Author's response to reviews

Title: The course of mental health after miscarriage and induced abortion: A five-year follow-up study.

Authors:

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Reviewer 1:
1) The reviewer writes: "See the above comment regarding lack of control for prior and subsequent pregnancy outcomes. This should at least be briefly mentioned in the discussion of the study's limitations".
Response: We agree that this is an important point. In fact, we did institute some controls for a few of the possible confounding factors but not for all the mental health outcomes, and not at all time points. However, we found no statistically significant effects of prior miscarriages or induced abortions on the IES scores or the scores on feelings related to the pregnancy termination event from T1 to T3. Nor did we find any statistically significant effects of childbirth events between T1 and T4 on the HADS anxiety and depression scores at T4 (mentioned in two of our former articles, the article published in Psychosomatic Medicine in 2004, and in an article in press in Acta Obstetricia et Gynecologica Scandinavica). Another study, with a much larger sample, might have minimized these confounding factors.
In the revised paper, we have made the following changes. On page 22, we have added: "Another limitation of the study is the lack of control for all prior and subsequent pregnancy outcomes. We did apply controls for a few of these possible confounding factors, but did not detect any statistically significant effect of prior miscarriages or induced abortions on scores for IES or feelings at T1, T2, or T3. Nor did we observe any statistically significant effect of childbirth events between T1 and T4 on the HADS anxiety and depression scores at T4. This finding should be tested in a study with a larger sample and extended to include the effects of subsequent miscarriages and abortions."

2) The reviewer writes: "Regarding the discussion of anxiety associated with abortion, the recent study by Cougle is especially important and should at least be cited, and possibly discussed".
Response: We agree that the study by Cougle should be cited in the discussion of anxiety after induced abortion. On page 18, we have now included: "In both groups, the HADS anxiety scores were high relative to those of the general population. This was especially true for the induced abortion group, for which the mean anxiety scores were statistically higher than those of the general population at all four interviews. Anxiety after induced abortions has been the topic of other studies. Higher rates of subsequent generalized anxiety were recently reported among aborting women than among women who had carried an unintended pregnancy to term [Cougle J 2005 230 /id]. The authors stated that no causal relationship between pregnancy outcome and anxiety could be determined. Despite this, they remarked that their findings of more generalized anxiety among aborting women were consistent with the results of other studies, which also noted that anxiety was a possible negative effect of induced abortion [Bradshaw & Slade 2003 183 /id; Moseley, Follingstad, et al. 1981 105 /id]. In our study, aborting women had somewhat higher (although non-significant) levels of anxiety than miscarrying women. This finding may imply that induced abortion resulted in more anxiety than miscarriage. However, the mental health of aborting women was poorer (almost statistically significantly) than that of miscarrying women prior to the pregnancy termination event. Therefore, we cannot infer that induced abortion caused the elevated anxiety of the induced abortion group relative to that of the miscarriage group.
The induced abortion group had significantly higher anxiety scores than the general population at all interviews, whereas the miscarriage group only had significantly higher anxiety scores at T1. This indicates that either the mental health of the aborting women was different from that of the general population before and after the abortion event or that the induced abortion led to anxiety that persisted for several years after the abortion. An appropriate experimental design is required to answer this question."

3) The reviewer writes: "Regarding the discussion of traumatic reactions associated with abortion, the recent study by Rue should be cited, and possibly discussed in particular in regard to the finding of very
high rates of avoidance reactions. It might also be mentioned in the discussion of the study's limitations as it reveals significant variations in reactions relative to nationality.

Response: In the revised version of the article, we have now included comments about the study by Rue. On page 20, we have added: "Our findings of high IES avoidance scores in the induced abortion group are in agreement with results from a study in which trauma responses after abortion were examined in American and Russian women [Rue, Coleman, et al. 2004 200 /id]. Many women had avoidance symptoms related to the induced abortion several years after the event (for American women, the mean was about 10 years after the event; for Russian women, the mean was about six years after the event). Among the American women, 50% avoided thinking or talking about the abortion, compared with 19% of the Russian women. About 25% of the American women had difficulties being near babies, compared with 4% of the Russian women. Of the American women, 36% had three or more avoidance symptoms, compared with 3% of the Russian women. That study indicates that cultural differences influence psychological responses to induced abortion. The results of our study imply that post-abortion avoidance responses among Norwegian women are more similar to those of American women than to those of Russian women."

Because we have mentioned the variations in reactions across nationalities here, we have not commented on it again in the limitations of the study.

Reviewer 2:
1) The reviewer writes: "There are statistical findings comparing the two groups and yet no sample size calculation or power calculations to say these are valid."

Response: We have now added a paragraph dealing with statistical power, in the "Statistics" section on page 12: "The study was designed to detect "medium" effects when comparing the two abortion groups (defined as 0.5 by Cohen [1988] and requiring sample sizes of approximately 70 individuals for each group when the alpha [type I] error level is set at 5% and the beta [type II] error level is set at 10%). After attrition, our study groups contained 70 (induced abortion) and 39 (miscarriage) participants at T4, yielding statistical power slightly above 70% for medium-sized effects and above 98% for "large (> 0.80) effects. This was considered satisfactory for our purposes."

2) The reviewer writes: "The two groups appear to have different levels of mental health prior to the event, although this is non significant, which may have more impact on the findings than the "characteristics of the pregnancy termination event". This is not discussed in the "Discussion" or "Conclusion"."

Response: We agree that this point should be mentioned in the "Discussion" and in the "Conclusion". On bottom of page 18, we have now added: "In our study, aborting women had somewhat higher (although non-significant) levels of anxiety than miscarrying women. This finding may imply that induced abortion resulted in more anxiety than miscarriage. However, the mental health of aborting women was poorer (almost statistically significantly) than that of miscarrying women prior to the pregnancy termination event. Therefore, we cannot infer that induced abortion caused the elevated anxiety of the induced abortion group relative to that of the miscarriage group.

The induced abortion group had significantly higher anxiety scores than the general population at all interviews, whereas the miscarriage group only had significantly higher anxiety scores at T1. This indicates that either the mental health of the aborting women was different from that of the general population before and after the abortion event or that the induced abortion led to anxiety that persisted for several years after the abortion. An appropriate experimental design is required to answer this question. Other mental health outcomes, such as depression, trauma responses, quality of life, and feelings, may likewise be poorer for women in the induced abortion group because of their mental health status before the abortion."

In the "Conclusion" on page 23 we have added: "This may be because the mental health of the aborting women was somewhat poorer than that of the miscarrying women before the pregnancy termination event."

3) The reviewer writes: "Women having unwanted pregnancies include women who are stable and happy but have not finished their education or have finished their families. They also include women who are having abortions because they have financial difficulties, unstable relationships, chronic mental illness and/or high stress. The life circumstances causing a woman to choose to abort the pregnancy are not discussed."

Response: It is correct that we have not discussed the circumstances causing a woman to abort the pregnancy in this article, although the topic is briefly mentioned in the Background on page 5. We refer to one of our former articles, where we studied the reasons why women chose to have an abortion, and also if the reasons had an impact on the women's mental responses the two years after the abortion (General Hospital Psychiatry 27 [2005] 36-43: "Reasons for induced abortion and their relation to women's emotional distress: a prospective, two-year follow-up study". Broen AN, Moum T, Bodtker AS, Ekeberg O).

We agree that the life circumstances that cause a woman to choose abortion should be discussed more extensively. In the Background section, page 4, we have added: "...whereas abortion is a planned and known event. Women with unwanted pregnancies include those who are stable and content but have not finished their education or have already the number of children they desire. This category also includes
women who have abortions because of financial difficulties, unstable relationships, or chronic mental illness. An induced abortion is the result of ...."

4) The reviewer writes: "Most clinicians reading this type of paper can understand a chi square only with the p value and can't understand the r value at all. It is important to describe your data so that the ordinary clinician caring for women understands it (with a little extra for the statisticians). The figures show your data in a much more understandable form but should explain what avoidance and intrusion mean".
Response: We agree that it is very important that the readers understand the information given in the article. We have marked statistically significant differences, and explained the p values that correspond to them. The figures showing IES intrusion and avoidance (mean scores and percentage of cases) now have legends explaining what intrusion and avoidance mean.

5) The reviewer writes: "If you could display all the data in Tables 2 and 3 in the form of graphs, it would be so much clearer."
Response: We have been thinking about how to best present the data. Apparently, there are several ways of doing this. We suggest that Table 3 is kept as it is. However, the data in Table 2 can be presented in graphs for greater accessibility. We suggest that Table 2 is retained as it is, as it gives the exact values and standard deviations. (If this requires too much space, these data could be presented in "Additional files"). We have created 11 new figures from the data shown in Table 2. If the editors think there are too many figures, only some of them need be included in the article. However, it is clear that the figures make it easier to trace the course of the mental health scores in the two groups of women, and we recommend that all the figures be included in the article.
The two original figures (Figures 1 and 2, now Figures 3 and 4) have been improved with the introduction of colors.

6) The reviewer writes: "(The article) needs some language corrections before being published.
Response: The article has been corrected and revised by professional editors to improve the English (OnLine English, Australia).

To the editors:
We have included reference to the approval of the Norwegian Ethics Committee in the Methods section, page 5, line 4.
In the Discussion section, page 21, line 7, we have now also included, in order to improve the understanding of the topic: ... affect the experience of the self and social behaviour, contribute to later psychopathology.....
We have also ensured that the revised manuscript conforms to all points in the manuscript formatting checklist. If there is anything lacking, we are willing to make the necessary corrections.