Author's response to reviews

Title: An Analysis of Reported Motivational Orientation in Students undertaking Doctoral Studies in the Biomedical Sciences

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Author's response to reviews: see over
Authors’ responses to peer review of manuscript ‘An Analysis of Reported Motivational Orientation in Students undertaking Doctoral Studies in the Biomedical Sciences’ for peer review by BMC Medical Education. MS: 177053372710751

Dear Sir/Madam,

Thank you once again for considering our work, ‘An Analysis of Reported Motivational Orientation in Students undertaking Doctoral Studies in the Biomedical Sciences’, for peer-review with BMC Medical Education.

We have carefully reviewed the Reviewers' comments and are very grateful for their helpful, detailed and positive assessment of our work. We have responded to each comment in point for, as detailed below. Please contact me directly should you require any further detail.

Sincerely yours,

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Reviewer's report

Title: An Analysis of Reported Motivational Orientation in Students undertaking Doctoral Studies in the Biomedical Sciences

Version: 1
Date: 11 November 2013
Reviewer: Catrin Evans

Reviewer's report:
Thank you for the opportunity to review this paper. I found it of interest, although, as a qualitative researcher and an ex-Director of a doctoral programme in Health Sciences, there were elements of this paper that I felt needed to be clarified. In particular, its usefulness in terms of informing and understanding current practice could have been stronger. Specific comments are provided below:

AUTHORS’ RESPONSE: Thank you for providing a helpful and thorough review of our submission.

R1C1: I felt that the introduction and background/literature reviews were too long. This section could perhaps be simplified – by laying out clearly the need for a better understanding of the learning process in doctoral study and explaining the role of motivation as but one element (of many different possible issues) affecting attrition within doctoral study. It is not quite clear why the team has chosen to focus particularly on motivation, as opposed to other possible issues.

AUTHORS’ RESPONSE: The reviewer makes an important point here and we agree that the rationale for adopting a focus on student motivational orientation could be made clearer. The analysis presented in this submission derives from a series of semi-structured interviews conducted with Ph.D. students working in the biomedical sciences at two Australian Universities. In our analysis of their interview responses three major themes were identified – learning relationships, perception of course assessment requirements and motivation. This submission deals with the identified theme of motivation. In the original version of our manuscript, the inductive structure of this study was not introduced until after the literature review (P.7, Paragraph 2, ‘This study forms a subset of a wider….’), which we agree may cause the reader some confusion. We have sought to clarify this by the addition of the following:

Page 3 Paragraph 3:
In an attempt to contribute to the body of data describing the form and function of doctoral learning in the biomedical sciences, we undertook a series of semi-structured interviews with students enrolled in two Australian Group of Eight (Go8) Universities. As discussed below, a thematic analysis of student responses identified learning relationships, learning objectives (both dealt with in separate submissions) and motivation were perceived as key elements of the learning environment. In the present submission, we used elements of self-determination theory to analyse the identified theme of reported motivational orientations.

We have also significantly shortened the introduction by removing the summary description of the study findings (please see R1C3 below).

R1C2: The operational definition of motivation could perhaps come in a section that acts as the conceptual framework for the study – rather than as part of the literature review. The function of the latter should be to show the need for, and value of, this study. In relation to this point, I am also not quite clear why the team has chosen to focus on the biomedical sciences. Perhaps there needs to be some discussion about the discipline areas involved
here and what makes this area different to others (if at all) – more contextual information on the nature of doctoral study in the biomedical sciences is required.

**AUTHORS’ RESPONSE:** Our operational definition of motivation and IM/EM is important to the subsequent discussion of self-determination theory and our review of the literature pertaining to motivation. As such we have elected to leave this section in the introduction / literature review. We do agree that additional explanation as to the choice of discipline (biomedical sciences) would enhance the flow of paper. We have added the following paragraph to the abstract to accommodate this suggestion:

Page 2 Paragraph 1:
Despite this, doctoral learning in the biomedical sciences has, to date, received little research attention.

R1C3: On p.4 (1st paragraph), the paper seems to be presenting findings by discussing the 3 major groups of motivational interest – I would suggest leaving these until the results section.

**AUTHORS’ RESPONSE:** This synopsis of the study’s findings was written with a biomedical audience in mind (brief summaries of this nature are common place in biomedical journals and the authors use a similar approach in their own biomedical research). However, with the Reviewer’s concerns regarding the length of the introduction in mind we have removed this section.

Page 4 Paragraph 1 (removed):
We argue that understanding students’ motivational orientations is a key step in developing research-informed improvements to scholarship in the biomedical doctorate. Drawing on previous research from the United States, Europe and Australia, we used elements of self-determination-theory to analyse the motivational orientations of biomedical Ph.D. students from two Australian Go8 universities. We identified the existence of three major groups of motivational orientation (Instrumentalist, Benevolent Interest, Innate Interest) in this cohort. A significant body of data exists to demonstrate that students whose motivational orientation is characterised solely by an instrumentalist approach (consistent with an external locus of motivational control) are those at greater risk of poor learning outcomes and attrition. Whilst acknowledging this important consideration, we also suggest that a balanced motivational orientation, characterised by the presence of both Instrumentalist (external motivation) and either Benevolent Interest (well internalised external motivation) or Innate Interest (intrinsic motivation) may be of key importance in sustaining a student across the lengthy and highly varied course of a doctoral program. We suggest that a greater focus on ascertaining student motivation, both initially but also across the length of doctoral programs in the biomedical sciences may assist in improving learning outcomes and reducing rates of attrition.

R1C4: The section on operational definition of motivation becomes a bit complicated and convoluted – it could do with being simplified or re-written to be clearer - there needs to be more explanation of organismic integration theory (p.5).

**AUTHORS’ RESPONSE:** We agree that a simplification of this section is warranted. We have streamlined the descriptions of qualitative and quantitative motivation accordingly. The paragraph in question now reads as follows:

Page 4 Paragraph 2:
Motivation is a key element in explaining human behaviour or, as described by Forbes (p.85) “why we do the things we do the way that we do them” ¹. As noted by Ryan and Deci (p.54) motivation can be assessed both quantitatively (as a measure of one’s enthusiasm for a
particular task) and qualitatively (as an assessment of the beliefs that give rise to a task being undertaken) ².

We suggest that for the purposes of this study the description of organismic integration theory contained in paragraph 1, page 5 is provides sufficient detail. We have, however, added sentence referring the interested reader to several comprehensive reviews on the subject, should additional depth be required:

Page 5, Paragraph 1:
(for a comprehensive review of the development of self-determination theory, including cognitive evaluation and organismic integration theories see Vansteenkiste, et al. and references therein) ³.

R1C5: The study justification should be incorporated within the literature review rather than in the methods section – the literature review should already have made it clear why this study is justified.

AUTHORS’ RESPONSE: We have removed the study justification from the methods, significantly shortened it and incorporated it into the introduction.

Page 1 Paragraph 3:
Despite these contemporary developments, relatively little specific focus has been applied to the scholarship of doctoral learning in the biomedical sciences ⁴, ⁵. As discussed by Golde and others, significant differences are found in the socio-cultural and operational construction of individual academic disciplines ⁶.

R1C6: The methods section reads like a justification for adopting a qualitative approach to a quantitative question. It currently feels like the research has essentially taken a pre-defined area of interest (motivation) and has set out – deductively – to explore this through semi-structured interviews. This is very different from the usual – inductive – approach to qualitative research where informants present their own world views. I think the team need to justify this approach more rigorously. In particular, the method of analysis needs more explanation. It is currently rather superficial and thin. I think what the team has done is used something of a ‘framework approach’ – where the data is scrutinised for pre-defined concepts as well as for inductively emerging themes. What were the free-standing inductive themes? Did they add anything to our existing understanding of motivation or doctoral study?

AUTHORS’ RESPONSE: The Reviewer makes an important point here. We have in fact used an inductive method very similar to that described by the reviewer as being a standard approach in this field. To clarify the methodology used we have significantly redrafted the materials and methods section as follows. Please refer to pages 7 and 8 in the revised manuscript to review these changes.

R1C7: In the methods section, it would help to have more details about the sample. Can we be provided with demographic details and other important information (e.g. stage of study, subject area, home or international).

AUTHORS’ RESPONSE: We agree that this would be of use in providing study context. We have added the following paragraph to the materials and methods section:

Page 8 Paragraph 2:
65% of study participants were female and the majority (88%) of participants were domestic enrolments. 3 students were in their first year of study, 5 in their second year of study, 6 in
their third year of study and 2 students had been enrolled for more than four years. One study participant did not report their candidacy status. The average interview length was 35.5 minutes. Students reported working in a range of biomedical fields including: physiology, cancer biology, musculo-skeletal disorders, reproductive biology, pharmacology, and cell signalling.

R1C8: In addition, we need to know more about the research team – who were they? Why were they undertaking this research? More reflexivity here would be useful.

AUTHORS’ RESPONSE: We suggest that sufficient detail is presently contained in the following:

Page 8 Paragraph 4:
In the present study, the interviewer (34 years old, male, biomedical scientist with experience in supervision and an interest in doctoral education)

R1C9: On p.8, it states that the participants were ‘broadly ignorant’ of the purposes of the research. Can this be explained in more detail with reference to research ethics conventions?

AUTHORS’ RESPONSE: We have rephrased this section as follows to better clarify the study function disclosure provided to the participants.

Page 7 Paragraph 4:
Prior to interview, participants were informed that the investigators wished to understand more about what they found to be important in their learning as doctoral students in the biomedical sciences. All participants were provided with a debriefing as to the purpose of the study and the methodology employed at the conclusion of their interview. All participants were advised of their right to withdraw from the study without prejudice.

R1C10: On p.9, in terms of the analysis, it is not clear whether these are inductive or deductive themes – more explanation as to how these themes were derived is important.

AUTHORS’ RESPONSE: We suggest that the revisions made to the materials and methods section (please refer to AUTHORS’ RESPONSE to R1C6) have addressed this point. In addition, we have added the following sentence to the results section:

Page 9 Paragraph 1:
An analysis of student motivations inductively identified in interview transcripts, using self-determination theory, demonstrated three distinct motivational orientations common to students studying at Institution A and Institution B:

R1C11: In terms of the presentation of the findings, there are too many quotes. I would expect to see a more nuanced elaboration of the different elements of each theme, with one quote illustrating each element – rather than just being presented with a list of quotes. A more nuanced and critical and explanatory approach to the themes and their inter-relationships would be expected within a qualitative research approach.

AUTHORS’ RESPONSE: We have reviewed our quotation usage and removed one, arguably redundant quotation from each category. However, we do feel it is important that the remaining quotations be included for publication in support of the study conclusions. Online journals such as BMC Medical Education are a very important forum for qualitative research due to a lack of restrictions on word length. This allows authors (as we suggest we have done) to provide a representative selection of interview excerpts for the reader to analyse and interpret against the study conclusions themselves.
One of our own criticisms of qualitative, semi-structured interviews as an investigative technique is the common practice of selectively using of a small number of quotes in support of a particular argument or position. For each motivational orientation in the present study, the key elements are clearly and succinctly described, with this description then supported by a rich selection of student responses. In using a larger selection of student responses we are able to better support the objectivity of our argument for the existence of different motivational orientations in this cohort. In R1C12, the Review makes an important point with regards variation in response – or ‘shades of grey’. By using more than one quote to support our argument we simultaneously demonstrate to the reader the degree of variation, and similarity, in the responses used to build our analysis. The potential interrelationships between these motivational orientations are then discussed with reference to the contemporary literature in the results section.

In keeping with a suggestion made by Reviewer 2, we have added the following sentence to further distinguish between the Benevolent and Innate categories of motivational orientation:

Page 12 Paragraph 1:
A key distinguishing factor between the Innate and Benevolent Interest classifications is the concept of research translation. In the Benevolent Interest category, motivation derives from a desire to see research translated into something that provide a tangible benefit to an individual or society. This feature was absent from the Innate Interest classification, where the process of research discovery was regarded as interesting in and of itself.

R1C12: The presentation of the analysis makes it appear as if the classification of the participants depending on their ‘motivation’ was very clear cut. What were the shades of grey? It feels unrealistically straightforward – unusual in qualitative research. Were there any significant differences within the sample dependent upon their stage of study or context or discipline area or university? What were the nuances?

AUTHORS’ RESPONSE: As noted above we suggest that inclusion of a number of representative student quotes supports the classification of motivational orientations into three categories. The Reviewer makes a valid point with regards potential simplification of the data – indeed this is recognised as a problem inherent to the use of any interpretative framework or model. That not all students stratified into a particular set of motivational orientations is discussed in the distributions section of the manuscript. To convey the point made by the Reviewer, we have added the following sentence to the discussion:

Page 14 Paragraph 2:
Due to the size of this cohort it was not possible to identify potential differences in motivational orientation between students enrolled in different institutions nor at different stages of candidacy. An analysis of motivational orientations, taking these factors into account, would thus constitute an important topic for future research.

R1C13: In the discussion, whilst the consideration of student motivation is important, I feel that it is equally important to critically consider the context of this motivation – in terms of the current job market or value placed on doctoral study – in different economic, social and cultural contexts – or in terms of the learning environment in which students finds themselves. The discussion feels rather de-contextualised. Of more interest perhaps would be to consider the external as well as internal influences on a student’s motivation. As a doctoral supervisor and programme director, I am left wondering what implications this research may have for my own practice or for my institution’s policies.

AUTHORS’ RESPONSE: The Reviewer makes a very interesting point here. We too have a particular interest in external influences on doctoral education and the need for evidence-based reform in this area of scholarship. However as this study was not designed to capture
the impact of these myriad factors we are reluctant to speculate as to their import in the absence of empirical data. Although external factors were not a specific target of this study they are almost certainly of importance to a many of the elements that construct the doctoral learning environment, including motivation. We have added the following sentence to the conclusion, identifying this as an important area for future research in this field.

Page 21 Paragraph 2:
There is also significant debate regarding the lack of tenure-track and faculty jobs available for graduates and even the continued relevance of traditional doctoral programs in an increasingly cross-discipline, output focused research market. In future research in this area it would be of great interest to examine the impact these contemporary environmental factors might play in supporting an EM in biomedical Ph.D. students, and whether or not these factors were impacting doctoral learning outcomes in a positive or negative fashion.

Reviewer's report
Title: An Analysis of Reported Motivational Orientation in Students undertaking Doctoral Studies in the Biomedical Sciences
Version: 1 Date: 21 January 2014
Reviewer: Frances J Kelly
Reviewer's report:
1. The question posed is well defined. The focus of the article is on the motivational orientations of doctoral students in the biomedical sciences, gaining an understanding of these has potential to influence improvements to PhD programs in that discipline. Understanding motivations for doctoral study is also an area of research that demands further research, both at the level of the discipline which, as the authors outline, is consistently growing its numbers of doctoral candidates, and in the field of doctoral education research. Although there is some research into motivations of doctoral candidates in the latter, as the authors identify, it is by no means exhausted. The contribution of the article is therefore twofold: to the discipline of biomedical science, and to the field of doctoral education. The aims of the research are clearly articulated, the potential benefits are identified.

2. Methodology: the article clearly outlines the methodology (including methods used) of the study and gives appropriate detail. The methodology is appropriate to the study. The account of the theoretical framework that is employed is also detailed, and for the most part is clear although it borders on being overly complex. The use of self-determination theory to analyse motivations is one of the paper's contributions and the authors make a good case for its application in this context.

3&4. The data are sound and reported appropriately. The findings are clearly identified and categorised, and although the differentiation between categories ii) and iii) in the initial brief explanation was not quite clear, this did become clearer once the detail is included. The quotations from the data for the most part fit or support the categorisations – yet not every quotation does. For example the quotations from students A and D at the top of page 11 are not as clear an example of instrumental motivation as preceding comments are – they are more nuanced, and perhaps require commentary; further or expanded analysis of these could assist in demonstrating how they fit the category, when it is not self-evident.

5. The discussion and conclusion are well-handled. The authors’ argument regarding the complexity of doctoral education and that external motivations combined with strong internal motivations intimate a positive outcome for the student, are articulate, clear, and supported by the findings. An initial question that was raised in reading this paper – how might identifying motivational orientations assist in improving learning outcomes or reducing
attrition – is not answered, nor perhaps can be, and questions remain (as the authors indicate) regarding the means by which a balance of motivations (such as are identified as being beneficial) could be fostered. There are references to research into socialisation and promoting agency, the work of the Carnegie Foundation, and I agree with the authors that these are important issues requiring further research.

6. Limitations of the research are identified and the authors are suitably cautious regarding generalisations – this is a ‘snap shot’ of a particular cohort, in particular context (disciplinary, institutional, and geographical-national). The section on distribution may be a requirement in this journal or field but seemed an unnecessary addition in this instance; I am not sure that distribution for this limited cohort (of 17) is that useful. It would strengthen the paper to have this section omitted and replaced with further analysis in the results section (see above), if it is a matter of word limit.

7. The authors clearly identify prior work in this area on which they are building. They draw here on a range of recent studies, as is appropriate to this research, including publications from other disciplines where similar studies investigating motivations for doctoral study are discussed. The research on attrition dates from the 1990s which could suggest that this dimension is of less interest in recent doctoral education research than it has been previously (last century).

8. The title and abstract are appropriate. The abstract is detailed and conveys the contributions of the paper, as well as the methods employed and the theoretical framework.

9. Writing and presentation: the article is very well-written, articulate, concise and clear with only a few minor typos (scholarship of doctoral learning (p.16)). Although I am not familiar with the journal (being in doctoral education, not biomed) from my brief survey the style and format of the article seems appropriate to it.

**AUTHORS’ RESPONSE:** Thank you for your positive, thorough and helpful assessment of our submission.

Discretionary Revisions (which are recommendations for improvement but which the author can choose to ignore):

R2C1: the authors could consider clarifying the theoretical framework as it borders on being overly complex.

**AUTHORS’ RESPONSE:** In keeping with comments (please see R1C4 above) we have clarified and shortened out theoretical framework and operational definition of motivation.

R2C2: The differentiation between categories ii) and iii) in the initial brief explanation could be clarified. Several quotations (e.g. students A and D at the top of page 11) could benefit from further commentary or expanded analysis to better demonstrate how they fit the category.

**AUTHORS’ RESPONSE:** We agree with the Reviewer here and, in keeping with comments also made by Reviewer 1 have added the following section to our description of Innate motivation:

Page 12 Paragraph 1:
A key distinguishing factor between the Innate and Benevolent Interest classifications is the concept of research translation. In the Benevolent Interest category, motivation derives from a desire to see research translated into something that provide a tangible benefit to an
individual or society. This feature was absent from the Innate Interest classification, where the process of research discovery was regarded as interesting in and of itself.

We have also expanded our commentary for the identified student quotation to better clarify how they fit the category:

Page 10 Paragraph 4:
Undertaking research to build self-esteem, obtain external validation from peers/society or continuing with research to avoid failure is consistent with introjected EM and was the second most commonly reported motivation identified in our Instrumental classification. Student A (below) reports being motivated to finish her studies due to the influence of a parent. Several students indicated that being awarded a qualification (Student D) or the title of doctor (students H and J) was an important motivation for undertaking a Ph.D.

R2C3: The section on distribution adds little to the argument and could be omitted. If there is more recent research into attrition in doctoral education the authors could include this (or if not, speculate on why this is not a current research interest in the field).

AUTHORS’ RESPONSE: We would prefer to retain the section on distribution as we feel it contributes to our discussion of the potential importance of a balanced motivational orientation in doctoral learning. We have included some more contemporary references on doctoral attrition (See references by Jiranek et al and Kiley et al).

R2C4: Check for minor typos: e.g. scholarship of doctoral learning (p.16).

AUTHORS’ RESPONSE: Thank you for this. We have carefully reviewed the manuscript.