Author's response to reviews

Title: Trajectories of maternal sleep problems before and after childbirth: a longitudinal population-based study

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Author's response to reviews: see over
Dear Editor

Thank you for the positive response regarding the manuscript “Trajectories of maternal sleep problems before and after childbirth: a longitudinal population-based study”. We have now revised the manuscript according to the suggestions and comments from the reviewers.

Reviewer #1

Major compulsory revisions: This is a nice, well conducted, longitudinal study of insomnia from late pregnancy to 2 years post-partum. There is excellent retention across 2 years but high dropout from 17 weeks (consent, Q1) to 32 weeks (Q2). Why was the dropout so high between Q1 and Q2 but remained quite high from Q2 for the rest of the study?

- Response: We do not fully agree that the dropout between the first and second questionnaire was high. Of the eligible women (i.e., those able to complete a questionnaire in Norwegian), 80% ($n = 3,751$) consented and returned the first questionnaire. Of these, 81% ($n = 2,943$) returned the second questionnaire.

Why were the questions only started at week 32 when women were enrolled at 17 weeks? This could have been a great opportunity to get longitudinal data across pregnancy.

- Response: We agree that it would have been ideal to also have included the sleep questionnaires at the first time point when the women were 17 weeks into the pregnancy. This would indeed have allowed a more detailed assessment of the women’s sleep across the pregnancy. The reason for including sleep assessment in the second wave was simply that the assessment battery was substantially expanded between the first two waves, allowing inclusion of more detailed and validated questionnaires.

Why <7 hours for short sleep? Short sleep is often categorized as <6 hours.

- Response: We agree that finding the optimal cutoff when dichotomizing sleep duration may be both difficult and problematic. In the present study, a sleep duration of less than 7 hours was originally chosen as 6 hours would have yielded a very small group of women (<7% at week 32). From a clinical point of view, such a small group may be considered artificially small. It also introduces problems with regards to statistical power, as conducting regression analyses (especially adjusted) on such small groups reduced the precision of the estimates. Therefore, we have opted to keep 7 hours as the cut-off for the regression analyses in Table 3. However, we agree with the reviewer that there is danger of misclassification of “short sleep” (moving below and over the 7hrs cutoff) across the three waves, and we have therefore removed Figure 3 to avoid overselling this point.

SOL, WASO and sleep efficiency are not good measures if calculated from subjective variables. It is unclear what these add to the study since they were not obtained via actigraphy.
• Response: We agree with the reviewer that self-reported sleep parameters, including SOL and WASO typically differ from those obtained from objective assessments such as PSG or actigraphy [22]. However, recent studies have shown that such self-report sleep assessments can be recommended for the characterization of sleep parameters in both clinical and population-based research [23], and we therefore consider these data to provide useful information. We have added a paragraph to address this issue under study limitations in the Discussion.

EPDS scores were collected but there is no report on how insomnia impacted EPDS. This is important

• Response: The association between sleep problems and subsequent postnatal depression is indeed an interesting and important research question. The rationale for not including these analyses in the current paper, is that a recent paper by Dørheim et al (2014) using the first two waves (Week 32 of pregnancy and Week 8 postpartum) from same dataset provided results on this topic. In short, that paper found insomnia, but not short sleep duration, was a risk factor for postnatal depression. As such, this research question was not included in the current study to avoid overlap.

Figure 3 is not helpful since this sleep duration is incredibly subjective and the bounds between <7 and 7-8 hours for example mean that there is a high likelihood of misclassification.

• Response: We are inclined to agree with this comment, and we have therefore removed Figure 3 from the manuscript. We have updated the text in the Results and Discussion accordingly.

What is the overlap between the current study and refs 18, 19, and 20? Are these the same women?

• Response: As correctly noted by the reviewer, the 3 studies by Dørheim et al. stem from the same study population as the current study. Although this was acknowledged in the original paper, we agree that it could have been even more clearly stated what the current study adds (data from 2 years postpartum). Therefore, we have added the following sentence to the introduction:

“Moreover, previous findings from the same dataset as the current study have shown that depressive symptoms and sleep problems are closely interrelated, both in late pregnancy and in the postnatal period [18-20].”

Minor essential revisions:

Table 1 should be of the women in the study rather than the 4662 who originally consented. An additional table showing the differences between those who consented and those who remained in the study would be appropriate.

• Response: Table 1 has been updated to reflect these suggestions. Demographical and clinical characteristics are now presented stratified by responders (those who completed all time points) and those who did not completed all waves (non-responders).

Line 315 what does “polysomnographic sleep registration” mean?
• Response: We have now changed this sentence to*:
  “…and the BIS has been shown to correspond well with objective sleep measures, including polysomnography (PSG)[21].”

Discretionary revisions:

Depression was accounted for at 2 years postpartum but what about depression during pregnancy and prediction of insomnia?

• Response: We have now included

It appears that obstetric complications were known about….why are these not included in the models? e.g. hypertension and diabetes

• Response: As suggested, we have now included information on hypertension and diabetes as covariates in the regression models.

Reviewer #2:

The manuscript describes a longitudinal study of 1480 women who were followed from late pregnancy until 2 years postpartum. The focus of the study is on the prevalence of short sleep and insomnia symptoms over this time, and the key predictors of these outcomes. Findings indicated high rates of Insomnia and short sleep across all 3 time points.

The manuscript addresses an interesting and relevant research question, which is the persistence of abnormal sleep across the perinatal period and into early motherhood. Although I believe that the study has the potential to add to current understanding of sleep across this time there are a number of key issues that need to be addressed before I feel it is suitable for publication.

Major compulsory revisions

1. The relationship between the current paper and previous papers (Dorheim et al. 2012; Dorheim et al 2014) requires clarification.
   a. It is my understanding that the same cohort of women is used in the current manuscript and the 2 earlier studies, with each paper adding an additional time point. I believe this should be made explicit in the current manuscript and the relationships between the papers and their findings in relation to the current manuscript described.

Response: We agree, and we have now made in clearer in the introduction that the studies by Dørheim et al. are based on the same dataset as the current study:

“Moreover, previous findings from the same dataset as the current study have shown that depressive symptoms and sleep problems are closely interrelated, both in late pregnancy (week 32) and in the postnatal period (8 weeks postpartum) [18-20].”

   b. The numbers provided in Figure 1 in the current manuscript differ from those provided in Figure 1 of the 2014 paper (e.g. the number of unreturned questionnaires between times
B-C, and C-D, and the number of women involved in the study 8 weeks postpartum. Given the measures are the same in both papers I am not sure why different numbers of women are involved. Please explain why this is the case.

Response: The data files have been regularly updated and quality assured, which has resulted in slightly different sample sizes for each research group.

c. Much of the information provided in the current paper is already presented in the earlier papers, although findings differ slightly due to the reducing number of participants involved in the most recent paper. Is all this repetition necessary?
Response: Although we agree that some of the findings have also been reported in earlier reports, we are somewhat reluctant to remove these altogether from the current paper. We consider it important that Table 2 provides detailed sleep data across all 3 time points, in order for the reader to see the course or sleep problems over time.

2. Given that only 32% of the original cohort responded at 2 years postpartum it is important to understand the characteristics of the non-responders. Please provide demographic information on the non-responders vs responders and also where the information is available, the differences between the responders and non-responders with regard to the key variables (insomnia rates, short sleep and depression) between times C-D, and D-E. Without such information it is not possible to make a judgement on the generalizability of the study findings.

Response: This important point was also raised by reviewer #1, and we have now included this information in Table 1. We have also updated the Results, as well as the Discussion accordingly: “However, it should be noted that there were notable differences between the responders and non-responders, with responders being older, more educated, and more likely to be married/cohabitating. This may limit the generalizability of the findings.”

3. In the previous paper (Dorheim et al 2014) Insomnia was not found to predict postpartum depression after correcting for a prior history of depression, but women who recovered from depression had higher Insomnia scores and those that developed new depression had higher Insomnia scores in pregnancy. Given these associations why was only depression at 2 years postpartum included in models in the current manuscript? The presence or absence of depression at earlier time points seems to potentially be a key predictor both of subsequent Insomnia and also short sleep.

Response: We agree with this comment, and we now also control for depressive symptoms in the two earlier waves (week 32 of pregnancy and week 8 postpartum). The Methods and Results sections (incl. Tables) have been updated to reflect this.

4. Why were demographic information collected at 17 weeks pregnancy used as predictors in the models and not more recent information? Marital status and BMI may have changed considerably since early in pregnancy and therefore have consequences of the outcomes of interest.
Response: Unfortunately, information on marital status was only assessed at 17 weeks. However, BMI was assessed also at week 32 (but not postpartum), and we have now recalculated all analyses controlling for BMI both at week 17 and at week 32.

5. Please make it clear in the Methods that the PSQI was completed at all time points.

Response: This information has now been added.

6. Please explain why negative binomial regression analyses were employed.

Response: Negative binomial regressions were chosen to provide relative risk (RR) rather than odds-ratios (OR) from logistic regression. As now stated more clearly in the Statistics section, ORs tend to overstate an effect size compared to RRs when the prevalence of the outcome of interest (in this case insomnia or short sleep duration).

Minor essential revisions

1. In general the manuscript is well written and easy to read. There are a few places in the Background in particular where edits are suggested. These include:
   a. Line 49, “already” not required
   b. Line 53, suggest the term “feeding” is used rather than “breastfeeding”, since bottle feeding can also result in sleep disturbance for mothers.
   c. Line 56, I don’t feel that short sleep and Insomnia should be described as “normal”, perhaps “common” or “frequent” is more appropriate.
   d. Line 64 and 69, instead of “sustain”, suggest “continue”
   e. Line 73, “need” instead of “needs”

Response: We appreciate these comments, and the manuscript has been updated accordingly.