Author's response to reviews

Title: Stability of empathy among undergraduate medical students: A cohort study at one UK medical school.

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Author's response to reviews: see over
Dear Dr. Galeng,

First could we express our thanks to the reviewers for their consideration of this paper and for their thoughtful comments. We have made substantial revisions (highlighted in yellow) in order to address the points raised by the reviewers. All tables have been re-formatted; these changes have **not** been highlighted in yellow.

Details of our revisions (in italics) are given in response to your comments which combine those of the reviewers:

1. Clarify the group of students is being discussed. The participants section in the methods section needs to be rewritten so that the reader understands that this is a cross-sectional study.

   *See comment below.*

2. An additional descriptor can be used, i.e., also state which graduating class each data point represents. It appears that students entering into medical school as early as 2002 filled out the survey instrument.

   *We have amended the paper so as to differentiate clearly between the two components of the Cambridge course: Core Science (Years 1-3) and Clinical (Years 4-6). All analyses and all results are now expressed in respect of students in each of the separate components. We have included a flow diagram which explains the structure of the Cambridge course and pattern of participation in the study (Figure 1). We hope these revisions remove any confusion as to when the study started and which year groups of students have participated.*

   Our data is longitudinal. We have data for the same individuals at three time points, for others at two time points and for some at one time point. Therefore we would dispute the view that the study is cross sectional. It is however true that we have not followed one specific cohort of students over all of their medical training. We cannot do this because only half of our students in the Core Science component of the course enter the Clinical component of the course.

   Did all entering year 1 students have IRI-EC & IRI-PT scores that were equivalent? If so, then combining the cohorts makes sense; if not, then each class must be followed in a longitudinal fashion.

   *The linear mixed effects regression models used to examine changes over time included an explanatory factor variable which controlled for year of entry (cohorts). Therefore, the time effects we have calculated can be interpreted independently of cohort group.*

3. Abstract: The authors indicate that changes in the curriculum may have lessened empathic erosion. There are no data to substantiate this claim.
We have removed this statement and rewritten both the abstract and conclusions.

4. The authors make a point of using an empathy scale that measures both affective and cognitive empathy, yet in many places in the manuscript they simply refer to "empathy" without differentiating between the two. The distinction needs to be made within this manuscript when discussing results.

This has been done throughout the manuscript.

5. Background: third paragraph: the authors state there are no norms with which to compare medical student empathy. The BEES does have a population norm, so that the vicarious empathy loss (as reflected by BEES scores) seen by medical students can be compared to the general population. This fact needs to be addressed.

We have amended the text to acknowledge that there are “norms” for certain measures of empathy (including the BEES). However we have also commented that such norms are derived from the general population and may not be entirely appropriate for medical students, since evidence suggests that empathy is influenced by age.

The authors suggest a norm needs to be established for the JSPE. It is probable that the JSPE cannot establish a general population norm, since it was specifically developed for medical education.

We have amended this point. Our argument is that benchmarks for the JSPE for medical students would be useful … not norms for the general population. We did not express this clearly in the original draft.

6. The last paragraph for the background section needs to be rewritten.

This has been done.

7. Methods: measures section: second sentence: Explain the statement "Given the age of the students...". A novice reader in this field of study will not be familiar with age issues with regard to empathy.

We have qualified this statement: students entering our Core Science component of the course are typically aged 18 and have limited clinical experience. Our view was that for many of these students the JSPE would not be appropriate. (We do use the JSPE with students in the Clinical component of the course.)

8. Results section: Please be specific when referring to tables. The appendix is never cited in the text.
More references to tables have been inserted and we have removed the appendix.

9. Please explain why outliers were removed. If the authors feel it is valid to remove the outliers, than an explanation needs to be given to support this decision.

Outliers were not removed for the primary analysis results but only as a sensitivity analysis to assess the robustness of our results and conclusions. It is our understanding that it is normal practice to undertake a sensitivity analysis in order to identify and examine the possible influence of outliers on the results. We believe that this sensitivity analysis strengthens our analysis.

In addition, in every survey there are those students that do not fill out the instrument in a valid fashion. For example, filling out all answers with a single number on the Likert scale. Were these "bogus" data removed from the study.

We seriously question this statement since it calls for researchers to exercise value judgments about individual respondents. Such judgments may not be substantiated or challenged. In the specific case of the IRI, the instrument contains 28 items of which we were interested in the 7 items relating to IRI-EC and the 7 items relating to IRI-PT. The items included in this study are randomly distributed throughout the instrument and are expressed both positively and negatively. Hence for a respondent to record an extreme score he/she would have to be switching consciously between rating items “4” (Describes me very well) and rating them “0” (Does not describes me very well). Similarly a respondent could use the same number, for example 2, and be answering in a valid fashion. Respondents with missing data were excluded from the study.

10. Discussion section: when citing the paper by Colliver, there also needs to be a reference to the letters to the editor that addressed his paper. (cf. Acad. Med., 85(12: 1812-14, 2010).

These references have been added

11. Conclusions section, the last sentence needs to be rewritten. The sweeping statement made that curricular changes account for changes in empathy cannot be made.

As noted point 3 we have removed this statement

12. Authors stated that “Many studies are cross sectional, preventing analysis of change in individuals over time.” “Few studies distinguish between results for men and women.” Although authors referred the article by Hojat et al (reference 13. number 31), in other paragraph, this article should be also referred in page 5. In the article, longitudinal analysis of empathy of both men and women was
reported. Such important previous study is to be mentioned (Page 5).

14. Reference number in the text should be listed in numerical order (Page 6, 10, 11). Add reference number 30 and 44 in the quotation in page 11 line 3. These articles also used Jefferson Scale of Physician Empathy.

_We have amended the referencing in accordance with the points raised above (12, 13 and 14)_

Minor revisions:

1. Please cite the appendix in your text.
_We have removed the appendix._

2. Make sure that all cited references in the text are in rank order.
_See above_

3. In the results section, with the paragraph starting with, "For IRI-EC, gender differences...", the expression of results as a percentage of S.D. is confusing. A further explanation of why these data would be discussed in this fashion would be helpful.
_We have replaced this and included data for standard deviation units (Cohen’s d)._  

Finally, in respect of the discretionary comment made by Professor Newton, the research team includes faculty members who teach and assess students. The data protection rules and terms of the ethical approval governing our study mean that the team have access only to anonymised survey results. Whilst as members of faculty they will observe student behaviour they cannot link an individual student to his or her empathy scores. We feel that although there is likely to be a positive relationship between empathy and pro-social behaviour we cannot comment on this.

Yours sincerely
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