figure 8).

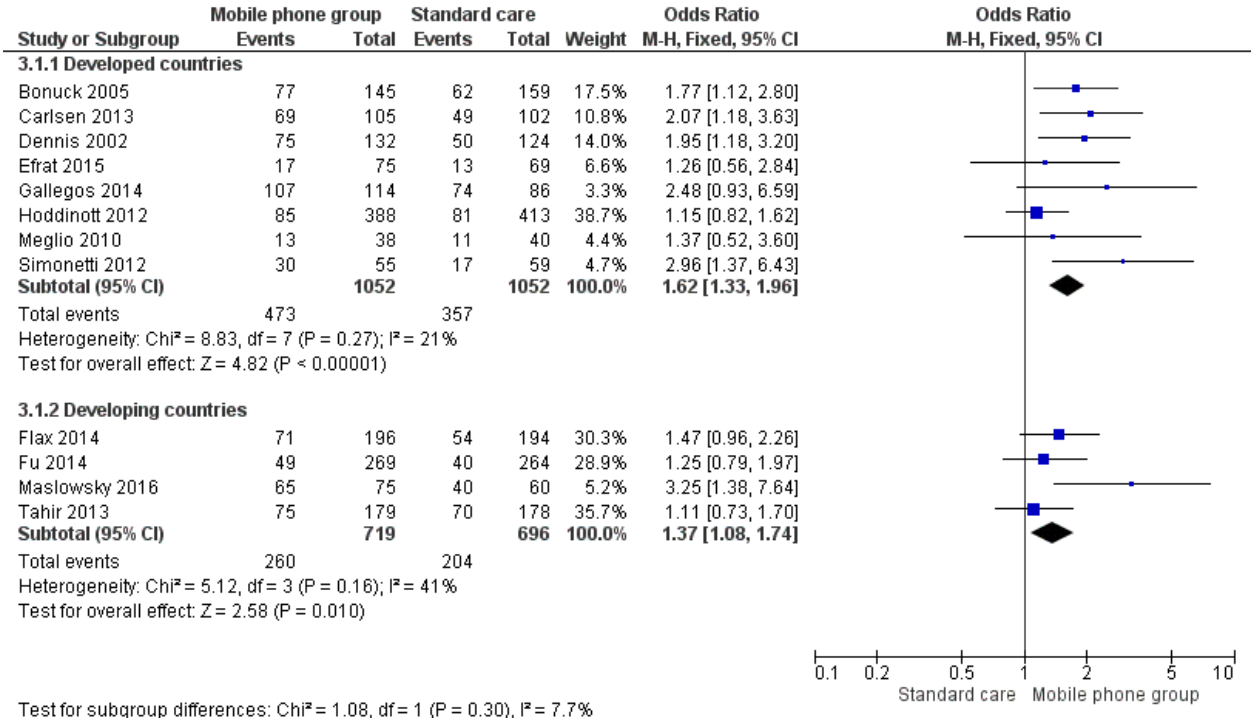

Figure 8: subgroup analysis comparing developed countries versus developing countries: outcome: exclusive breastfeeding from 2 to 3 months.

Subgroup analysis undertaken at 6 months comparing developed versus developing countries illustrated the results were nearly statistically significant (test for subgroup differences, chi2= 0.45, df =1, P=0.05)(figure 9).

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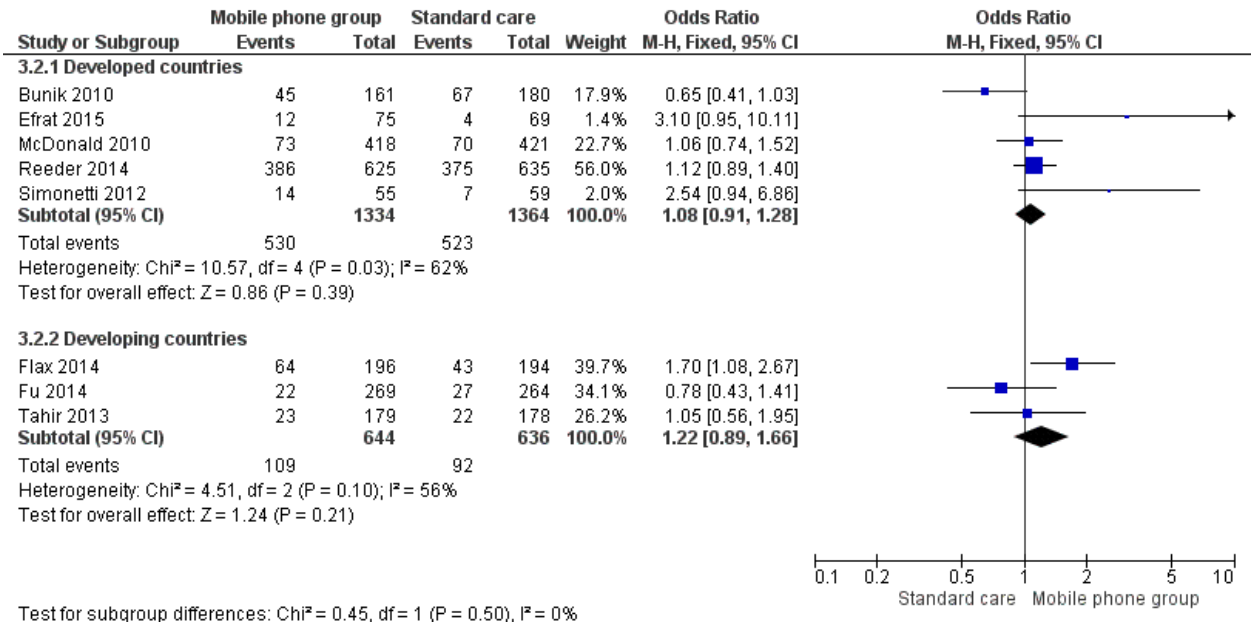

Figure 9: subgroup analysis comparing developed countries versus developing countries: outcome: exclusive breastfeeding within 6 months.

Discussion

Overall completeness and applicability of evidence

We conducted a systematic search of eligible in different database without any language restriction. This review included studies from low and middle income countries as well as industrialized countries. RCTs included in the overall results were fifteen, illustrating quite wide number of studies in the overall completeness. Considering the effectiveness of mobile phone intervention on exclusive breastfeeding, the evidence was graded as high in the first, second and third months of intervention. We undertook subgroup analysis comparing developed countries versus developing countries. Findings were as well as similar in different settings within three months of exclusive breastfeeding. This evidence could be effective when mobile phone intervention was applied within three months. However, subgroup analysis has illustrated nearly different results between developed and developing countries. In fact, mobile phone intervention appeared to lack efficacy in developed countries. This could be explained high rate of employment among working mothers. Working mothers are more likely to stop exclusive breastfeeding prematurely. By the way, adequate interventions should be studied to strengthen exclusive breastfeeding in working mothers within six months.

Quality of the evidence

We judged the overall methodological quality of included RCTs in this review to be mixed. In fact, we assessed over 75% of the studies to have low risk of bias for generating randomization sequence. We judged ten RCTs to have adequately

concealed group allocation (67%). The ability to effectively blind participants and personnel was inadequate, and then performance bias was estimated around 33.33%. In addition, detection was less minimized. Around 12.5% of RCTs reported low risk of detection bias. This could be explained by self-reported outcome used in almost all RCTs. Incomplete outcome data was less likely to be source of possible bias in this review. Among 15 RCTs included in this review, only one reported high risk of attrition bias. This was based intention to-treat analysis used in the studies. We assessed fifteen studies as being at low risk of bias for selective outcome reporting (100%) and we judged nine studies as low risk of other bias (see figure 10 and 11).

The quality of the evidence as described in Summary of findings for the main. For the outcome exclusive breastfeeding, the comparison mobile phone intervention versus standard care, we assessed the quality of evidence for exclusive breastfeeding as high respectively from four weeks to three months. Therefore, we downgraded the quality of evidence in six months because of imprecision. Concerning the comparison formula feeding versus standard care, the evidence was judged as moderate from one, three and six month. The evidence was downgraded either imprecision or high heterogeneity).

Potential biases in the review process

Bias can potentially be introduced at any stage of the review process. To minimize this, two review authors independently screened studies for inclusion and any disagreements were resolved by a third review author. Data extraction and 'Risk of bias' assessments were performed by one review author and then checked by a second review author. Again, any discrepancies were resolved by a third review author. 'Risk of bias' assessment is subjective in nature and therefore another team of review authors may have graded studies differently. To minimize language bias, we translated any study not reported in English into English, and included it in the review, providing it met the inclusion criteria. Whilst we attempted to identify all the evidence on interventions for the initiation of breastfeeding (including published abstracts from conference proceedings) and followed up ongoing studies, it is feasible that relevant research which is unpublished or not registered in a clinical trials register could have been missed. The funnel plot was symmetrical, strengthening the evidence that publication bias was minimized in this review (figure 12).

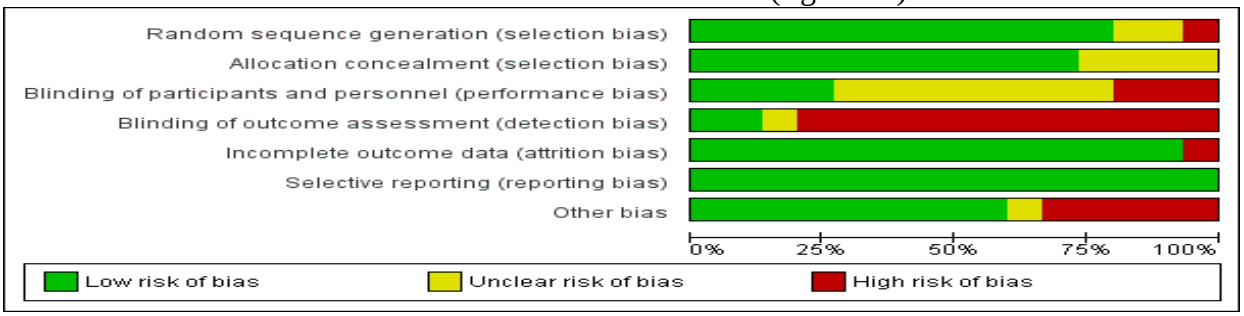

Figure 10: Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

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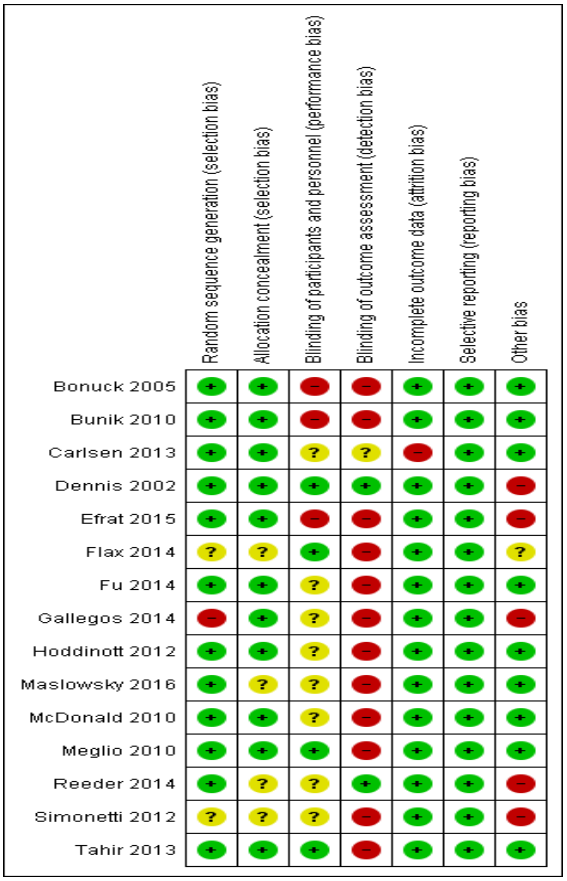

Figure 11: risk of bias summary: review authors' judgements about each risk of bias item for each included study.

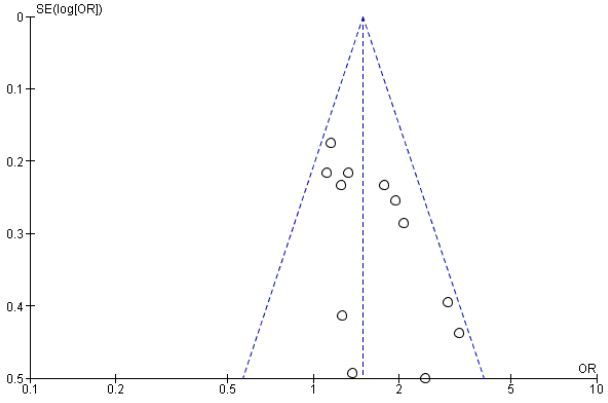

Figure 12: funnel plot of comparison: 1 Exclusive breastfeeding, outcome: 1.1 Exclusive breastfeeding 2 to 3 months.

Agreements and disagreements with other studies or reviews

Recent published work demonstrates that among low and middle income countries mobile phone communication for Improving Uptake of Antiretroviral Therapy in HIV-infected Pregnant Women (Tamuzi 2017) illustrated that mobile phone communication did not improve efficiently HIV outcomes. Therefore, this review should be considered in a context of several limitations. Most common reviews conducted in this field have shown positive outcomes; mHealth interventions improved health system (Kallander 2013; Tian 2017), improve chronic diseases outcomes (de Jongh 2012; Finitsis 2014; Thakkar 2016). Furthermore, (Finitsis 2014) found a dose-response between mobile interventions was likelihood to improve health outcomes. The use of new technologies may also be an area for future development, with one study in the review by Rollins 2016 suggesting that mass or social media promotion of breastfeeding potentially has a major effect on early initiation of breastfeeding.

Authors' conclusions

Implications for practice

In conclusion, the evidence has shown that mobile phone intervention improves significantly exclusive breastfeeding. Mobile phone communication improves exclusive breastfeeding from one until three months of intervention compared to the standard care. Mobile phone intervention could have a large application in clinical practice to ameliorate exclusive breastfeeding. Therefore, mobile phone interventions lack efficacy in improving

exclusive breastfeeding within six months. In fact, postpartum period is subject of several barriers that should be overcome. In fact, HIV, caesarean section, poverty, gender inequity and other barriers could interact negatively to exclusively breastfeed. Envisaging only one intervention in post-partum period could lack efficacy. We suggest at least two interventions to improve post-partum outcomes (Tamuzi 2017). However, Policy makers should propose mobile phone communication to improve breastfeeding.

Implications for research

Mobile phone interventions have proven its efficacy in improving exclusive breastfeeding from one to three months. This review included only randomized control trials, implying that the level of evidence was high. However, the interventions lack efficacy until six months.

New research should investigate how to strengthen mobile phone intervention to improve exclusive breastfeeding at least up to six months. Then, further research to evaluate interventions that combine mobile phone intervention and other type of community based interventions are needful to support exclusive breastfeeding efficiently. Those interventions should be based on creativity in health education, behavior change communication and healthy behaviors practiced at home and in the communities.

Acknowledgements

We sincerely thank the whole review team for different contribution.

Declarations of interest

Authors declared no conflict of interest.

Differences between protocol and review

Published notes

Tamuzi Lukenze Jacques, Muyaya Muyaya, Jonathan Tshimwanga Lukusa. Mobile phone and breastfeeding: systematic review of randomized control trials. PROSPERO 2015:CRD42015025943 Available from http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015025943

Characteristics of included studies

Bonuck 2005

Methods	The randomized, non-blinded, controlled trial
Participants	Two community health centers serving low income, primarily Hispanic and/or black women. Participants. The analytic sample included 304 women (intervention: n 145; control: n 159) with >1 postnatal interview
Interventions	Study lactation consultants attempted 2 prenatal meetings,

	a postpartum hospital visit, and/or home visits and telephone calls. Control subjects received the standard of care.
Outcomes	Cumulative breastfeeding intensity at 13 and 52 weeks, based on self-reports of weekly feeding, on a 7-level scale. The intervention group was more likely to breastfeed through week 20 (53.0% vs 39.3%). Intervention group: 77/145 Control group: 62/159
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	The project's bio statistical office generated and maintained a list of random codes for subjects, corresponding to the intervention and control assignment groups
Allocation concealment (selection bias)	Low risk	Each page was secured in a sealed envelope and labeled externally with the subject number, name of the study, and study contact information.
Blinding of participants and personnel (performance bias)	High risk	Neither the RA collecting breastfeeding outcome data nor the study LCs providing the intervention were blinded with respect to treatment group.
Blinding of outcome assessment (detection bias)	High risk	Cumulative breastfeeding intensity at 13 and 52 weeks, based on self-reports of weekly feeding, on a 7-level scale.
Incomplete outcome data (attrition bias)	Low risk	Lost to follow up seems to be balanced.
Selective reporting (reporting bias)	Low risk	The study protocol is available
Other bias	Low risk	the study seems to be free of other bias

Bunik 2010

Methods	**Randomized controlled trial comparing usual care to 2 weeks of daily telephone calls**
Participants	Women age 18 years or older who delivered a healthy, term, singleton infant and who were willing to consider breastfeeding were eligible. Women were excluded if their primary language was not English or Spanish, if they had medical complications that interfered with breastfeeding, and if they required a hospital stay longer than 72 hours for vaginal deliveries or longer than 96 hours for Cesarean section. intervention (n=161) and control (n = 180) groups setting: Denver Health and Hospitals
Interventions	The intervention consisted of daily telephone calls by trained bilingual (English/Spanish) nurses starting on the day of discharge and continuing daily for the first 2 weeks postpartum.
Outcomes	**exclusivity breastfeeding: 1 month** Intervention group: 120/ 161 Control group: 134/180 **exclusivity breastfeeding at 6 months** Intervention group: 45/ 161 Control group: 67/180
Notes	

Risk of bias table

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	All eligible mothers provided written informed consent and were randomized by block random allocation
Allocation concealment (selection bias)	Low risk	...was done using sequentially numbered opaque sealed envelopes

Blinding of participants and personnel (performance bias)	High risk	The allocation assignment was not blinded...
Blinding of outcome assessment (detection bias)	High risk	5-point Likert scale questionnaire developed by the authors (we found no published general feeding satisfaction scales)
Incomplete outcome data (attrition bias)	Low risk	We used an intention-to-treat analysis and excluded lost to follow-up and dropouts similarly.
Selective reporting (reporting bias)	Low risk	The study protocol was available. Clinical trials registration number NCT00717496
Other bias	Low risk	This study seems to be free of other bias

Carlsen 2013

Methods	**Randomized control trial**
Participants	226 obese pregnant women/Hvidovre Hospital, Copenhagen University.
Interventions	The initial contact was made within the first week. All participants were offered a minimum of 9 consultations during the first 6 mo provided that the mothers breastfed during the entire period. Three contacts were made during the first month, and thereafter, participants were contacted every second week until 8 wk postpartum and, thereafter, once monthly.
Outcomes	**Exclusive breastfeeding(3 months)** Intervention group=69/105 Control group=49/102 **Any breastfeeding(6 months)** 1.85 (1.06, 3.21) Intervention group=105 Control group=102
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Mother-newborn dyads were allocated (1:1) to the intervention by telephone support or control standard care
Allocation concealment (selection bias)	Low risk	By using a web based independent program.
Blinding of participants and personnel (performance bias)	Unclear risk	Not sufficient information to judge 'Yes' or 'No'
Blinding of outcome assessment (detection bias)	Unclear risk	Insufficient information to permit judgement of 'Yes' or 'No'
Incomplete outcome data (attrition bias)	High risk	Significant missing outcomes enough to introduce clinically bias
Selective reporting (reporting bias)	Low risk	This trial was registered at clinicaltrials.gov
Other bias	Low risk	The study seems to be free of other bias

Dennis 2002

Methods	**randomized controlled trial**
Participants	256 breast-feeding mothers from 2 semi-urban community hospitals near Toronto/Canada Peer support group(intervention group) n = 132 Control group n = 124
Interventions	Conventional care plus telephone-based support, initiated within 48 hours after hospital discharge, from a woman experienced with breast-feeding who attended a 2.5-hour orientation session).
Outcomes	Infant feeding categories at follow-up 4 weeks **Exclusive breast-feeding** Control group: 78/124 Intervention group:98/132 **Almost exclusive breast-feeding**

Control group:6/124

Intervention group:4/132

High breast-feeding

Control group:2/124

Intervention group:6/132

Partial breast-feeding

Control group:16/124

Intervention group:11/132

8 weeks

Exclusive breast-feeding

Control group:68/124

Intervention group:83/132

Almost exclusive breast-feeding

Control group:4/124

Intervention group:5/132

High breast-feeding

Control group:5/124

Intervention group:5/132

Partial breast-feeding

Control group:14/124

Intervention group:18/132

12 weeks

Exclusive breast-feeding

Control group:50/124

Intervention group:75/132

Almost exclusive breast-feeding

Control group:9/124

Intervention group:1/132

High breast-feeding

Control group:8/124

Intervention group:3/132

Partial breast-feeding

Control group:15/124

Intervention group:26/132

Notes

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomization was achieved using consecutively numbered

Allocation concealment (selection bias)	Low risk	sealed, opaque envelopes containing randomly generated numbers constructed by a biostatistician who was not involved in the recruitment process
Blinding of participants and personnel (performance bias)	Low risk	A research assistant blinded to group allocation telephoned all participants at 4, 8 and 12 weeks post-partum to collect data regarding current infant feeding status, breast-feeding problems encountered and health services used.
Blinding of outcome assessment (detection bias)	Low risk	Participants in both groups completed confidential questionnaires before randomization and at 4, 8 and 12 weeks post-partum.
Incomplete outcome data (attrition bias)	Low risk	An intention-to-treat approach was used to analyze the data.
Selective reporting (reporting bias)	Low risk	The study protocol is not available therefore the authors reported all expected outcomes.
Other bias	High risk	The study seems to have other type of bias.

Efrat 2015

Methods	**Randomized two-group design**
Participants	Pregnant low-income Hispanic women (298) were recruited from community health clinics in Los Angeles County (USA) Intervention group: 75 Control group: 69
Interventions	Control group mothers received the routine breastfeeding education and support offered by the NEVHC. Intervention group mothers received all of the services of the control group, plus a telephone-based breastfeeding intervention (described below). Inclusion criteria included: (a) 26 -34 weeks pregnant); (b) Medicaid recipient; (c) self-identified Hispanic; (d) available via telephone; and (e) not assigned to a WIC peer counsellor.

	The intervention entailed four prenatal and seventeen postpartum phone calls (first call initiated when mothers were in the third trimester of pregnancy and the last call when mother was six months postpartum). With the exception of prenatal contacts 2 and 3, all phone contacts were to be between 5-7 minutes in duration or as long as needed if the mother reported a breastfeeding concern. Prenatal phone contact 2 and 3 were to last about 20 minutes in duration, and focused on ensuring that the intervention participant was equipped with critical breastfeeding knowledge prior to the birth of her baby. The intervention participants were also provided with the lactation educator's phone number so they could contact her more frequently if need be. On occasion, text messages were used to implement phone contacts with participants.
Outcomes	**Not exclusively breastfeeding** Not breastfeeding(1 month) Intervention group: 5/75 Control group: 6/69 Not breastfeeding(3 months) Intervention group: 1/75 Control group: 3/69 Not breastfeeding(6 months) Intervention group: 3/75 Control group: 7/69 Breastfeeding, not exclusive(1 month) Intervention group: 45/75 Control group: 42/69 Breastfeeding, not exclusive(3 months)

	Intervention group: 25/37 Control group: 29/40 Breastfeeding, not exclusive(6 months) Intervention group: 28/39 Control group: 30/38 **Exclusive breastfeeding** Exclusively breastfeeding(1 month) Intervention group: 24/75 Control group: 22/69 Exclusively breastfeeding(3 months) Intervention group: 17/75 Control group: 13/69 Exclusively breastfeeding(6 months) Intervention group: 12/75 Control group: 4/69
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	...were randomized to either the control or intervention group using computer software.
Allocation concealment (selection bias)	Low risk	Randomization was blocked by weeks of recruitment.
Blinding of participants and personnel (performance bias)	High risk	The research assistants, who also served as lactation educators implementing the breastfeeding

		intervention, were not blinded with respect to the treatment groups.
Blinding of outcome assessment (detection bias)	High risk	To evaluate the efficacy of the breastfeeding intervention, research assistants collected self-reported breastfeeding data
Incomplete outcome data (attrition bias)	Low risk	Intention to treat was used to minimize attrition bias
Selective reporting (reporting bias)	Low risk	The study protocol is available
Other bias	High risk	The study seems to have other bias

Flax 2014

Methods	**Cluster-randomized controlled trial**
Participants	390 female microcredit clients among which 196 receiving a breastfeeding promotion intervention and 194 receiving the standard care/Bauchi State, Nigeria
Interventions	The intervention had 3 components: Trained credit officers led monthly breastfeeding learning sessions during regularly scheduled microcredit meetings for 10 mo. Text and voice messages were sent out weekly to a cell phone provided to small groups of microcredit clients (5–7women). The small groups prepared songs or dramas about the messages and presented them at the monthly microcredit meetings.
Outcomes	**Initiated breastfeeding within 1 hour of delivery** Intervention group:70/196 Control group:48/194 **Gave only colostrum/breast milk during the first 3 days** Intervention group:86/196 Control group:71/194

	Exclusively breast-fed 1 month Intervention group:73/196 Control group:61/194 3 months Intervention group:71/196 Control group:58/194 6 months Intervention group:64/196 Control group:43/194
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Block randomization was conducted at the level of the monthly meeting group. To ensure equal numbers of clusters and pregnant women in both study arms for each local partner, monthly meeting groups with similar numbers of clients and pregnant women were paired, with 1 group randomly assigned to intervention and the other to control using a Bernoulli random variable generated by 1 of the researchers.
Allocation concealment (selection bias)	Unclear risk	Not specified
Blinding of participants and personnel (performance bias)	Low risk	Baseline and final survey interviews were conducted by an independent team of trained data collectors

		unaware of the clients study arm assignment. Interviews were completed with the use of paper questionnaires.
Blinding of outcome assessment (detection bias)	High risk	The outcome was assessed through the interview
Incomplete outcome data (attrition bias)	Low risk	The intention treat was used in primary analysis.
Selective reporting (reporting bias)	Low risk	This trial was registered at clinicaltrials.gov
Other bias	Unclear risk	Our study design had some potential limitations

Fu 2014

Methods	**Multicentre, three-arm, cluster randomized controlled trial**
Participants	724 primiparous breastfeeding mothers with uncomplicated, full-term pregnancies/public hospitals in Hong Kong 264 to the standard care group 191 to the in-hospital support group 269 to the telephone support group
Interventions	The study interventions were: (1) standard hospital postnatal care; (2) in-hospital support that included three 30-minute professional breastfeeding support sessions in the first 48 hours postpartum; or (3) telephone follow-up support weekly for up to 4 weeks postpartum or until breastfeeding had been completely stopped.
Outcomes	**Exclusive breastfeeding** 1 month. Control group: 45/264 Intervention group:78 /269 2 months Control group: 40/264

	Intervention group: 59/269 3 months Control group: 40/264 Intervention group:49/269 6 months Control group: 27 /264 Intervention group: 22/269 **Any breastfeeding** 1 month Control group: 178/264 Intervention group: 205/269 2 months Control group:129 /264 Intervention group: 158/269 3 moths Control group: 103/264 Intervention group: 130/269 6 months Control group: 64/264 Intervention group: 81/269
Notes	

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Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	....there would be a high chance of contamination of the different intervention groups if participants within each hospital site were individually randomized to the three treatment groups. Therefore, cluster randomization was used with hospitals being the unit of randomization. Each week, we randomly assigned each study hospital to one of the three treatment groups.
Allocation concealment (selection bias)	Low risk	The allocation sequence was generated using an online program (www.randomization.com) by a person not involved in the subject recruitment or data collection, and were placed in sequential numbered opaque sealed envelopes.
Blinding of participants and personnel (performance bias)	Unclear risk	The research nurses and study sites were only informed of the weekly treatment allocation48 hours prior to commencing recruitment for that week... A study research assistant, who was blinded to the participants' treatment allocation, conducted the telephone follow-up.
Blinding of outcome assessment (detection bias)	High risk	Interview was used to assess the outcome.
Incomplete outcome data (attrition bias)	Low risk	All loss to follow-up was because we were unable to contact the participants.
Selective reporting (reporting bias)	Low risk	All outcomes were reported whether the protocol is not available.
Other bias	Low risk	The cluster randomization resulted in an imbalance in the number of participants in the three treatment groups.

Gallegos 2014

Methods	**Parallel randomized trials**
Participants	200 women were analyzed. intervention group(n=114) and control group(n=86)./Brisbane/Australia
Interventions	Allocated to intervention to receive SMS: single text message once a week for eight weeks. MumBubConnect (MBC) sent women a single text message once a week for eight weeks, asking them how their breastfeeding was proceeding to all women in the intervention group. It then asked for a standard response to which women received an automated reply. Women received a magnet and wallet card with the responses required. A response indicating some level of distress (for example, keyword of 'worried', 'confused' or 'down') prompted a trained Australian Breastfeeding Association (ABA) breastfeeding counsellor to make an outbound call within 24 hours. The text message responses were about normalizing common issues and problems (such as sore nipples, milk oversupply or under-supply), providing active solutions and affirming positive behaviour.
Outcomes	After 9 weeks **Exclusive Breastfeeding** Control group: 74/86 Intervention group :107/114 **Predominant Breastfeeding** Control group:1/86 Intervention group:4/114 **Partial feeding** Control group: 12/86 Intervention group: 7/114
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	all women who registered were allocated to the intervention group as a convenience sample
Allocation concealment (selection bias)	Low risk	the intervention group (n = 120) were directed to register at a website
Blinding of participants and personnel (performance bias)	Unclear risk	Not sufficient information
Blinding of outcome assessment (detection bias)	High risk	A questionnaire was used to assess outcome
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	the trial was registered in the Australian New Zealand Clinical Trials Registry
Other bias	High risk	The study had some other problem

Hoddinott 2012

Methods	**Randomized controlled trial embedded within a before-and-after study.**
Participants	There was no difference in feeding outcomes for women initiating breast feeding before the intervention (n=413) and after (n=388). Setting: A postnatal ward in Scotland. Sample: Women living in disadvantaged areas initiating breast feeding.
Interventions	After hospital discharge to intervention: daily proactive and reactive telephone calls for 14 days or control: reactive telephone calls for day 14.
Outcomes	**any breast feeding at 6 to 8 weeks** Intervention group:130/ 388 Control group: 116/413 **exclusive breast feeding at 6 to 8 weeks** Intervention group: 85/388

Control group: 81/413
Notes

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	...using a website randomization sequence service
Allocation concealment (selection bias)	Low risk	...the proactive group as they received a phone call from then feeding team within 24 h of hospital discharge
Blinding of participants and personnel (performance bias)	Unclear risk	The study did not provide enough information to judge 'Yes' or 'No'
Blinding of outcome assessment (detection bias)	High risk	Entire breastfeed observed...reporting was incomplete with information missing in 25% of randomized women.
Incomplete outcome data (attrition bias)	Low risk	Intention-to-treat analysis compared the randomized groups on cases with complete outcomes at follow-up.
Selective reporting (reporting bias)	Low risk	The study is protocol is available.
Other bias	Low risk	The sample size was small and as is common for pilot studies no sample size calculation was performed prior to the study.

Maslowsky 2016

Methods	Parallel randomized control trial
Participants	Overall, 102 women were assigned to the intervention group and 76 to the control group. postpartum women at two public hospitals in Quito, Ecuador, between June and August 2012
Interventions	Mothers assigned to the intervention group received a two-part intervention in addition to the standard treatment. Both parts of the intervention were delivered by one bachelor-degree-level, licensed Ecuadorian nurse with more than 15 years of clinical experience. Part 1 consisted of an educational session administered by the

	nurse via phone within 48 h of hospital discharge. The nurse followed a semi-structured patient education protocol, guided by a checklist of topics to cover and bullet points detailing the information to be provided.
Outcomes	**Breastfeeding exclusively at 3 months after delivery** Intervention group: 65/75 Control group: 40/60 **Feeding formula at 3 months after delivery** Intervention group: 9/75 Control group: 18/60
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	At enrollment, participants were assigned via a random number generator to either the intervention or the control group.
Allocation concealment (selection bias)	Unclear risk	not enough information to judge yes or no
Blinding of participants and personnel (performance bias)	Unclear risk	not enough information to judge yes or no
Blinding of outcome assessment (detection bias)	High risk	Breastfeeding and formula use were assessed by mothers' reports of whether they were exclusively breastfeeding (yes/no) and whether they were currently feeding the infant any formula (yes/no).
Incomplete outcome data (attrition bias)	Low risk	There was no significant difference in attrition rates in the intervention versus control groups, and attrition did not systematically vary according to demographic or baseline clinical characteristics (data not shown).

Selective reporting (reporting bias)	Low risk	The study protocol is available
Other bias	Low risk	the study seems to be free of other bias

McDonald 2010

Methods	**randomized controlled trial**
Participants	In total, 849 women were recruited with 425 allocated to the EMSgroup and 424 allocated to SMS group.
Interventions	The aim of the postnatal educational session was to complement information available in the promotional literature or on thein-house video. The session reinforced advice about positioning and attachment, and reviewed common breast-feeding problems, grow t hand development, crying patterns and settling techniques. On discharge from hospital, women in the EMS group were telephoned twice weekly and offered weekly home visits by a research midwife until their baby was six week sold. Where possible; women were contacted by the same midwife in order to maintain consistency of care.
Outcomes	The primary outcome was full breastfeeding at six months postpartum. A secondary outcome was breastfeeding to any degree at six months. **Any breastfeeding(6 months)** Intervention group: 267/ 418 Control group: 286/ 421 **Full breastfeeding(6 months)** Intervention group: 181/418 Control group: 179/ 421 **Exclusive breastfeeding(6 months)** Intervention group: 73/ 418 Control group: 70/ 421
Notes	

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Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomization...replenished in blocks of 12.
Allocation concealment (selection bias)	Low risk	Women were asked to select an envelope from a group of at least six sealed, opaque envelopes,
Blinding of participants and personnel (performance bias)	Unclear risk	Difficult to judge 'Yes' or 'No'
Blinding of outcome assessment (detection bias)	High risk	Outcomes were assessed through questionnaire
Incomplete outcome data (attrition bias)	Low risk	Data analysis was conducted on an 'intention to treat' basisusingSASVersion8.2
Selective reporting (reporting bias)	Low risk	The study protocol is available
Other bias	Low risk	The study seems to be free of other bias

Meglio 2010

Methods	**Randomized control trial**
Participants	78 subjects were randomized Intervention group: 38 and Control group: 40
Interventions	Intervention subjects were assigned to one of the peer support person based on the peer support persons's availability and case load. Peer support persons telephoned the new mother at 2, 4 and 7 days post discharge and then at 2, 3, 4 and 5 weeks post discharge.
Outcomes	**Any breastfeeding** Intervention group: 26/38 Control group: 30/40 **Exclusive breastfeeding** Intervention group: 13/38 Control group: 11/40
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	....computer-generated random numbers
Allocation concealment (selection bias)	Low risk	Envelopes were sealed and numbered...
Blinding of participants and personnel (performance bias)	Low risk	The PI was the only person aware of the group assignment and no direct contact with any of the subjects.
Blinding of outcome assessment (detection bias)	High risk	The outcomes were assessed through interviews
Incomplete outcome data (attrition bias)	Low risk	Lost to follow up seems to be minimized
Selective reporting (reporting bias)	Low risk	The study protocol is available
Other bias	Low risk	This study seems to be free of other bias

Reeder 2014

Methods	**Randomized Controlled Trial**
Participants	1948 breastfeeding women Control group: 635 Intervention group 1(low frequency peer counseling):625 Intervention group 2(high couples attending antenatal): 625
Interventions	3 intervention arms: no peer counseling, 4 telephone contacts, or 8 telephone contacts 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 schedules 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.
Outcomes	Outcomes included breastfeeding initiation as well as dichotomous outcomes of partial or exclusive breastfeeding for at **least 6 months** **Exclusive breastfeeding** Intervention group 1: 394/625 Intervention group 2(Phone): 386/625 Control group: 375/ 635 **Non -exclusive breastfeeding** Intervention group 1: 388/625 Intervention group 2(Phone): 382/625 Control group: 343/635
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	....after which they were randomly allocated to 1 of 3 study arms by using a computer-generated random number function.
Allocation concealment (selection bias)	Unclear risk	Information was not provided to judge 'Yes' or 'No'
Blinding of participants and personnel (performance bias)	Unclear risk	Not sufficient information to imply 'Yes' or 'No'
Blinding of outcome assessment (detection bias)	Low risk	Outcome was assessed through medical records.
Incomplete outcome data (attrition bias)	Low risk	The loss of follow up was not significant in the three groups to introduce attrition bias.

Selective reporting (reporting bias)	Low risk	The study protocol is available.
Other bias	High risk	This study has some limitations.

Simonetti 2012

Methods	**Randomized control trial**
Participants	The study was carried out on 114 primiparous women from February to March 2009. After randomization, women were divided into two groups: 55 receiving STC and 59 receiving conventional counselling. Setting: public Italian maternity
Interventions	Every mother in the experimental group received telephone calls during the first 6 weeks after delivery. The phone call timing was planned in accord by both the mother and LM. The frequency of phone calls was at least once per week; in addition, mothers were invited to call when necessary the LM to solve any breastfeeding problem. During every phone call, the LM gave support and all information on fully breastfeeding. No weekly calls were missed. Mothers enrolled in the control group received a standard counselling program, consisting of programmed periodical visits with the physician at 1, 3 and 5 months after delivery.
Outcomes	**Exclusively breastfeeding** 1 month Intervention group: 42/55 Control group: 25/59 3 months Intervention group: 30/55 Control group: 17/59 5 months Intervention group: 14/55

	Control group:7/59
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	We did not find enough information to judge
Allocation concealment (selection bias)	Unclear risk	Information provided was not enough to judge 'Yes' or 'No'
Blinding of participants and personnel (performance bias)	Unclear risk	It was difficult to judge 'Yes' or 'No'
Blinding of outcome assessment (detection bias)	High risk	The outcome was assessed through a questionnaire
Incomplete outcome data (attrition bias)	Low risk	Intention to treat was used to minimized lost to follow up
Selective reporting (reporting bias)	Low risk	All outcomes were reported
Other bias	High risk	The sample size might not be representative

Tahir 2013

Methods	**Parallel randomized controlled trial, Single blinded**
Participants	The intervention group (n = 179) and control group (n = 178). Maternity wards in a public hospital in Kuala Lumpur, Malaysia
Interventions	Lactation counseling given by certified lactation counselors via telephone twice monthly to each lactating mother, in addition to the current conventional care. Duration: 6 months
Outcomes	**Exclusive breastfeeding** 1 month Intervention group: 151/179 Control group: 133/178 4 months

	Intervention group: 75/179 Control group: 70/178 6 months Intervention group: 23/179 Control group: 22/178 **Stop breastfeeding** 1 month Intervention group: 14/179 Control group: 10/178 4 months Intervention group: 23/179 Control group: 18/178 6 months Intervention group: 25/179 Control group: 17/178
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	a list of random codes for the subjects was generated...using a blocked randomization method with a block size of four
Allocation concealment (selection bias)	Low risk	...a random allocation software program
Blinding of participants and personnel (performance bias)	Low risk	Only the Research Enumerator who collected the breastfeeding outcome

		data was blinded with respect to the treatment group.
Blinding of outcome assessment (detection bias)	High risk	A questionnaire was used to assess outcome
Incomplete outcome data (attrition bias)	Low risk	The loss of follow up was minimized and balanced in the two groups.
Selective reporting (reporting bias)	Low risk	Available protocol and the trial was registered
Other bias	Low risk	The study seems to be free of other source of bias

Characteristics of excluded studies

Agostino 2012

Reason for exclusion	**A retrospective chart audit**

Bruun 2016

Reason for exclusion	**Prospective cohort study**

Chen 1993

Reason for exclusion	**Quasi-experimental study**

Demirci 2016

Reason for exclusion	**Qualitative study**

Du 2013

Reason for exclusion	**A feasibility study.**

Flax 2016

Reason for exclusion	**Qualitative study design**

Hmone 2016

Reason for exclusion	**Qualitative study**

Jiang 2014

Reason for exclusion	**Quasi-experimental study design**

Labarere 2005

Reason for exclusion	**The intervention was out patient visit**

McLachlan 2014

Reason for exclusion	**Community based interventions**

Moniz 2015

Reason for exclusion	**Prospective cohort study and assess other types of outcomes.**

Parrilla-Rodriguez 2001

Reason for exclusion	**Prospective cohort study**

Whitford 2012

Reason for exclusion	**Qualitative study**

Characteristics of ongoing studies

Ericson 2013

Study name	**The effectiveness of proactive telephone support provided to breastfeeding mothers of preterm infants:**

	study protocol for a randomized controlled trial
Methods	Multicentre randomized control trial
Participants	breastfeeding mothers and their partners
Interventions	The intervention in this study is proactive telephone support initiated by the BST based at the NICU from which the infant is discharged. Daily phone calls from a member of the BST to the mother will be performed from day 1 until day 14 after discharge. In addition, the mother has the option to call someone in the BST during the same period (reactive telephone support).
Outcomes	infant breast milk (i.e. exclusive, partial, none) method of feeding (i.e. breast, bottle, cup, tube) and infant's weight
Starting date	May 2013
Contact information	jenny.ericson@ltdalarna.se
Notes	

Forster 2014

Study name	**Ringing Up about Breastfeeding: a randomized controlled trial exploring early telephone peer support for breastfeeding (RUBY) – trial protocol**
Methods	Parallel randomized controlled trial
Participants	primiparous women who have recently given birth to a live baby, are proficient in English and are breastfeeding or intending to breastfeed.
Interventions	For the intervention group, peers will make two telephone calls within the first ten days postpartum, then weekly telephone calls until week twelve, with continued contact until six months postpartum.
Outcomes	Breastfeeding duration
Starting date	April 2014
Contact information	d.forster@latrobe.edu.au
Notes	

Maycock 2015

Study name	**A study to prolong breastfeeding duration: design and rationale of the Parent Infant Feeding Initiative (PIFI) randomized controlled trial**
Methods	Factorial randomized controlled trial
Participants	couples attending antenatal

Interventions	The Medium Intensity Intervention 1 (MI1) and the High Intensity Intervention (HI) groups will include a specialized antenatal breastfeeding education session for fathers. Fathers randomized into either the Medium Intensity Intervention 2 (MI2) or the High Intensity Intervention groups (HI) will receive sequenced, motivational, social support and educational material that will include 'trouble shooting' suggestions for handling common breastfeeding related difficulties Push notifications delivered via the smartphone application will contain links to a library of more detailed web-based materials which fathers will be encouraged to share and discuss with their partner.
Outcomes	Primary outcomes Duration of any breastfeeding Duration of exclusive breastfeeding Secondary outcomes Age of introduction of formula Age of introduction of complementary foods ('solids') Infant feeding attitudes of both partners. Maternal breastfeeding self-efficacy
Starting date	6 June 2014
Contact information	jane.scott@curtin.edu.au
Notes	

Tarrant 2014

Study name	**Professional breastfeeding support to increase the exclusivity and duration of breastfeeding: a randomized controlled trial.**
Methods	randomized controlled trial
Participants	724 postnatal women admitted to postnatal obstetric units of three public hospitals between November 2010 and September 2011.
Interventions	Compared with the usual care group, the in hospitals support group and telephone support group.
Outcomes	breastfeeding (any and exclusive)
Starting date	June 2014
Contact information	tarrantm@hku.hk
Notes	

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Zakarija-Grkovic 2016

Study name	**Breastfeeding booklet and proactive phone calls for increasing exclusive breastfeeding rates: RCT protocol.**
Methods	Randomized control trials
Participants	Eligible participants will include primigravidae, with a singleton pregnancy, attending six(three public, three private) primary care obstetric practices between 20 and 32 weeks gestation who speak and Croatian and are planning to reside in the Country of split-Dalmatia for at least 1 year from recruitment.
Interventions	The intervention in this RCT is breastfeeding focused support in form of printed educational material and four proactive calls.
Outcomes	Exclusive breastfeeding and any breastfeeding
Starting date	2016
Contact information	irena.zakarija-grkovic@mefst.hr
Notes	

Summary of findings tables

Mobile phone interventions for Breastfeedding

Patient or population: patients with Breastfeedding
Settings: USA, Danmark, Canada, Nigeria, China, Australia, Scotland, Ecuador, Italia, Malasia
Intervention: Mobile phone interventions

Outcomes	Illustrative comparative risks* (95% CI) Assumed risk Control	Corresponding risk Mobile phone interventions	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
Exclusive breastfeeding 2 to 3 months Follow-up: 2 to 3 months	**Study population**		**OR 1.49** (1.28 to 1.74)	3519 (12 studies)	⊕⊕⊕⊕ **high**	
	323 per 1000	**416 per 1000** (379 to 454)				
	Moderate					
	345 per 1000	**440 per 1000** (403 to 478)				
Exclusive breastfeeding until 6 months Follow-up: median 6 months	**Study population**		**OR 1.11** (0.96 to 1.29)	3978 (8 studies)	⊕⊕⊕⊖ **moderate**[1]	
	308 per 1000	**330 per 1000** (299 to 364)				
	Moderate					
	145 per 1000	**158 per 1000** (140 to 180)				
Exclusive breastfeeding in 1 month Follow-up: median 4 weeks	**Study population**		**OR 1.52** (1.25 to 1.84)	2130 (7 studies)	⊕⊕⊕⊕ **high**	
	472 per 1000	**576 per 1000** (528 to 622)				
	Moderate					
	492 per 1000	**595 per 1000** (548 to 641)				

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **OR:** Odds ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] The 95 % CI included the null value

Mobile phone interventions for Breastfeeding

Patient or population: patients with Breastfeeding
Settings: USA, Danmark, Canada, Nigeria, China, Australia, Scotland, Ecuador, Italia, Malasia
Intervention: Mobile phone interventions

Outcomes	Illustrative comparative risks* (95% CI) Assumed risk Control	Corresponding risk Mobile phone interventions	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
Formula feeding 1 month Follow-up: median 4 weeks	**Study population**		**OR 1.12** (0.85 to 1.47)	1358 (5 studies)	⊕⊕⊕⊖ **moderate**[1]	
	415 per 1000	**443 per 1000** (376 to 511)				
	Moderate					
	609 per 1000	**636 per 1000** (570 to 696)				
Formula feeding within 3 months Follow-up: median 3 months	**Study population**		**OR 1.27** (1.05 to 1.54)	2359 (7 studies)	⊕⊕⊕⊖ **moderate**[2]	
	258 per 1000	**307 per 1000** (268 to 349)				
	Moderate					
	281 per 1000	**332 per 1000** (291 to 376)				
Formula feeding until 6 months Follow-up: median 6 months	**Study population**		**OR 1.16** (0.99 to 1.35)	3066 (5 studies)	⊕⊕⊕⊖ **moderate**[3]	
	482 per 1000	**519 per 1000** (479 to 557)				
	Moderate					
	540 per 1000	**577 per 1000** (538 to 613)				

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **OR:** Odds ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] The null value was included in the 95%CI
[2] There was hetergeneity between studies
[3] The 95 % CI included the null value

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