Author's response to reviews

Title: An assessment of functioning and non-functioning distractors in multiple-choice questions

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Author's response to reviews: see over
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Professor Melissa Norton  
Editor in Chief, BMC Medical Education  

Re: An assessment of functioning and non-functioning distractors in multiple-choice questions  
(MS 6733148332571344)  

Dear Professor Norton:  

Further to the editorial decision on the above cited manuscript, we have made the further recommended revisions and are resubmitting the second revision of the manuscript for your consideration. Below you will find the detailed responses to the reviewers’ comments and we have highlighted (in green) the edited and added passages in the manuscript. The revisions have been read and approved for publication by all authors. Should you have any further queries, please feel free to contact me at tarrantm@hku.hk.  

Sincerely,  

Marie Tarrant RN MPH PhD
Response to Reviewers

Reviewer #1 (DS):

Minor essential revision
Page 14, lines 15-17: The authors have done a good job earlier in the manuscript acknowledging that three may not always be the magic number of options. It would be nice if this continued in the Conclusions. I would suggest rewriting this sentence to read "Because the majority of items developed by teachers will not have more than two functioning distractors, including more distractors may not be a good investment of a teacher's time in item development."

Response: This sentence has now been changed (page 17, lines 16-17)

Reviewer #2 (SMS):

I would like to suggest that the conclusion be "toned down a little" as I still think that the results obtained do not fully justify the conclusion made. Thus, perhaps p.14 Line 15 could read: "Because the majority of items developed by teachers are not likely to have more than two functioning distractors, ...." and Line 18 could read: ".... and additional non-functioning distractors are not likely to improve item or test psychometric properties."

Response: This sentence has now been changed (page 17, lines 18-19)

My main concern is with the criteria used for defining the "non-functioning distractor" in this study, since only slightly more than half of these distractors were defined as "non-functioning" by BOTH low frequency response and poor discrimination power. This means that even these two criteria do not substantially agree as to whether or not a distractor is functioning or non-functioning. So by using "either or" instead of "both" of these two criteria to define non-functioning distracters, it may have inflated the proportion of non-functioning distractors somewhat.

Response: Thank you for your comment. The decision to use one of these two criteria to define a non-functioning distractor instead of both criteria was made in consideration of previous empirical and theoretical research on this topic as referenced in the methods section (page 4, lines 6-8). While these two criteria are different and don’t always agree, we feel that if distractors were required to fulfill both criteria to be defined as non-functioning, this would substantially underestimate the true proportion of non-functioning distractors. For example, a distractor chosen by only 1% of the examinees is clearly non-functioning as so few people chose it that it likely appealed only to people who were purely guessing.1 This same distractor, however, could possibly have a negative discrimination index because those few examinees who are purely guessing and choose the option are also more likely to be lower achieving students. Therefore, if we used both criteria of low choice frequency and positive (poor) discrimination, this distractor would not be defined as non-functioning when it clearly is non-functioning. Conversely, a distractor that is chosen by >5% of students but has positive (poor) discrimination would also not be defined as non-functioning although the positive discrimination index indicates a problem with that distractor. A positive discrimination index means that the distractor is appealing to the higher achieving students. There are many possible reasons for this but one possibility is that the distractor is also a correct or partially correct answer. Therefore, even though it is appealing to a substantial proportion of students (> 5%) it is also not performing as desired because of its attraction to the higher achieving students. In both of these examples, the distractors are clearly not performing as distractors should but do not fulfill both criteria for a non-functioning distractor. If distractors must fulfill both criteria to be...
considered non-functioning this would substantially underestimate the true number of non-functioning distractors.

A closing bracket is missing for the percentage (12.0) of None Functioning distractors per item for Test E in Table 2.

Response: Thank you. This has been corrected.

References