Author’s response to reviews

Title: Colorectal cancer screening knowledge, attitudes and behavioural intention in Indigenous Western Australians

Authors:

Aliki Christou (alikichristou@yahoo.com.au)
Sandra C Thompson (sandra.thompson@cucrh.uwa.edu.au)

Version: 3 Date: 22 May 2012

Author’s response to reviews: see over
22 May 2012

Editor-in-Chief
BMC Public Health

To the Editor,

Please find attached the revised manuscript entitled, ‘Colorectal cancer screening knowledge, attitudes and behavioural intention in Indigenous Western Australians’ which was submitted for publication as an original research article in your journal, BMC Public Health.

We very much appreciate the extra time given for us to have the manuscript reviewed by a statistician and have addressed the reviewer’s comments that were remaining from the last submission, point-by-point below.

The main concerns were related to our multivariate logistic regression analyses which aimed to identify predictors of screening intent. We found on assessment by the statistician and following re-analysis of the data, that many of the variables included in the logistic regression model were significantly related to each other which may have caused the conflated odds ratios and wide confidence intervals observed initially. In particular, the bowel cancer knowledge variable was related to perceived self-efficacy and having participated in screening in the past, so these could not be included in the same logistic regression model. As all of these variables were significant in bivariate analyses we performed two separate logistic regressions - one without knowledge score and another with knowledge but excluding the other variables.
We hope the comments have been sufficiently addressed to enable the manuscript to proceed for review again. We look forward to receiving your response.

Regards,

Aliki Christou
and
Sandra Thompson
**Pending comment from Reviewer 1:**

Point 2:

There are several issues about the multivariate analysis of ‘intention to screen’ that need to be clarified.

“There is an inconsistency between the results of the univariate and multivariate analyses of variables associated with ‘intention to screen’ (Tables 5 and 6). The odds ratios (ORs) for the variables (except gender) in the final model are very large, but the ORs for the same variables in univariate analysis are much smaller: age 18.41 c/w 1.69, marital status 18.30 c/w 5.96, perceived self-efficacy 41.05 c/w 13.4, participated in screening in the past 12.45 c/w 3.83. This suggest that there were one or more very strong confounders of the univariate associations with ‘intention to screen’; this needs to be explored and explained in more detail because it raises more questions than it answers.”

As described below, when we conducted cross-tabulations with all variables we found that bowel cancer knowledge score was related to a number of variables included in the model and this may have accounted for the much higher odds ratios observed. In addition, the variable marital status seems to be causing some instability when it is included in the same model as the variable perceived self-efficacy, therefore we decided to remove it from Model 1. It does not seem to cause the same problem in Model 2 so we have kept it in this case.

**Pending comments from Reviewer 2:**

Point 12: "Significantly more detail on the multivariate analyses needs to be offered"  

Substantially more detail is now provided in the methodology section of the manuscript on how the multivariate logistic regression was performed.

Point 15: "It is unclear why the odds ratios for the multivariate analyses are higher than the univariate analyses."

This is addressed in Point 2 of Reviewer 1.
**Comments from Reviewer 3**

Title: Colorectal cancer screening knowledge, attitudes and behavioural intention in Indigenous Western Australians

Version: 2 Date: 13 March 2012

Reviewer: Peter O'Rourke

Reviewer's report:

**Major Compulsory Revisions**

1. The authors have not responded adequately to Point 2 of Reviewer 1 and Points 12 and 15 of Reviewer 2. It is essential that they do respond adequately to these points before a decision can be made on the suitability of this manuscript for publication.

   *These are addressed above.*

2. Clearly I do not have access to the data so I can only comment in generalities on the possible reasons for the major discrepancies in odds ratios between univariate and multivariate analyses in tables 5 and 6. It is most likely that there is ill conditioning across the cell numbers for the risk factors related to the outcome. Ill conditioning means close to a singularity caused by small cell numbers or factors which are very closely aligned on cell numbers. The consequences of this ill conditioning are large unstable odds ratios and very wide confidence bounds as seen in table 6. It would usually be one or two of the risk factors which cause this instability. A small number of individuals, perhaps with an unusual combination of risk factors, would be having high leverage in the analysis. The sample size is small with a maximum of 92 individuals and reducing to 84 for multivariate analyses. The two way tables of risk factors with each other need to be explored to check on corrupt or nearly corrupt distributions and for influential individuals. The odds ratios need to be explored for stability after deleting each of the risk factor in turn, as has been done for age and marital status in the revision. However it would be preferable to maintain a consistent data set of n=84 for these comparisons.

   We conducted several cross-tabulations and found that the variables, *having participated in screening in the past two years* (p=0.001), *perceived self-efficacy* (p=0.001) and *perceived susceptibility* (p=0.006) were related to *bowel cancer knowledge scores*. Marital status was also marginally significant (p=0.054). Because of this, we performed two logistic regressions – one without these variables together and another with these but without knowledge score. We did however, keep marital status in both models due to the strong association with screening intention. However when it was removed from Model 1 it substantially reduced the ORs and CIs suggesting that it maybe causing some instability (see details in table below). We therefore decided to remove it from Model 1. This effect was not observed in model 2.
<table>
<thead>
<tr>
<th>Predictor (n=89)</th>
<th>Adjusted OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (&gt;44 years vs &lt;44 years)</td>
<td>9.68 (1.74-53.77)</td>
<td>0.010</td>
</tr>
<tr>
<td>Participated in screening in the past (yes vs no)</td>
<td>9.62 (2.13-43.51)</td>
<td>0.003</td>
</tr>
<tr>
<td>Perceived self-efficacy (confident-very confident vs not confident)</td>
<td>27.20 (5.28-140.03)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Marital status (married vs unmarried)</td>
<td>15.27 (3.34-69.91)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Removing marital status

<table>
<thead>
<tr>
<th>Predictor (n=88)</th>
<th>Adjusted OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (&gt;44 years vs &lt;44 years)</td>
<td>4.45 (1.20-16.53)</td>
<td>0.026</td>
</tr>
<tr>
<td>Participated in screening in the past (yes vs no)</td>
<td>6.84 (2.01-23.25)</td>
<td>0.002</td>
</tr>
<tr>
<td>Perceived self-efficacy (confident-very confident vs not confident)</td>
<td>19.8 (5.46-71.79)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

**Model 2** (excluding the variables: perceived self-efficacy, perceived susceptibility and previous participation in cancer screening from the model)

<table>
<thead>
<tr>
<th>Predictor (n=86)</th>
<th>Adjusted OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marital status (married vs unmarried)</td>
<td>6.91 (2.1-22.5)</td>
<td>0.001</td>
</tr>
<tr>
<td>Bowel cancer knowledge score (overall)</td>
<td>9.97 (2.4-41.3)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Medium vs Low</td>
<td>13.6 (3.4-54.0)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>