PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Association between Home Birth and Breast Feeding Outcomes: a Cross-Sectional Study in 28,125 Mother-Infant Pairs from Ireland and UK
AUTHORS	Quigley, Clare; Taut, Cristina; Zigman, Tamara; Gallagher, Louise; Campbell, Harry; Zgaga, Lina

VERSION 1 - REVIEW

REVIEWER	Prof Helen Ball Durham University, UK
REVIEW RETURNED	24-Dec-2015

GENERAL COMMENTS	This paper addresses a valid and interesting research question that is clearly articulated with appropriate outcome measures. The paper is clearly written and the analyses appear to have been conducted appropriately. I am not convinced it is appropriate to claim 'this is the largest study' when the authors are reporting parallel analyses of two separate studies. The question would best be answered using longitudinal data, but these are not available. The datasets used were not generated with this research question in mind and therefore there are some limitations. Most of these are acknowledged, but some are not. One limitation not mentioned by the authors is the retrospective nature of the data, reliant on maternal recall of events that may have happened 6 to 9 months previously. When mothers are asked about their breastfeeding history retrospectively there is a tendency for them to 'round-up' or to extend their reported breastfeeding duration due to social desirability. The reported data may therefore be over-inflated and has not been validated against contemporaneous records. This should be noted. Another limitation is the self-selected nature of the cohorts, especially the GUI cohort and the need for respondents to return questionnaires. This means that only the most literate and motivated mothers would be likely to take part, and those with an interest in the topic. Even though the UKMCS cohort over-recruited lower SES groups, participants were still self-selected to opt-in to the study. A key birth-related factor that is increasingly being recognised in breastfeeding outcomes is analgesia presence and type during labour. This should be discussed -- home births are likely to involve no or minimal analgesics, while their use is common in hospital births. Their use (even in the small doses used in epidurals) are now known to cause lethargy in the infant and to delay milk production, both of which interfere with breastfeeding initiation.

| | Another two key variables that are not examined/available here are prenatal breastfeeding intent and previous breastfeeding success. The association of these factors with breastfeeding outcomes, and the lack of information on their role in the associations found here should also be mentioned. |
| | Ethical approval is mentioned for GUI, but not for UKMCS. |

| **REVIEWER** | Sunny Hallowell
Villanova University - USA |
| **REVIEW RETURNED** | 27-Dec-2015 |

GENERAL COMMENTS	Thank you for the opportunity to review this important study. Strong work. A few suggestions below.
	It would be very helpful for the reader to understand what the rate of home birth vs. hospital birth is in Ireland in the opening paragraph of the paper.
	Pg 5 ln 27: Also to compare the national rate of breastfeeding in Ireland to the rest of the UK or EU. (Breastfeeding rates are low compare to ....)
	Pg 5 ln 28: You should state why they chose 6 months as a rate of duration. In the U.S. it is because this coincides with the immunization schedule, though the recommendation is now 12 months by the AAP.
	Pg 5 ln 32: Consider adding WHY the WHO states women have low breastfeeding rates (eg. lack of support, knowledge, prenatal care etc.)
	Pg 8: Consider including the N of all eligible babies as well as participating parents.
	Pg 8: Please add detail for why you included both the GUI And UK datasets
	Pg 8: Covariates - please consider adding rational for the covariates you list as "typically considered" - why are they typically considered and what is the relationship to breastfeeding in Ireland?
	Pg9: It is unclear what the adjustments were for the covariates? Were they included in the model because of significance in terms of correlation? Did you perform a step-wise regression to determine what the final variables were in the final model? Or did you include variables using VIF to reduce multicollinearity among variables? Detail would help the reader understand your analysis.
	Pg 12: Consider putting the first paragraph in the introduction?
	Pg 14: Multiple messages - is this due to hospital birth? Might want to include challenges to the overall health system that contributed to this fragmented care. What is the role of the paediatrician in breastfeeding support in the UK? Who are the multiple care providers for the mother? For the infant? Why is this?

Why is there such wide variation in adherence to first visits? To the pediatrician? or Midwife?

Pg 15: It would be helpful if you would provide some detail of the psychological factors that hinder breastfeeding, other than stress, consider depression, other children, poverty

Pg 15: the most interesting part of the paper has the potential to be the unmeasured factors. It is unclear what these might be. Do they hold the keys to improved breastfeeding at home? Is it because mothers have individual support from a midwife vs. a nurse who is overwhelmed caring for 3 other patients or more in a hospital? Is breastfeeding at home influenced by the contrast of hospital delivery systems or individual maternal choice?

Pg 16: Why are hospital births associated with formula supplementation? Is it because of the higher frequency of infants who are born late preterm or in distress or mothers with complications? Higher formula use may be related to more complex deliveries rather than maternal choice. OR poor nurse staffing where no one has the time to support mothers to breastfeed. Or poor resources, no lactation consultants on staff, OR physicians who believe that breastfeeding is the best form of nutrition and that it is possible in the hospital setting. Rationale to support this statement would be very helpful

Conclusion: Currently breastfeeding rates fall short of WHO recommendations - please clarify where - in Ireland?

Overall: An improved discussion regarding the rationale for why home birth seems to be associated with improved breastfeeding exists would be helpful. One suggestion would be to focus the discussion should on resources available on home birth that are distinct from the hospital and process of birth and postpartum care that are different.

Thank You.

REVIEWER	Leslie A. Parker University of Florida United States
REVIEW RETURNED	31-Dec-2015

GENERAL COMMENTS	This is an extremely well written manuscript with minor editorial errors on a very interesting and important subject. Methodology: Additional information regarding the questionnaire is needed including how and when following birth it was administered. Timing may be important due to ability of the mothers to recollect this information Please clarify why folic acid supplementation would be a covariate. Please write out what HSE and NICE stand for when first introduced in the manuscript. Page 9: line 41-43: please clarify why assisted deliveries was not discussed in the methodology section. Page 9: line 47: please discuss how you will determine a mother's world view. It is also not clear what this refers to Discussion: please include a discussion of the potential etiology of

	the lack of correlation between breastfeeding and support.
	Page 14: line 10-37: please rewrite this paragraph for clarity
	Page 15: second paragraph: This could also be related to the infant and/or mother being at higher risk.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Prof Helen Ball
Durham University, UK

1. This paper addresses a valid and interesting research question that is clearly articulated with appropriate outcome measures. The paper is clearly written and the analyses appear to have been conducted appropriately.
Response:
We thank Prof Ball for her favourable opinion and useful comments.

2. I am not convinced it is appropriate to claim 'this is the largest study' when the authors are reporting parallel analyses of two separate studies.
Response:
In the article summary, we have changed the sequence so that it is upfront clear two separate cohorts have been analysed. Distinction to other studies is that population cohort has been used, and this has now been clarified (introduction), moreover, both studies alone are still larger than any previous population cohorts examined in this context.
[article summary]
♣ Two large nationally representative cohorts comprising 28,125 mother-infant pairs were included in the analysis
♣ These are the largest population cohorts studied to date that comprehensively examined the relationship between breast feeding and place of birth in low-risk pregnancies
[introduction]
"Here, we explore the relationship between place of birth and breast feeding outcomes in mother-infant pairs at low risk of birth complications in two large population cohorts, to deliver the largest and most comprehensive study of the relationship between home birth and breast feeding to date."

3. The question would best be answered using longitudinal data, but these are not available. The datasets used were not generated with this research question in mind and therefore there are some limitations. Most of these are acknowledged, but some are not.
One limitation not mentioned by the authors is the retrospective nature of the data, reliant on maternal recall of events that may have happened 6 to 9 months previously. When mothers are asked about their breastfeeding history retrospectively there is a tendency for them to 'round-up' or to extend their reported breastfeeding duration due to social desirability. The reported data may therefore be over-inflated and has not been validated against contemporaneous records. This should be noted.
Response:
We agree with the reviewer and extend our limitation sections to include limitations arising from recall bias.
[discussion]
"Limitations also include maternal reporting of the information and consequential risk of recall bias as longer breast feeding duration may have been reported due to social desirability; however, there is no reason to expect differential reporting according to place of birth."

4. Another limitation is the self-selected nature of the cohorts, especially the GUI cohort and the need for respondents to return questionnaires. This means that only the most literate and motivated mothers would be likely to take part, and those with an interest in the topic. Even though the UKMCS

cohort over-recruited lower SES groups, participants were still self-selected to opt-in to the study.
Response:
As in any study, self-section of participants is a difficult issue to deal with and can be addressed only partially. When participants were opting-in to the study, larger proportion of those who are better off tend to volunteer. In GUI and UKMCS, participants were selected from registers and invited to participate, and they could, of course, choose to opt-OUT; however, the issue of self-selection is attenuated when compared to opt-IN studies. In GUI, interviews were conducted by trained interviewers and they took place in the family home, in their entirety – there was no need to return the questionnaires by post, for example. Both studies were general studies of health and lifestyle, so interest in home birth or breastfeeding is unlikely to have influenced participation. Having all that said, the issue of self-selection remains so we have added a note to the limitations section:
[discussion]
"Similarly, participants could self-selected through opting-out from the study, and therefore underrepresentation of lower socioeconomic groups may have occurred."

5. A key birth-related factor that is increasingly being recognised in breastfeeding outcomes is analgesia presence and type during labour. This should be discussed -- home births are likely to involve no or minimal analgesics, while their use is common in hospital births. Their use (even in the small doses used in epidurals) are now known to cause lethargy in the infant and to delay milk production, both of which interfere with breastfeeding initiation.
Response:
We thank the reviewer for this point and accept that this is relevant for the present study. We included a point about this in the section where intrapartum interventions (that are also more common in hospital births) are discussed.
[discussion]
"Apart from interventions, analgesia during labour is also common in hospital birth but rare in home birth. This is relevant because analgesia has been shown to cause lethargy in the infant and to delay milk production, thereby interfering with breastfeeding initiation(Ransjo-Arvidson, Matthiesen et al. 2001)."

6. Another two key variables that are not examined/available here are prenatal breastfeeding intent and previous breastfeeding success. The association of these factors with breastfeeding outcomes, and the lack of information on their role in the associations found here should also be mentioned.
Response:
Unfortunately, information on breastfeeding intent and previous breastfeeding success was not available. We have included a remark on this in limitations section and add a section on other psychological factors that may affect breastfeeding (also see response to Reviewer 2 comment 11).
[discussion]
"...and we did not have information on breast feeding intent or previous success."

7. Ethical approval is mentioned for GUI, but not for UKMCS.
Response:
Thank you – this has now been specified in text.
[methods]
"…and study received ethics approval from National Health Service Ethical Authority."

Reviewer: 2
Sunny Hallowell
Villanova University - USA

1. Thank you for the opportunity to review this important study. Strong work. A few suggestions below.

Response:
We thank the reviewer for taking time to review our paper, and for their positive opinion and useful comments that helped improve our manuscript.

2. It would be very helpful for the reader to understand what the rate of home birth vs. hospital birth is in Ireland in the opening paragraph of the paper.
Response:
The paragraph from Discussion has been moved to the Introduction to describe this upfront.

3. Pg 5 ln 27: Also to compare the national rate of breastfeeding in Ireland to the rest of the UK or EU. (Breastfeeding rates are low compare to ....)
Response:
This has been added to the introduction.
[introduction]
"This is particularly true for Ireland, where the breast feeding initiation rates are low, at 56% in 2008-2009,(Brick and Nolan 2013, Ladewig, Hayes et al. 2014) compared to 81% reported in the UK in 2010.(NHS 2010)"

4. Pg 5 ln 28: You should state why they chose 6 months as a rate of duration. In the U.S. it is because this coincides with the immunization schedule, though the recommendation is now 12 months by the AAP.
Response:
We have amended the text to include current AAP recommendations:
[introduction]
"Apart from initiation, many recent government health policies, nationally and internationally, aim to maximise the six month exclusive breast feeding(Breastfeeding 2005) (Prevention 2014) and continued breast feeding for a year or longer.(Pediatrics. 2012)"
We feel that details on development and rationale behind guidelines can be found elsewhere, and could not be given in their entirety here.

5. Pg 5 ln 32: Consider adding WHY the WHO states women have low breastfeeding rates (eg. lack of support, knowledge, prenatal care etc.)
Response:
Discussion section of the paper is structured around various issues that may affect breastfeeding and these are described in detail and supported with references. To avoid duplication, we prefer to keep it in discussion only and keep it focused on aspects that relate to both breastfeeding and home birth.

6. Pg 8: Consider including the N of all eligible babies as well as participating parents.
Response:
Due to specific delivery and other circumstances associated with multiple birth – all of which could confound the analysis between breast feeding and home birth, only singletons were included in our analysis. This means that the number of families included in our study is equal to the number of infants.
We feel that adding detail on handling twins, triplets etc. in datasets would be redundant. For example, there is a total of 398 non-singleton children included in the GUI data. Given the random sampling procedures used for the nine-month cohort, only in a small number of cases (54) were both twins from any one set selected into the sample independently. In these 54 cases, information for both twins is included in the data file – but since these are anyway excluded it does not make sense to burden the reader with unnecessary detail.

7. Pg 8: Please add detail for why you included both the GUI And UK datasets
Response:

We used two cohorts we had access to, to increase statistical power, test hypothesis when using varied study designs, and to check consistency of findings. The following text was added to the Methods section:

[methods]

"We chose to use two cohorts with complementary strengths and weaknesses to examine consistency of findings and increase statistical power."

8. Pg 8: Covariates - please consider adding rational for the covariates you list as "typically considered" - why are they typically considered and what is the relationship to breastfeeding in Ireland?

Pg9: It is unclear what the adjustments were for the covariates? Were they included in the model because of significance in terms of correlation? Did you perform a step-wise regression to determine what the final variables were in the final model? Or did you include variables using VIF to reduce multicollinearity among variables? Detail would help the reader understand your analysis.

Response:

We have consulted published studies to select covariates for the adjusted model. Studies were selected according to their relevance to our research question (Shearer 1985, Dowswell, Thornton et al. 1996, Johnson and Daviss 2005, Lanting, Van Wouwe et al. 2005, van Rossem, Oenema et al. 2009, Al-Sahab, Lanes et al. 2010, Brocklehurst, Hardy et al. 2011, Catling-Paull, Coddington et al. 2013, Norris, Collin et al. 2013).

While we agree with the reviewer that backwards stepwise regression would be appropriate, the issue in this paper is that we are reporting on 4 outcomes for two cohorts – that is eight models in total. After inspection of fully adjusted models, most of covariates happen to be statistically significant, but some are not (and would have been discarded in stepwise regression). However, covariates that would end up excluded are not perfectly overlapping between models and cohorts. To ensure comparability between models and consistency of adjustments, we decided to report fully adjusted model in the paper, but we employed backwards stepwise regression for each model (reduced model) to ensure that there is no noteworthy change in the relationship between breastfeeding and home birth.

The way analysis has been done has been explicitly stated in Methods:

[methods; statistical analysis]

"Covariates chosen for the fully adjusted model that were: infant's gender, birthweight, gestation, delivery mode, mother's age, marital status, parity, BMI, smoking, education, socio-economic status, income, ethnicity, alcohol, stress, depression, return to work and support. While we report results from the full model to enable comparison, we used step-wise backwards regression removing least significant covariate at the time, and we check consistency of findings between fully adjusted and reduced models."

[results]

"Only minor differences were observed between fully adjusted and reduced model."

9. Pg 12: Consider putting the first paragraph in the introduction?

Response:

We agree - the paragraph from Discussion has been moved to the Introduction.

10. Pg 14: Multiple messages - is this due to hospital birth? Might want to include challenges to the overall health system that contributed to this fragmented care. What is the role of the paediatrician in breastfeeding support in the UK? Who are the multiple care providers for the mother? For the infant? Why is this?

Why is there such wide variation in adherence to first visits? To the pediatrician? or Midwife?

Response:

In this paragraph we attempt to depict different "tracks" mothers end up following as a direct consequence of place of birth they opted for. Those tracks – home birth and hospital birth track, have

an impact at the time of the birth but also in the early postnatal period, and we wanted to highlight some differences and give an example how even when intention is there (public health nurse visit within 48h of discharge), it does not always happen in practice. We feel it is beyond the scope of this paper to go into details of breastfeeding support providers, as discussion on these issues and details on policy implementation can be found elsewhere. Here, we attempt to focus on issues directly pertinent to the relationship between place of birth and breastfeeding.

11. Pg 15: It would be helpful if you would provide some detail of the psychological factors that hinder breastfeeding, other than stress, consider depression, other children, poverty
Response:
We agree with the reviewer that a mention of other psychological factors is warranted. We included the following paragraph:
[discussion]
"Additional psychological factors that have been known to affect breastfeeding include anxiety, adaptability, mother's priorities and mothering self-efficacy, breastfeeding self-efficacy, dispositional optimism, faith in breastmilk, breastfeeding expectations, planned duration of breastfeeding and the time of the infant feeding decision and other;53 54 unfortunately, we were unable to study these."

12. Pg 15: the most interesting part of the paper has the potential to be the unmeasured factors. It is unclear what these might be. Do they hold the keys to improved breastfeeding at home? Is it because mothers have individual support from a midwife vs. a nurse who is overwhelmed caring for 3 other patients or more in a hospital? Is breastfeeding at home influenced by the contrast of hospital delivery systems or individual maternal choice?
Response:
We agree with the reviewer: the most interesting part of the paper could be the unmeasured factors. We also agree that it is unclear what these may be. In this paragraph (on unmeasured and/or unmeasurable differences between mothers who opt for hospital vs. home birth), we attempted to highlight exactly that – the differences that may be confounding the relationship between place of birth and breastfeeding are unclear and may involve anything from personality, "worldview", priorities… In this section we focus on mothers' characteristics and not on the interactions with health care system (support from midwife etc). Future work is needed to examine these vague areas of potential differences, and hopefully new findings will help address problematic issues and improve breastfeeding rates.
Text has been modified to clarify this:
[discussion]
"Thirdly, the mothers who deliver at home may differ in unmeasured and/or unmeasurable factors, such as in personality, believes, lifestyle choices, or in their attitudes towards birth and infant feeding. Many of these potential factors are difficult to capture or even define clearly."

13. Pg 16: Why are hospital births associated with formula supplementation? Is it because of the higher frequency of infants who are born late preterm or in distress or mothers with complications? Higher formula use may be related to more complex deliveries rather than maternal choice. OR poor nurse staffing where no one has the time to support mothers to breastfeed. Or poor resources, no lactation consultants on staff, OR physicians who believe that breastfeeding is the best form of nutrition and that it is possible in the hospital setting. Rationale to support this statement would be very helpful
Response:
The issue of formula feeding in hospital is a known problem and has been studied in multiple instances in different settings. The text has been modified to include reviewer's suggestions:
[discussion]
"In hospitals, supplementation may be encouraged due to busy clinical routine or inadequate staffing, where formula feeding is a more convenient solution to feeding problems than diagnosis and

treatment of breast feeding issues;61 a further barrier to supporting breast feeding may be the lack of lactation consultant and/or staff training in breast feeding needs.62"
We feel that further discussion into formula feeding practices in hospitals is beyond the score of this paper; we merely wanted to lay out this issue as another potential contributor to lower breastfeeding rates in hospital-born infants.

14. Conclusion: Currently breastfeeding rates fall short of WHO recommendations - please clarify where - in Ireland?
Response:
This has been clarified.
[discussion]
"Currently breast feeding rates fall short of WHO recommendations in Ireland and the UK. This is particularly true for the rate of breast feeding exclusively for six months, which occurred in less than 10% of infants in this study."

15. Overall: An improved discussion regarding the rationale for why home birth seems to be associated with improved breastfeeding exists would be helpful. One suggestion would be to focus the discussion should on resources available on home birth that are distinct from the hospital and process of birth and postpartum care that are different.
Response:
We have modified the discussion in response to reviewer's comments. Discussion is systematically structured around differences, known and hypothesised, between home and hospital birth, including: the health care provision and resources, health system interaction with the family, psychological factors and differences in maternal characteristics. Current study is unable to answer why is homebirth associated with improved breastfeeding rates, but we do attempt to discuss our results in broader context and suggest factors that could be influencing the observed relationship.

Reviewer: 3
Leslie A. Parker
University of Florida

1. This is an extremely well written manuscript with minor editorial errors on a very interesting and important subject.
Response:
We thank the reviewer for their favourable opinion of our work and taking the time to provide helpful comments.

2. Methodology:
Additional information regarding the questionnaire is needed including how and when following birth it was administered. Timing may be important due to ability of the mothers to recollect this information. Please clarify why folic acid supplementation would be a covariate.
Response:
We agree with the reviewer that timing and method of administering the questionnaire is important. This information is given in Methods section, for GUI:
"The interviews with families took place in 2008-2009, when the infants were nine months old, and were carried out by trained interviewers using a detailed questionnaire;
and for UKMCS:
"Trained interviewers carried out interviews with 18,552 families during home visits in 2001–2002 when the infants were approximately nine months old (mean age: 9.7 months).(Hawkins, Cole et al. 2008)"
Details on limitations due to recall bias are also now discussed in Strengths and Weaknesses section.

Maternal folic acid supplementation during pregnancy is a very simple covariate that can be captured easily. It was considered as a proxy of preparation for and care during pregnancy, and we decided to include it as it could be related to maternal views and attitudes.

3. Please write out what HSE and NICE stand for when first introduced in the manuscript.
Response:
This has been addressed (in Introduction, paragraph 3).

4. Page 9: line 41-43: please clarify why assisted deliveries was not discussed in the methodology section.
Response:
This omission has been corrected and the following sentence has been added to Methods:
[methods]
"Further details collected about birth covered elective/planned or emergency Caesarean section, vaginal breech delivery and suction (vacuum extraction) or forceps assisted delivery."

5. Page 9: line 47: please discuss how you will determine a mother's world view. It is also not clear what this refers to
Response:
This relates to the table shown in supplementary where maternal characteristics according to place of birth are given. The sentence reviewer refers to in Methods section has been changed, and now it reads:
"Because maternal characteristics and lifestyle may be main confounders that affect both preference for home birth and breast feeding, we also examined the differences between two groups of mothers."

6. Discussion: please include a discussion of the potential etiology of the lack of correlation between breastfeeding and support.
Response:
We have added a section discussion the findings in relation to support and breastfeeding. Further detail is also available in Appendix F.
[discussion]
"With regard to partner support, in GUI we found no association between breastfeeding and a living-in partner, while in UKMCS an association was found, but was not consistent across the time points. In other measures of support, in the UKMCS presence of a partner, or utilization of supports was not found to be associated with breastfeeding at all assessed time-points, however, surprisingly, a consistent inverse association was observed in GUI of perception of support with both breastfeeding and home birth. Some responses, upon questioning on levels of support perceived, may have been an indirect measurement of maternal socio-demographic or personality traits, such as resilience and self-reliance. Further studies aimed at addressing all elements of professional and partner/community support, including non-perceived support, are needed."
Our instruments for capturing the level of support were very limited – we added a section on this to Limitations:
"Questionnaires had limited ability to capture support for the mother; we used presence of live-in partner in the analysis, which does not necessarily correspond to getting support."

7. Page 14: line 10-37: please rewrite this paragraph for clarity
Response:
This paragraph has been modified:
"Secondly, psychological factors are likely to have an important role in the success of breast feeding. Stress during birth has been linked to delayed breast feeding.(Chen, Nommsen-Rivers et al. 1998, de Jager, Broadbent et al. 2014) The physiologic experience of giving birth at home in a familiar environment may lead to reduced stress, and a reduction in stress could contribute to an intervention-

free birth, and may consequentially influence breast feeding outcomes. Intrapartum interventions are stress-provoking and they have been negatively associated with breast feeding (Bai, Wu et al. 2013). However, it is difficult to isolate birth circumstances, in home or in hospital, as directly causative of increased stress: women who report psychosocial stress during pregnancy are more likely to experience birth complications themselves,(Paarlberg, Vingerhoets et al. 1995) and may also be less likely to breast feed as a result of background levels of stress, thereby confounding a direct relationship between birth circumstances-related HPA axis activation and subsequent breast feeding."

8. Page 15: second paragraph: This could also be related to the infant and/or mother being at higher risk.
Response:
We agree with the reviewer; this caveat in relation to the interpretation has been added:
"Unfortunately, no information on treatment of high risk births was given in the paper, so it cannot be excluded that the association is partially driven by higher risk deliveries taking place in a hospital."

VERSION 2 – REVIEW

REVIEWER	Prof Helen Ball Durham University, UK
REVIEW RETURNED	09-Feb-2016

GENERAL COMMENTS	Thank you for addressing the issues raised in my original review. I have no further comments.

REVIEWER	Sunny Hallowell, PhD, PPCNP-BC, IBCLC Villanova University, College of Nursing Villanova, PA, United States
REVIEW RETURNED	16-Mar-2016

GENERAL COMMENTS	Thank you for the opportunity to review such an important manuscript. A few minor points - Statistics - should there be some discussion regarding multicollinearity between the covariates? The stepwise regression is well described but I wonder if a statement regarding any potential multicollinearity might be pertinent Ln 12 Pg 12 - The rate observed in the GUI study (1.48%) was more than seven times the home birth rate reported in Irish government-published data (0.2%).19 - please clarify which rate you are referring to, the home birth rate or the breastfeeding rate. Ln5 Pg 13- Firstly, the type and level of support from health professionals that the mother receives may differ: care is typically midwife-led in the case of home birth, and physician-led in case of the hospital birth. - Consider that the reason this is the case because the level of training related to lactation between health professions is nil. Midwives, however receive more education. You may want to highlight the significant gap in the level of training among health care providers that may be a reason for inconsistent messages among caregivers. Also in the hospital it is not physicians, rather it is

postpartum nurses that provide the majority of breastfeeding support and the training across to board is inadequate and inconsistent. You may also want to mention that this messaging must be initiated prenatally and that our OBGYN partners may not have time or training to begin this message to provide evidence based consistent information.

Ln 47 pg 13 - Stress during birth has been linked to delayed breast feeding - You may want to stress that post partum stress has a significant effect on milk production. Being at home both for birth and immediately after may alter this experience. Ln 47 pg 14 touches on some of these points and I would move these points up.

Ln3 pg 15 - Thirdly, the mothers who deliver at home may differ in unmeasured and/or
unmeasurable factors, such as in personality, believes, lifestyle choices, or in their
attitudes towards birth and infant feeding - provide a reference(s) for this statement or re-write.

Ln 34 pg 16 - Lastly, it has been shown that formula supplementation in the early postnatal period
reduces likelihood of subsequent exclusive breast feeding, and also reduces overall
duration of breast feeding.58 59 Hospital births have been associated with formula
supplementation.60 - Consider that infants born in hospitals are more likely to be monitored for weight loss, jaundice and dehydration especially prior to discharge. Supplementation using formula may be based on clinical findings as well as the goal to discharge patients. Infants born at home can spend more time breastfeeding and establishing a maternal milk supply without the need to rely on formula to satisfy hospital discharge criteria and processes.

The discussion would benefit from inclusion of two important arguments:

1. The ability for mom and infant to be skin to skin immediately after birth and for a prolonged period post partum to faciliate homeostasis of the infant, initiate the cascade of events that result in lactogenesis 2, and maternal infant bonding. You may also want to highlight programs that use visiting nurses or nurse carers post partum to help with this transition as well as IBCLC. There is sufficient evidence that maternal and child outcomes are improved with nurse intervention during this period (studies from moms discharged from hospitals, the same mechanisms for follow up ore something similar should be discussed for home birth moms using doulas or midwives)

2. The cost argument. The ability for mothers to give birth at home and breastfeed has a potentially significant effect on the cost of maternal infant care in Ireland when compared to a hospital admission. Both short and long-term outcomes for children and mothers are potentially better (you can cite WHO and AAP 2012 for a summary).

Breastfeeding is a major, global public health issue. It is a cost-effective, evidence-based intervention that has the potential to improve outcomes for both mothers and infants. This paper contributes to the evidence that highlights home birth as an intervention for healthy women to both provide an economical and

	evidenced based alternative to hospital birth. Many thanks for allowing me to provide a review. Excellent work!

REVIEWER	Leslie A. Parker University of Florida USA
REVIEW RETURNED	13-Feb-2016

GENERAL COMMENTS	The authors have done a very nice job of revising this manuscript based upon reviewers comment. I have very few comments. Page 4 line 45: define "community" midwife - does community refer to her education?

REVIEWER	Yana Vinogradova The University of Nottingham The United Kingdom
REVIEW RETURNED	12-Apr-2016

GENERAL COMMENTS	Overall, the statistical analysis is adequately described and performed. There are a few points to clarify in Methods and to report in Results. Methods: There is some inconsistency in reporting the use of BMI data. Although the authors state 'BMI was not available for all mothers in UKMCS', Table 2 appears to provide the BMI distribution for all participants. In the GUI study, however, Table 1 has a category for missing BMI. BMI was obviously considered as a confounder and data were collected for both studies. The authors, however, decided not to include it only on the grounds of unavailability. Were there, however, statistically significant associations between the outcome and BMI for available exact values or categories? If yes, I would impute BMI values at least in a sensitivity analysis to make sure that the findings are robust. If not, I would report it as a proper justification for not including BMI in the multivariate analysis. Results: Reported P-values are not informative, the confidence intervals would give a better idea of the scale and precision of the estimates. The authors reported that there was an association with gestational age (was this for the main outcome?). It also needs to be stated for which unit increase (one year of age?) the given odds ratios apply.

VERSION 2 – AUTHOR RESPONSE

Reviewer: 1

Prof Helen Ball, Durham University, UK

Please state any competing interests or state 'None declared':   None declared

Please leave your comments for the authors below.

1. Thank you for addressing the issues raised in my original review. I have no further comments.

We thank Prof Ball for taking time to review our manuscript and changes made.

Reviewer: 3

Leslie A. Parker, University of Florida, USA

Please state any competing interests or state 'None declared':   None declared

Please leave your comments for the authors below.

1. The authors have done a very nice job of revising this manuscript based upon reviewers comment. I have very few comments.

We thank Prof Parker for taking time to review our manuscript and the changes we have made.

2. Page 4 line 45: define "community" midwife - does community refer to her education?

This refers to midwifes belonging to a collective of self-employed midwifes under the umbrella of The Community Midwives Association. They work with women and their families requesting homebirth. Including "community" is not necessary and is actually confusing here without further explanation so we took it out. This sentence now reads:

"In Ireland the national Home Birth Service provides for planned home birth in low-risk healthy women, under the care of a self-employed midwife on behalf of the Health Service Executive (HSE)."

Reviewer: 2

Sunny Hallowell, Villanova University, College of Nursing Villanova, PA, United States

Please state any competing interests or state 'None declared':   None declared

Please leave your comments for the authors below.

1. Thank you for the opportunity to review such an important manuscript. A few minor points

We thank Prof Hallowell for taking time to review the manuscript and give suggestions for further improvement.

2. Statistics - should there be some discussion regarding multicollinearity between the covariates? The stepwise regression is well described but I wonder if a statement regarding any potential multicollinearity might be pertinent

Multicollinearity of covariates was assessed using variance inflation factors (function "vif" implemented in package "usdm" for R); values over 4 indicate the presence of multicollinearity. The highest VIF for GUI was 2.2 and for UKMCS 1.7; hence, we found no evidence of multicollinearity. Brief description of multicollinearity assessment was added to statistical methods.

3. Ln 12 Pg 12 - The rate observed in the GUI study (1.48%) was more than seven times the home birth rate reported in Irish government-published data (0.2%).19 - please clarify which rate you are referring to, the home birth rate or the breastfeeding rate.

This has been clarified:

"The home birth rate observed in the GUI study (1.48%) was more than seven times the rate reported in Irish government-published data (0.2%).[1]"

4. Ln5 Pg 13- Firstly, the type and level of support from health professionals that the mother receives may differ: care is typically midwife-led in the case of home birth, and physician-led in case of the hospital birth.

- Consider that the reason this is the case because the level of training related to lactation between health professions is nil. Midwives, however receive more education. You may want to highlight the significant gap in the level of training among health care providers that may be a reason for inconsistent messages among caregivers. Also in the hospital it is not physicians, rather it is postpartum nurses that provide the majority of breastfeeding support and the training across to board is inadequate and inconsistent. You may also want to mention that this messaging must be initiated prenatally and that our OBGYN partners may not have time or training to begin this message to provide evidence based consistent information.

We thank the reviewer for their suggestion and agree that this is an important point to raise. We have included the following sentence to the manuscript:

"There is also a difference in the level of training related to lactation among carers, with midwifes typically receiving more education in this area."

We considered further expanding the discussion into lactation and education, but decided that would deviate readers' attention from the focus of the paper.

5. Ln 47 pg 13 - Stress during birth has been linked to delayed breast feeding - You may want to stress that post partum stress has a significant effect on milk production. Being at home both for birth and immediately after may alter this experience. Ln 47 pg 14 touches on some of these points and I would move these points up.

We have modified this part to expand the time-period we refer to from birth to the whole perinatal period. We have added a reference that explores the relationship between stress in perinatal period and lacatation (Dewey KG: Stress during birth in perinatal period has been linked to delayed breast feeding, J Nutr)

"Stress in the perinatal period has been linked to delayed breast feeding."

6. Ln3 pg 15 - Thirdly, the mothers who deliver at home may differ in unmeasured and/or unmeasurable factors, such as in personality, believes, lifestyle choices, or in their attitudes towards birth and infant feeding

- provide a reference(s) for this statement or re-write.

We modified this sentence so that it is clear it is our hypothesis that such factors may be confounding the reported relationship.

"Thirdly, we hypothesise that the mothers who deliver at home may differ in unmeasured and/or unmeasurable characteristics, such as in personality, believes, lifestyle choices, or in their attitudes towards birth and infant feeding."

7. Ln 34 pg 16 - Lastly, it has been shown that formula supplementation in the early postnatal period reduces likelihood of subsequent exclusive breast feeding, and also reduces overall duration of breast feeding.58 59 Hospital births have been associated with formula supplementation.60

- Consider that infants born in hospitals are more likely to be monitored for weight loss, jaundice and dehydration especially prior to discharge. Supplementation using formula may be based on clinical findings as well as the goal to discharge patients. Infants born at home can spend more time breastfeeding and establishing a maternal milk supply without the need to rely on formula to satisfy hospital discharge criteria and processes.

We agree with the reviewer and feel that inclusion of this point improves section on hospital practices. We were cautious not to imply that babies born at home are not adequately monitored for weight loss, jaundice or dehydration - babies born at home are monitored for these by a registered midwife and public health nurse. Paragraph has been modified:

"Lastly, it has been shown that formula supplementation in the early postnatal period reduces likelihood of subsequent exclusive breast feeding, and also reduces overall duration of breast feeding. All 19 maternity units in Ireland participate in the Baby Friendly Health Initiative, step 6 of which states that newborn infants should receive no food or drink other than breast milk, unless medically indicated. However, hospital births have been associated with formula supplementation which may be based on clinical findings, or may be encouraged due to busy clinical routine or inadequate staffing, where formula feeding is a more convenient solution to feeding problems than diagnosis and treatment of breast feeding issues. A further barrier to supporting breast feeding may be the lack of lactation consultant and/or staff training in breast feeding needs.63"

8. The discussion would benefit from inclusion of two important arguments:

8-1. The ability for mom and infant to be skin to skin immediately after birth and for a prolonged period post partum to facilate homeostasis of the infant, initiate the cascade of events that result in lactogenesis 2, and maternal infant bonding. You may also want to highlight programs that use visiting nurses or nurse carers post partum to help with this transition as well as IBCLC. There is sufficient evidence that maternal and child outcomes are improved with nurse intervention during this period (studies from moms discharged from hospitals, the same mechanisms for follow up ore something similar should be discussed for home birth moms using doulas or midwives)

8-2. The cost argument. The ability for mothers to give birth at home and breastfeed has a potentially significant effect on the cost of maternal infant care in Ireland when compared to a hospital admission. Both short and long-term outcomes for children and mothers are potentially better (you can cite WHO and AAP 2012 for a summary).

We have highlighted in the previous section that all 19 maternity units in Ireland participate in BFHI. Nine have been designated as Baby friendly and hence all are working towards implementation of the 10 Steps to successful breastfeeding, of which Skin to Skin is a key step. We agree with the reviewer that further discussion was required and have added these points to discussion section,

"The physiologic experience of giving birth at home in a familiar environment may lead to reduced stress, and a reduction in stress could contribute to an intervention-free birth, and may consequentially influence breast feeding outcomes. Moreover, post partum circumstances of home

birth that enable immediate and prolonged skin-to-skin contact can facilitate homeostasis of the infant, mother-infant bonding and play a role in the cascade of events that promote lactogenesis."

"This is important because intervention in early post-partum period has been shown to improve maternal and infant outcomes."

"Economically, both breastfeeding and the ability to give birth at home have a potential to significantly lower the cost of care."

9. Breastfeeding is a major, global public health issue. It is a cost-effective, evidence-based intervention that has the potential to improve outcomes for both mothers and infants. This paper contributes to the evidence that highlights home birth as an intervention for healthy women to both provide an economical and evidenced based alternative to hospital birth. Many thanks for allowing me to provide a review. Excellent work!

We thank Prof Hallowell for encouraging comments!

Reviewer: 4

Yana Vinogradova, The University of Nottingham, The United Kingdom

Please state any competing interests or state 'None declared':   None declared

Please leave your comments for the authors below.

1. Overall, the statistical analysis is adequately described and performed. There are a few points to clarify in Methods and to report in Results.

We thank Dr Vinogradova for reviewing our paper.

Methods:

2. There is some inconsistency in reporting the use of BMI data. Although the authors state 'BMI was not available for all mothers in UKMCS', Table 2 appears to provide the BMI distribution for all participants. In the GUI study, however, Table 1 has a category for missing BMI.

We thank the reviewer for spotting this. We have added the missing data count for UKMCS cohort in Table 2.

Total		17521	100	11774	67	7630	44	3768	22	226	1
Maternal BMI	<18	612	3%	386	3%	236	3%	125	3%	5	2%
	18-25	8691	50%	5898	50%	4043	53%	2094	56%	115	51%
	25-30	3920	22%	2625	22%	1645	22%	777	21%	59	26%
	≥30	1982	11%	1316	11%	753	10%	355	9%	22	10%
	missing	2316	13%	1549	13%	953	12%	417	11%	25	11%

3. BMI was obviously considered as a confounder and data were collected for both studies. The authors, however, decided not to include it only on the grounds of unavailability. Were there, however, statistically significant associations between the outcome and BMI for available exact values or categories? If yes, I would impute BMI values at least in a sensitivity analysis to make sure that the findings are robust. If not, I would report it as a proper justification for not including BMI in the multivariate analysis.

The number of missing values was acceptable in GUI, so BMI as included as the covariate in the analysis of GUI cohort. In UKMCS, the amount of missing data was for BMI variable was very high - there were 2316 missing BMI observations. We however do report on the distribution of this variable based on the reminder of the data, but choose not to include it in multivariate analysis because on the dramatic loss this would cause to the sample available for the analysis.

We conducted a sensitivity analysis in UKMCS to see if inclusion of BMI modifies the reported results. We found no material difference in our findings. Results from sensitivity analysis have been added to the supplementary materials (appendix D).

| Breast feeding time-point | Study population | Adjusted Analysis | | |
		OR	Confidence interval (95% CI)	p-value
Initiation	UKMCS	2.80	2.01-3.99	<0.0001
8 weeks	UKMCS	2.60	1.97-3.47	<0.0001
6 months	UKMCS	3.09	2.36-4.03	<0.0001
6 months: exclusive	UKMCS	2.50	1.26-4.53	0.004

Results:

4. Reported P-values are not informative, the confidence intervals would give a better idea of the scale and precision of the estimates.

We agree with the reviewer in that confidence intervals are a better way of presenting estimates. This is why we included details on confidence intervals for all reported estimates in Table 3:

| Breast feeding time-point | Study population | Unadjusted Analysis | | | Adjusted Analysis | | |
		OR	Confidence interval (95% CI)	p-value	OR	Confidence interval (95% CI)	p-value
Initiation	GUI	2.23	1.53-3.24	<0.0001	1.9	1.19 -3.02	<0.0001
Initiation	UKMCS	2.31	1.74-3.05	<0.0001	2.49	1.84-3.44	0.011
8 weeks	GUI	2.25	1.61-3.13	<0.0001	1.78	1.18 -2.69	0.0029
8 weeks	UKMCS	2.69	2.14-3.38	<0.0001	2.49	1.92-3.26	<0.0001
6 months	GUI	2.23	1.61-3.09	<0.0001	1.85	1.23-2.77	0.0058
6 months	UKMCS	3.3	2.66-4.10	<0.0001	2.9	2.25-3.73	<0.0001
6 months: exclusive	GUI	2.94	2.01-4.31	<0.0001	2.77	1.78 -4.33	0.0073
6 months:	UKMCS	3.17	1.79-5.60	<0.0001	2.24	1.14-4.03	<0.0001

5. The authors reported that there was an association with gestational age (was this for the main outcome?). It also needs to be stated for which unit increase (one year of age?) the given odds ratios apply.

Gestational age was originally recorded in weeks for GUI and in days for UKMCS. We repeated the analysis and calculated the OR for UKMCS when expressing gestation in weeks, to keep it consistent with GUI. Results section has been modified accordingly:

"The covariates which showed a consistent association with home birth in both GUI and UKMCS were higher education level or professional qualification (GUI: OR=3.62 (1.50, 8.74); UKMCS: OR = 2.26 (1.16, 4.38)) and gestational age (per week): GUI: OR = 1.15 (1.03, 1.30); UKMCS: OR = 1.13 (1.05, 1.22) (**Appendix E**)."

VERSION 3 – REVIEW

REVIEWER	Yana Vinogradova University of Nottingham United Kingdom
REVIEW RETURNED	29-Apr-2016

GENERAL COMMENTS	Although I have recommended the article to be accepted I still feel that the odds ratios in the results paragraph 2 should be supported not with p-values but with 95% confidence intervals. It would be also consistent with the rest of the results where, in paragraph 3, the authors quote the confidence intervals.