Author's response to reviews

Title: Physical activity before and after breast cancer diagnosis and survival - The Norwegian Women and Cancer cohort study

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Author's response to reviews: see over
Reviewer's report

Title: Physical activity before and after breast cancer diagnosis and survival - The Norwegian Women and Cancer cohort study

Version: 2

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Reviewer: Elizabeth Poole

Reviewer's report:
I thank the authors for their careful response to the prior reviews. Based on the revisions, I have a few more suggestions to improve the manuscript. In general, these are minor revisions that would improve the readability of the manuscript.

Author’s response: We also want to thank the reviewer for the comprehensive review. The comments have been very useful and valuable contributing to improve this manuscript. The manuscript Please find our response below.

Major compulsory revisions

Minor essential revisions

1. In the abstract (lines 39-42), the authors describe the results for reducing PA levels as well as for maintaining low levels. However, the HRs seem to only be for women who reduced PA levels. The description is confusing - I suggest rewording to state that results were similar among women who maintained low PA levels post-diagnosis.

Author’s response: This has been corrected in the text.

2. Abstract (line 46), the authors refer to PA as a primary cancer treatment - I think this is bad wording, as it seems to imply that PA could be a substitute for medical treatment of breast cancer. I think it would be better to refer to PA as a preventive measure or something like that. (Similar wording appears in the end of the discussion, line 352.)

Author’s response: We have rephrased the sentence both in the abstract (line 45-47) and discussion (line 370-372) part.

3. I think the authors need to provide information on whether women with breast cancer who completed at least one post-dx questionnaire (and are included in the study) are different from women who had to be excluded.

Author’s response: We have included description of these sensitivity analyses in the methods (line 107-108), and also reported the findings in the first paragraph of the results(line 171-177).

4. In the results (line 165), the authors state that there were 197 deaths during follow-up. However, in table 1, there are 217 deaths listed.

Author’s response: We have corrected the numbers in the table 1 and also in the result, first paragraph (line 168).

5. In the results (lines 170-171), the authors state that there were no statistically significant associations between PA and age at diagnosis. However, this is
completely unsurprising, considering that all women completed the PA questions at baseline, when they were in a relatively narrow age range. Rather, the authors should look whether there were differences in PA by time to diagnosis (i.e., do women who were diagnosed sooner after baseline have different PA levels than women who were diagnosed many years later)? A similar analysis should be done by time between diagnosis and post-diagnosis PA questionnaire completion.

**Author’s response:** We did not find any differences in PA levels and time before and after the diagnosis and this is now described in the first paragraph of the results (line 179-182).

Discretionary revisions

1. In the abstract (lines 38 and 39), the authors should revise the statement ‘and did not change statistic significantly with body mass index’ to did not differ across categories of body mass index. Also, there is no need to abbreviate BMI, as it is never used again in the abstract.

**Author’s response:** We agree and have corrected this.

2. In the background (lines 66-67), the authors state that change in PA has received little attention - I think the authors could further emphasize that understanding whether women who had low PA pre-diagnosis change to being more active post-dx, and this has benefits for breast cancer survivors, that this would be a huge driver towards improving the survival experience for these women.

**Author’s response:** We agree and have included this in the background section (line 68-70).

3. Did the authors also look at continuous change in pre- to post-dx PA, adjusting for (or stratifying by) pre-dx levels? I think this is an important component to this analysis - if women who change a little still see some effect, this is also an important message. The analysis the authors did is still a good one, but this might help to complement the current paper.

**Author’s response:** As suggested by the reviewer we analyzed finer categories of change in pre- and post-diagnostic PA adjusting for pre-diagnostic PA level. This new variable has the advantage to avoid the zero value for women with no change (n=338). In addition it specified the direction of change i.e. changing from low to moderate (1-4 to 5-6) or from low to high (1-4 to 7-10) or the opposite direction. The results were not different from what we initially presented. In addition as we revealed in lines 191-192: “More than 80% of the women who changed their PA levels the most moved 1 to 2 levels on the PA scale”:

4. When the authors refer to hormonal therapy (line 154 for example), do they mean tamoxifen and other breast cancer treatments or do they mean
menopausal hormone therapy?

Author’s response: We mean menopausal hormonal therapy; this is specified in the methods (line 157).

5. In the results (lines 199-202), the authors state that the results for post-diagnosis PA were similar in sensitivity analyses adjusting for various factors, but the first set of variables listed (age at diagnosis, stage, pre-diagnosis PA, time to post-diagnosis questionnaire) are all the variables that the authors state were included in the main model (see Methods, lines 143-145). Please clarify which sensitivity analyses the authors are referring to.

Author’s response: This is already clarified in line 156-160 in the methods.

6. In the results (lines 215-221), the authors should explicitly state who the reference group is, as it is difficult to make comparisons as the current paragraph is written. Also, I suggest adding a couple of HRs as examples.

Author’s response: This is highlighted in the paragraph, and the HRs that came out significant were already there. We have not included the non-significant estimates.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being Published.

Author’s response: a professional language editor represented by Ms. Trudy Perdrix-Thoma and Professional Standards Editing has edited the manuscript before resubmission.

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests: I declare that I have no competing interests.