Author’s response to reviews

Title: Does academic interest play a more important role in medical sciences than in other disciplines? A nationwide cross-sectional study in China

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Author’s response to reviews:

Dear Editors,

We appreciate the detailed and thoughtful comments from you and the two reviewers in helping us increase the quality of our paper. In the revised manuscript, the new changes are written in blue for easy reference. We hope that we have addressed all the concerns and look forward to your feedback.

Below you will find our point-by-point responses to the comments from you and the two reviewers.

Editor Comments:

#Comment 1. Please ensure that your revised manuscript conforms to the journal style, which can be found at the Submission Guidelines on the journal homepage.

* Response: Thanks for your kind reminder. We have double checked the format of our revised manuscript to ensure that it conforms to the journal style.

#Comment 2. Please note that you will not be able to add, remove, or change the order of authors once the editor has accepted your manuscript for publication.
* Response: Thanks for reminding. We understand the policy of this journal and therefore will not add, remove or change the order of authors once it’s accepted for publication.

Reviewer reports # Dirk Tempelaar (Reviewer 1):

#Comment 1. The use of 'causal language'. Although some PSM studies claim that 'PSM allows causal inference in observational studies', that claim is not without debate. The claim being valid is fully depending on the assumption that there are no unobserved confounders. But that assumption cannot be tested. In fact, the Zheng paper does not even mention this assumption: it discusses three main assumptions at the bottom of p. 10, top of p. 11, but not this one. It is not difficult to bring forward arguments why the assumption of no unobserved cofounders is unlikely to satisfy. The 'treatment' is no treatment in the true meaning of that term, but the presence or absence of interest, an observed quality. We know from an abundance of empirical educational research that having interest generally goes together with many different adaptive learning dispositions, such as being engaged, motivated, having proper learning goals, and so on. All of these learning dispositions are potential cofounders. But if so, all are unobserved, because the covariates exclude any dispositional student variables. Why insist so strongly on this causal language? If you are slightly more modest in your claims, do not talk about 'causal effects' but just about 'effects', you do not hurt those researchers who are more strict, and at the same time can bring your message?

* Response: We really appreciate your effort on pushing this manuscript more methodologically sound. We agree with your comment. Following your suggestion, we have changed the expression of ‘causal effects’ to ‘effects’ throughout the manuscript.

#Comment 2. Somewhat related is my second issue, related to my comment1. The author has introduced a new reference to justify some analytic choices: Caliendo M, Kopeinig S. Some Practical Guidance for the Implementation of Propensity Score Matching[J]. Journal of Economic Surveys, 2008, 22(1): 31-72. First of all: I cannot find the ATT formula in that paper as it is given in the Zheng paper. Second, and more important: in the discussion of the ATT criterion the referred paper mentions the importance of the 'so-called self-selection bias', and continues to state: "In social experiments where assignment to treatment is random this is ensured and the treatment effect is identified. In non-experimental studies one has to invoke some identifying assumptions to solve the section problem stated in equation (3)." That provides a nice summary of the issue in the Zheng paper: the treatment is not random, since it is an observed learning disposition, implying that these identifying assumptions are of crucial importance.
Response: Thanks for these constructive comments. In terms of the ATT formula used in our manuscript, you can find it on p. 3 of Caliendo and Kopeinig’s paper. To be specific, the equation 2 in the middle of p.3. For your second concern, we totally agree that the assumptions are of crucial importance. Therefore, we tested the three key assumptions that underlie the use of PSM before examining the effect of interest on academic performance. As you mentioned, the treatment was not random, which may cause differences in unobservable confounders between treated group and untreated group. To address this problem, we chose the matching algorithm satisfied this assumption best, which was the nearest-neighbour algorithm. As shown in Table 2, after matching there were no significant differences between the two groups for all covariates. We acknowledge that there may still exist some unmeasured or unobserved variables in PSM, despite we tried to include as many important confounding variables as possible. We mentioned this research limit in the manuscript (p. 16).

Reviewer reports # Connor McGuire (Reviewer 3):

#Comment 1: Abstract: Please consider dropping a few of the question statements in the background section of the abstract. Keep the background section concise in terms of a brief one or two sentence introduction and a single sentence with the objective/purpose. The current format is not conducive to easy understanding.

* Response: Thanks for this comment. Following your suggestion, we have revised the background part in the Abstract section.

#Comment2: Abstract: confidence intervals should be included for all effect sizes along with p-values.

* Response: Following your suggestion, we have now added the p-values when giving the effect sizes. We would like to explain why we did not report confidence intervals in the original version of our manuscript. One reason is that we referred the empirical articles published in BMC medical education like Hou et al. (2016), as well as the articles used the same analytical method (i.e., PSM) with us, for instance, Olitsky (2014). Another reason as pointed out by Panczyk et al. (2017) is the general practice in reporting research results wherein confidence intervals are usually provided in descriptive statics. But we do appreciate your perspective. Due to the word limit of the abstract section, we have now provided corresponding confidence intervals for the effect sizes in Table 3 and Table 4. Thanks again for this suggestion.


#Comment3: Methods: "For the purpose of this study, we resampled the participants to better represent the distribution of undergraduate students in terms of their demographic characteristics, such as gender and home location (rural or urban area)." Why was this done? If you had data from 100,000+ students why would you resample to 54,398? Please clarify why this was done as it’s not clear.

* Response: Thank you for highlighting the lack of clarity on this issue. As mentioned in the manuscript, this research was a retrospective cross-sectional study based on the National Undergraduate Student Development Survey (NUSDS). However, the aim of NUSDS was a bit different from our research focus. Therefore, we resampled the participants to better represent the national distribution of undergraduate students in terms of their disciplines and demographic characteristics, such as gender and home location (rural or urban areas), considering that we compared the effects of academic interests across various disciplines while controlling for potential confounders.

#Comment4: Table 1: Some numbers have one decimal place and others have two, keep consistent with one decimal place throughout as that is typically what is presented.

* Response: Thanks for catching this. Having taken your suggestions into account, we have kept consistent with one decimal place in Table 1. Besides, we have also revised the other tables to keep the values in the same column with the same decimal places.
#Comment5: Results: Please provide confidence intervals and p-values for all estimates, they are necessary for proper interpretation of the data.

* Response: We have now added confidence intervals and p-values for all estimates in Table 3 and Table 4 in accordance with your recommendation.

#Comment6: Results: "Specifically, the effect sizes of academic interest on academic performance for medical sciences, humanities, social sciences, natural sciences and engineering are 2.310, 2.231, 2.016, 3.840 and 2.698, respectively. The results reveal that students must have a relatively high academic interest to achieve academic excellence in the natural sciences. In the medical sciences, no extra academic interest is needed to gain academic success relative to the natural sciences and engineering programmes, but more academic interest is required than for the humanities or social sciences." How are you able to say no extra academic interest is needed when comparing disciplines? What test did you use? You must report confidence intervals to see if they intersect in order to compare two effect sizes.

* Response: Thanks for this comment. We should have been more cautious about the interpretation of our results. When we mentioned no extra academic interest was needed in medical sciences compared to natural sciences and engineering programmes, we meant that the effect of academic interest for the latter two disciplines was larger than that for medical sciences. These results were from descriptive statics. However, it’s noteworthy the effect of academic interest on learning achievement in medical sciences was still significantly important (p = .000) as revealed by PSM. We have now revised our previous expressions and added language to clarify these points. Please refer to p. 13-14 for the information.

Thank you again for your consideration of this manuscript. We look forward to receiving your response.

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