Author's response to reviews

Title: Proxy Response Bias in Assessing Health and Functional Status among Medicare Beneficiaries

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Author's response to reviews: see over
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Arlene Pura
Journal Editorial Office
BioMed Central

Dear Arlene Pura,

We are pleased to resubmit the manuscript “Proxy Response Bias in Assessing Health and Functional Status among Medicare Beneficiaries” for publication in *BMC Medical Research Methodology*. We have revised the manuscript having taken the requested comments into consideration and made required changes.

Associate Editor’s Comment:

The article is in an important area and as you can see from Reviewer 1’s comments it has value to researchers in this area. Alternatively, as reviewer 2 comments the methods sections fails to provide enough detail to evaluate the propensity matching methods used and this has to be addressed in order to fully evaluate the value of the article. If you choose to fully address all of reviewer 2’s comments regarding the propensity matching method we would like to revive the article again.
RE: We have revised the manuscript based on the comments from Reviewer 1 and Reviewer 2.

Reviewer 1:

General comments
I believe the subject matter, the analysis and the results are of interest. The authors appear to have completed major revisions. My comments are about minor revisions.

Major Compulsory Revisions
1. None: the authors have responded to prior comments

Minor Essential Revisions
2. While the text is generally clear, there are several minor errors and a couple of sentences that are unclear. These could be fixed by a proofreader. I have listed those I identified below.

3. Abstract, p. 2 line 10: change study 'for' to study 'of'

RE: We have revised the manuscript accordingly.

line 14 delete 'approach'. It is not needed

RE: We have revised the manuscript accordingly.
4. Background line 10 delete "the"
RE: We have revised the manuscript accordingly.

line 14 should be respondents
RE: We have revised the manuscript accordingly.

line 19 change accuracy on to accuracy of
RE: We have revised the manuscript accordingly.

p. 5 line 7 add be 'may not be valid'
RE: We have revised the manuscript accordingly.

line 7 and 8 change understanding to information
RE: We have revised the manuscript accordingly.

line 9 add has 'literature has focused'
RE: We have revised the manuscript accordingly.

5. Measures

p. 6 line 18 change by themselves to for themselves
RE: We have revised the manuscript accordingly.
p. 7 line 1 and 2, the last sentence of the paragraph on the prior page. This does not make sense or is at least unclear and should be rewritten.

RE: We have rewritten this sentence.

Page 7: ‘Health and functional status was measured by the percentage of limitations reported by survey respondents or proxies.’

6. Statistics

p. 7 lines 14 and 15, this sentence is unclear and should be revised

RE: We have rewritten this sentence.

Page 7: ‘In step 3, we conducted a multivariate logistic regression. In the model, the dependent variable was the log of proxy and independent variables were a set of conditioning variables.’

7. Results

p. 9 line 1 delete ‘were’

RE: We have revised the manuscript accordingly.

lines 4 and 5 sentence starting "Non-random...." is unclear

RE: We have rewritten this sentence.

Page 9: ‘Distributions of some socio-demographic characteristics and chronic conditions were found to be uneven between subject self-reports and proxy-reports.’

line 9 delete "was found to be"
RE: We have revised the manuscript accordingly.

line 17 add "even after propensity score matching."

RE: We have revised the manuscript accordingly.

8. Discussion

p. 10 in lines 16 and 18 respondent should be respond

RE: We have revised the manuscript accordingly.

line 23 add These so it is These major confounders

RE: We have revised the manuscript accordingly.

p. 11 lines 1 to 3, this is your assumption/interpretation so the wording should reflect this. For example, "it seems" or we believe, proxies are more likely

RE: We have revised the manuscript accordingly.

line 18 should be revised to say "this questions is about an activity that is private. It is the activity not the question that is private."

RE: We have revised the manuscript accordingly.

p. 12 line 2 add the 'most of the existing studies'

RE: We have revised the manuscript accordingly.
line 4 change the to this--according to the findings of this...
RE: We have revised the manuscript accordingly.

line 5 change better to improve
RE: We have revised the manuscript accordingly.

line 8 delete 'in the confounding variables'
RE: We have revised the manuscript accordingly.

line 16 delete two groups and say what they are
RE: We have revised the manuscript accordingly.

Discretionary Revisions
None

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published
RE: We have corrected the language.

Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:

I declare that I have no competing interests

Reviewer 2:

Major Compulsory Revisions:

The description of the matching process does not provide the reader with enough information to truly understand how the matching was conducted. More specifically, the following questions should be addressed:

1) In the original sample, there were 76,115 self-reported person-year observations. In the matched sample, the number is reduced to 7,780 person-year observations. What accounts for this dramatic reduction in observations? Is it due to the use of sampling without replacement? Missing data? Etc.?

RE: The observations of proxy-report (n=8,822) and subject self-report (n=76,115) in the unadjusted analysis were the total number of observations identified in the study. In order to have a 1:1 matching, the maximum possible observations for subject self-reports would be 8,822. Because the two groups were matched on similar propensity scores, those observations that did not share similar propensity scores in both groups were deleted, resulting in 7,780 observations in both groups. Therefore, the real drop of observations due to this matching technique was 1042 person-years (about 10%) which is a reasonable reduction in observations.
We further revised the manuscript to make it clearer:

Page 8: ‘Subject self-reports were matched to proxy-reports in a 1:1 ratio (without replacement).’

Page 13: ‘Thirdly, this study matched subject self-reports to proxy reports in a 1:1 ratio. Using 1:n matching could lead to higher bias, although it might increase estimate precision. [13]’

2) What is the goodness-of-fit statistic of the logistic regression model used to generate the propensity scores? What is its predictive power?

RE: The literature documents that it is not necessary to compute goodness-of-fit statistic when developing propensity score models. Therefore, we did not compute goodness-of-fit statistic in this study. (Weitzen S, Lapane KL, Toledano AY, et al. Weaknesses of goodness-of-fit tests for evaluating propensity score models: the case of the omitted confounder. Pharmacoepidemiol Drug Saf. 2005;14(4):227-38.)

3) During matching, was a maximum acceptable difference threshold set for the difference between the propensity scores of self-reporters and proxy-reporters? For example, was a proxy-reporter consider a suitable match if the difference between its score and a self-reporter’s score was less than 0.2? The larger the difference in propensity scores between proxy-reporters and self-reporters, the greater the likelihood that they may not be suitable matches and differ in ways not captured by the conditioning variables.
RE: We used “Greedy 5-to-1 digit matching approach” described by Parsons and Lunt (Parsons LS. Reducing bias in a propensity score matched-pair sample using greedy matching techniques. Proceedings of the Twenty-Sixth Annual SAS Users Group International Conference. Cary, NC: 2001. and Lunt M. Selecting an appropriate caliper can be essential for achieving good balance with propensity score matching. Am J Epidemiol. 2014;179(2):226-35). This approach first rounds propensity scores to 5 significant figures, and then randomly picks up matched pairs precisely. The scores are then rounded to 4 significant figures and the same process follows until they are matched to 1.

We have added descriptions about this matching technique in the methods section: Page 7-8: ‘In step 4, Greedy 5-to-1 digit matching was used to create matched samples. With this matching method, subject self-reports were first matched to proxy-reports with the same 5 digits. For those that did not match, subject self-reports were matched to proxy-reports with the same 4 digits. Similar processes were continued until the remaining subject self-reports were matched to the remaining proxy-reports with the same 1 digit.’

4) Are the results robust to alternative matching techniques, such as Kernel matching, radius matching, and Mahalanobis metric matching? Conducting a sensitivity analysis of matching techniques is important because they could affect the number of matched
observations. Also, different techniques are associated with tradeoffs in bias, efficiency, and consistency (Baser, 2006; Gibson-Davis & Foster, 2006; Ho et al., 2007).

RE: We agree with the reviewer that additional analysis making comparisons and contrasts of the additional 3 matching methods are certainly warranted. However, the research question of this present methodology paper is to focus on comparing proxy response with self-report response in Medicare beneficiaries. In fact, we did conduct a sensitivity analysis (subgroup analysis) of proxy response bias, which is the focus of this research. Further assessment of different statistical methodologies is beyond the scope of this health care paper. It certainly warrants another methodology paper. Also, publications in this field usually do not report sensitivity analyses of different matching techniques. (Gajdos C, Kile D, Hawn MT, et al. The significance of preoperative impaired sensorium on surgical outcomes in nonemergent general surgical operations. JAMA Surg. 2015;150(1):30-6. and Brinkman W, Herbert MA, O'Brien S, et al. Preoperative β-blocker use in coronary artery bypass grafting surgery: national database analysis. JAMA Intern Med. 2014;174(8):1320-7.)

However, in our future studies, we will explore the impact of different matching techniques on proxy response bias.

We discussed the limitation of only use Greedy matching approach.

Page 13: ‘Finally, this study only used Greedy 5-to-1 digit matching. Different matching techniques might change the number of matched observations and affect accuracy and precision of estimates.’
5) From the description of the methods, it is clear that matching was used to create the self-reporter and proxy-reporter groups. However, it is unclear whether matching was performed as part of the subgroup analysis. Table 4 suggests that matching was used. Also, for the subgroup analysis, was the balancing property satisfied?
RE: Matching was also performed in the subgroup analysis. We have added descriptions about matching in the subgroup analysis.

Page 8: ‘The same matching technique was used in the stratified analysis.’
Page 10: ‘Characteristics were balanced between two types of responses in the stratified analysis. (Data not shown)’

References:
RE: We have added these three references in the revised manuscript.
Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Thank you for your time and consideration. Please let me know if further revisions are needed.

Yours sincerely,

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