Author's response to reviews

Title: Awareness and correlates of the role of physical activity in breast cancer prevention among Japanese women: Results from an internet-based cross-sectional survey

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Author's response to reviews: see over
Dear Dr. Mona Jeffreys:

RE: Resubmission of manuscript (1780162908121736)

Please find attached the revised version of our manuscript ‘Awareness and correlates of the role of physical activity in breast cancer prevention among Japanese women: Results from an internet-based cross-sectional survey’, which we would like to resubmit for publication as a Research Report in BMC Women’s Health.

The manuscript has been revised in accordance with the Reviewers’ and Editor’s comments. The suggestions provided are addressed in the following pages in our point-by-point responses to each of the comments. Revisions are indicated in red text.

We hope that the revisions in the manuscript and our accompanying responses will be sufficient to make our manuscript suitable for publication in BMC Women’s Health.

We look forward to hearing from you at your earliest convenience.

Sincerely yours,

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**Reviewer (Referee 1):** The article seems to be very interesting and important using an unique concept, awareness of relationship between breast cancer and physical activities. However the main rationale of the article should be modified as indicating bellows:

1) The article concludes that prevalence (31%) of awareness of the relationship is low among middle aged women. However, as the authors indicated the limitation of this study, the representativeness of the sampling in this survey is limited because of limited sampling only in the Japanese women and using internet-based sampling. Thus, authors should modified the title and conclusion as clearly indicating the limitation of the sampling, by adding such as "among the Japanese sample through internet based study" Also, the confidence interval of the average proportion of prevalence, 31% should be indicated to compare the results with other studies.

**Response**

Thank you for your comments. As suggested, we have modified the title and conclusion, and added a clarifying phrase to the discussion section. The abstract has also been changed accordingly.

**Title:** Awareness and correlates of the role of physical activity in breast cancer prevention among Japanese women: **Results from an internet-based** cross-sectional survey

**Conclusion:** Japanese women **through internet-based study** were poorly aware of the role of physical activity in breast cancer prevention. (Abstract; page 14, line 247–248)

**Discussion:** This is the first study to identify the prevalence and correlates of awareness for the preventive effect of physical activity on breast cancer among adult women **through internet-based study.** (page 10, lines161–163)

With regard to the confidence interval, we have changed the abstract and appended the change in the results section.
• The prevalence of awareness was 31.5% (95% CI: 28.6–34.4). (Abstract)

• The prevalence of awareness about the preventive role of physical activity in breast cancer among Japanese women was 31.5% (95% CI: 28.6–34.4). (page 9, line 144–145)

2) The correlations between awareness of breast cancer prevention and physical activities and other demographic and knowledge of breast cancer were observed in this study. However the item about the awareness is in the part of knowledge of breast cancer and the intercorrelations seems to be higher among the items within them. Thus, the correlations that the article presented as between other variables and awareness seems not to be specific observation for awareness but more general trend in knowledge of breast cancer. The authors should present the specificity of the awareness from other knowledge items by additional analyses.

Response
In accordance with this suggestion, we have recalculated the total score for knowledge of risk factors. We summed up the number of correct responses from knowledge items of risk factors except for the item about physical activity. We also re-examined whether knowledge and other variables were related to awareness. We revised the methods, results and discussion sections accordingly. These revisions are indicated in red text as follows:

Methods: The total score for each part summed up the number of correct responses except for the item about physical activity in the risk factors subsection. (page 6, lines 67–69)

Abstract Results: The prevalence of awareness was 31.5% (95% CI: 28.6–34.4). Factors significantly associated with awareness included sociodemographic variables, exposure to information, and knowledge of breast cancer. Being married (AOR, 95% CI: 1.75, 1.05–2.92) was positively related to awareness, while having children (0.65, 0.36–0.86) was negatively related. College graduates or those with higher levels of education (1.50, 1.01–2.22) were significantly more likely to be aware than those who
had not graduated high school. Moreover, exposure to information (2.11, 1.51–2.95), and high knowledge of symptoms (2.43, 1.75–3.36) were positively associated with awareness. Finally, low knowledge of risk factors (0.30, 0.22–0.40) was negatively associated with awareness.

**Results 1:** The median of knowledge score about breast cancer risk factors was 6.8 (out of 12), and 58.6% were classified as belonging to the high level group. (page 9, lines 134-136)

**Results 2:** Being married (AOR=1.75; 95% CI: 1.05–2.92) was positively related to awareness of the role of physical activity in breast cancer prevention. Having children (AOR=0.65; 95% CI: 0.36–0.86) was negatively related to awareness of the role of physical activity in breast cancer prevention. In addition, those with 4 year university degrees or higher (AOR=1.50; 95% CI: 1.01–2.22) were significantly more likely to be aware of the preventive effect of physical activity on breast cancer than those with less than high school graduate levels of education. Moreover, exposure to information (AOR=2.11; 95% CI: 1.51–2.95) and high knowledge of breast cancer symptoms (AOR=2.43; 95% CI: 1.75–3.36) were positively associated with awareness of the role of physical activity in breast cancer prevention. Finally, low knowledge of breast cancer risk factors (AOR=0.30; 95% CI: 0.22–0.40) was negatively associated with awareness of the role of physical activity in breast cancer prevention. (pages 9–10, lines 146–158; Table2)

**Discussion 1:** …marriage, and having a high level of education were found to be positively associated with awareness. Several studies have indicated that marital status is a consistent correlate of breast cancer knowledge and screening behavior [24, 25]. (page11, lines 186–189)

**Discussion 2:** Respondents who had greater knowledge about breast cancer risk factors had lower awareness of the connection to physical activity than respondents with less knowledge. The result suggests that the role of physical activity in breast cancer prevention may not have been disseminated widely enough, even if individuals
had high knowledge about breast cancer risk. In contrast, respondents who had previous exposure to information and higher knowledge about breast cancer symptoms had higher awareness than their counterparts with less exposure and less knowledge of symptoms. These findings may indicate that providing clearer cancer information and, more specifically, information about the effect of physical activity in reducing cancer risk may be necessary for increasing awareness of the role of physical activity in breast cancer prevention. (pages11–12, lines 195–205)

3) Awareness in this study seems to be one of hypothetical constructs. However, awareness was only measured by a single item. Authors should present rationales for reliability and validity or limitations using single item measurement.

Response
Thank you for your suggestion. We have acknowledged the limitation of using a single item measurement as follows:

Moreover, the outcome variable for this study—awareness of the role of physical activity in breast cancer prevention—was measured using only a single item. Although this approach was adapted from previous studies [14, 15, 17], other measurement approaches may yield varying estimates of awareness. (page13, lines 237–240)

4) The article suggests that the development of specific communication strategies for subgroups with low awareness is needed in conclusions. However, it may be not enough for planning strategic communication only to enhance the awareness of relationship between breast cancer and physical activities in certain subgroups. If the article succeeded to identify the certain psychological and behavioral characteristics of the segment with low awareness, it will be helpful to plan the strategic communication such as mass media campaign. Present data does not cover this scope. Also, the authors’ argument seems that the only enhancing awareness of relationship between breast cancer prevention and physical activity is necessary and sufficient for breast cancer prevention. If the people aware about the relationships, there would be several types of segments for the people who
differently respond the information. I think there are a lot of people without the awareness but with daily exercise habits, or exercise habits are good not only for prevention of breast cancer but for prevention of other disease. If it is difficult to present the other compelling data conceded with awareness, the authors should write a more humble conclusion and implications consistent with the conclusion.

Response
We appreciate your comments. We have revised the discussion and conclusion sections as suggested.

Discussion: The present study did not find an association between awareness and the level of physical activity engaged in by the participants. However, this finding is consistent with a previous study that found that mass media campaigns increased awareness and knowledge of physical activity, but had less impact on changes in physical activity levels [31]. Previous research indicated that the influence of media campaigns related to healthy diet and physical activity was limited to awareness and attitudes [32]. Nevertheless, awareness is considered an essential first step in changing physical activity behavior [11]. Therefore, it may be especially important to make an effort to increase women’s awareness of the role of physical activity in breast cancer prevention. In addition, it would be necessary to design segmented information campaigns for people who respond differently to information. Regular physical activity and exercise habits are effective not only for breast cancer prevention but also for the prevention of other diseases. Thus there may be women, for example, without awareness of the effective role of physical activity in breast cancer prevention, but who take regular physical activity or exercise. (pages 12–13, lines 218–232)

Abstract Conclusions: The findings suggest that strategies to increase awareness about the preventive role of physical activity are needed for breast cancer prevention in subgroups with low awareness.

(Prior to the revision) This suggests that the development of specific communication strategies for subgroups with low awareness is needed.
Conclusions: The findings suggest that the development of communication strategies to increase the awareness of the preventive role of physical activity on breast cancer is needed for cancer prevention. Further identification of the specific psychological and behavioral characteristics of subgroups with low awareness would help in developing more effective and targeted communication strategies. (pages 14, lines 252–256) (Prior to the revision) These findings suggest that the development of specific communication strategies for low awareness subgroups revealed in this study would be needed in addition to the population-wide approach to cancer prevention to increase the awareness of the preventive role of physical activity on breast cancer.

Reviewer (Referee 2): In general the paper reads well and merits publication. However, before its publication there is need for a careful proof reading.

Response
Thank you for your comment. We have had our manuscript proofread by a professional language editing service.

Editor: The comments from reviewer 1 need to be addressed. In particular:
- there should be a CI around the prevalence of 31%
- consideration of points 2 and 3, regarding the relationship between awareness and knowledge, and the reliability of the awareness measure
- further discussion around point 4 (acknowledging the need for more than just awareness. In addition,

1) Please remove X2 values from the text, as these add nothing beyond the quoted P value (page 9).

Response
Thank you for your comments. According to your suggestion, we removed χ2 values from the text and left only the p values as follows:
Those with children were less likely to be aware than those without a child (p=.002). Awareness was higher in those having greater educational attainment (p=.004). (page 9, lines 129–131)

2) In the abstract and results, make sure that for each OR it is clear what the comparison group is. E.g. it makes no sense to quote an OR of "those with 4 year universoty degrees or higher" when you do not say what this is compared to

Response
As suggested we have revised the abstract and results sections to be clearer about the comparison group of each AOR.

Abstract Results: Being married (AOR, 95% CI: 1.75, 1.05–2.92) was positively related to awareness, while having children (0.65, 0.36–0.86) was negatively related. College graduates or those with higher levels of education (1.50, 1.01–2.22) were significantly more likely to be aware than those who had not graduated high school. Moreover, exposure to information (2.11, 1.51–2.95), and high knowledge of symptoms (2.43, 1.75–3.36) were positively associated with awareness. Finally, low knowledge of risk factors (0.30, 0.22–0.40) was negatively associated with awareness.

Results: Being married (AOR=1.75; 95% CI: 1.05–2.92) was positively related to awareness of the role of physical activity in breast cancer prevention. Having children (AOR=0.65; 95% CI: 0.36–0.86) was negatively related to awareness of the role of physical activity in breast cancer prevention. In addition, those with 4 year university degrees or higher (AOR=1.50; 95% CI: 1.01–2.22) were significantly more likely to be aware of the preventive effect of physical activity on breast cancer than those with less than high school graduate levels of education. Moreover, exposure to information (AOR=2.11; 95% CI: 1.51–2.95) and high knowledge of breast cancer symptoms (AOR=2.43; 95% CI: 1.75–3.36) were positively associated with awareness of the role of physical activity in breast cancer prevention. Finally, low knowledge of breast cancer risk factors (AOR=0.30; 95% CI: 0.22–0.40) was negatively associated with awareness of the role of physical activity in breast cancer prevention. (pages 9–10, lines 146–158)
3) Please be clear what strategy "forced entry" regression uses to choose what variables are in the model. It appears that you just put all variables in the multivariable model.

**Response**

Thank you for your suggestion. We have revised the part of the methods section referring to forced-entry to be more explicit.

…forced-entry logistic regression analysis was conducted to examine the independent relationships between sociodemographic variables, knowledge, exposure to information, level of physical activity and awareness of the role of physical activity in breast cancer prevention adjusted for all independent variables. Adjusted Odds Ratios (AORs) and their 95% confidence intervals (CIs) were calculated. (page 8, lines 111–116)

4) Please state as a footnote to table 2 that all variables are mutually adjusted for each other (if this is the case)

**Response**

According to your suggestion, we have added a footnote to Table 2 indicating that all variables were mutually adjusted.

Note: The multivariate model examined all variables simultaneously and mutually adjusted them for each other. (Table2)

5) Please add crude OR and 95% CI to Table 1 - otherwise the interpretation of adjusted OR is difficult.

**Response**

We have added crude OR and 95% CI to Table 2.