

Dr Rubin Minhas
BMJ Associate Editor

09th March 2017

Re: BMJ.2016.035517 entitled BMJ.2016.035517.R1 entitled "Association between active commuting (walking and cycling) and incident cardiovascular disease, cancer and mortality: Prospective cohort study of 264,337 UK Biobank participants"

Dear Dr Minhas

We would again like to thank the Editors and the Reviewers for their efforts in assessing the suitability of this manuscript for publication in The BMJ and the additional helpful suggestions which have helped us to improve this paper further. We have considered these comments carefully and feel that we have fully addressed the reviewer's further minor concerns. Our responses to the Editors' and Reviewers' comments are **outlined in red** below and changes to the text of the manuscript are also highlighted in red.

Thank you for your time in considering this paper for publication in The BMJ and we look forward to hearing your final decision in due course.

Yours sincerely



Dr Jason Gill and Dr Carlos Celis-Morales, on behalf of the authors

**The University of
Glasgow Charity Number
SC004401**

Dr Jason Gill

Reader

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Author responses in red.

Dear Dr. Celis-Morales

Manuscript ID BMJ.2016.035517.R1 entitled "Association between active commuting (walking and cycling) and incident cardiovascular disease, cancer and mortality: Prospective cohort study of 264,337 UK Biobank participants"

One reviewer has suggested some further, minor, changes. Please would you review and consider revising.

I hope you will find the comments useful.

Best wishes

Yours sincerely

Rubin Minhas
Dr Rubin Minhas
BMJ Associate Editor
rm1000@live.com

*** Present at Analysis meeting:[INSERT]

INFORMATION TO INCLUDE IN REVISION

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Reviewer(s)' Comments to Author:

Reviewer: 1

Recommendation:

Comments:

The Authors have done a good job with the revision. I have no further comments.

Author reply: Thank you we are pleased that we have satisfactorily addressed your concerns.

Additional Questions:

Please enter your name: Lars Bo Andersen

Job Title: professor

Institution: Sogn and Fjordane University College

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Review provided by Dr Shannon Sahlqvist

This remains an important study strengthened by its large sample, inclusion of a wide range of disease outcomes, ability to control for important confounders and its exploration of both walking

and cycling for commuting purposes. Further, as the authors highlight, much of the work on the health benefits of active travel is confined to countries that report high rates of active travel. The fact that this study was conducted in the UK, with traditionally much lower rates of active travel, is important.

Author reply: Thank you.

This manuscript is original, important for policy makers and addresses an important, and well defined, research question.

Author reply: Thank you.

I thank the authors for their thoughtful considerations of my comments. The manuscript has been greatly strengthened and makes a valuable contribution to the field.

Author reply: Thank you.

I remain concerned (yet understand why) the authors did not control for total physical activity (or all other physical activity except for the commuting). Models did control for time spent walking for pleasure, strenuous sport, time spent in heavy DIY and occupational physical activity, and this is important, but there are other types of physical activity that could be explaining the associations and that weren't controlled for. Are the findings due to commuter cycling specifically or simply the fact that commuter cyclists report higher overall levels of physical activity and correspondingly greater cardiorespiratory fitness? This is important from a policy perspective - should policy makers be promoting commuter cycling specifically, or just greater physical activity in general. I think the authors need to give more weight to this in the discussion.

Author reply: Thank you for your suggestions, we believe they are relevant. We adjusted for all other aspects of physical activity that were available in the UK Biobank database which included key aspects of leisure-time database (including time spent walking for pleasure, strenuous sport, time spent in light and heavy DIY), as well as occupational physical activity. The measure of total physical activity available in UK Biobank was based on the short-form IPAQ and did not distinguish between leisure-time, occupational and commuting physical activity, thus it is not possible from the available data to derive a variable for all non-commuting physical activity. Thus, the adjustment we used was the best that we can do with the available data. We don't think that it would be appropriate to adjust for total physical activity as this variable includes the primary exposure of active commuting and thus would be an over-adjustment. Indeed, the other reviewers requested that we adjust for non-commuting forms of activity (i.e. leisure-time and occupational) – which we did – rather than total physical activity. We agree fully with the reviewer that the association between active commuting and health outcomes is likely due to the fact that active commuters are more physically active overall, rather than a specific effect of active commuting *per se*, and that active commuting simply provides a practical way of building more physical activity into your day. We reported the higher total physical activity (and higher fitness) levels of active (particularly cycle) commuters in the results (lines 166-169 and Table 1) and have commented on this in the discussion in a number of places as highlighted below:

Lines 195-198:

“These results are important, because daily active commuting is an important contributor to total physical activity,³⁻⁶ and thus facilitating active commuting, particularly cycle commuting, may be a viable approach to deliver physical activity-related health benefits at the population level.”

Lines 199-207:

“The risk-reductions associated with active commuting are likely to be related to their contribution to overall daily physical activity – and potentially cardiorespiratory fitness – for which the association with lower mortality, CVD and cancer is well established.^{18 21-24} Cycle commuters, and mixed-mode cycling commuters, had greater overall physical activity and fitness than walking commuters. The latter may reflect the greater exercise intensity of cycling compared to walking.²⁵ While ~90% of cycle commuters and ~80% of mixed mode cycling commuters achieved current physical activity guidelines, only 54% of walking commuters and ~50% of mixed-mode walking commuters did; a similar proportion to non-active commuters (51%). Thus the findings support the benefits of active commuting, particularly commute with a cycling component, and suggest that longer commutes than currently being undertaken by many walking commuters may be needed to elicit meaningful benefits.”

We have now added an additional sentence in the discussion (lines 236-239) about the limitations of our adjustment for non-commuting physical activity:

“We adjusted for occupational physical activity and some aspects of leisure-time physical activity (walking for pleasure, strenuous sport and DIY), but do not have a measure of overall non-commuting activity, so may not have fully adjusted for potential contributions of non-commuting physical activity on the measured health outcomes.”

We hope that this addition to our discussion of this point now fully addresses the reviewer’s concern.

I have a couple of other points of clarification

1. In the abstract could the authors qualify that the question about commuting referred to ‘a typical day’?

Authors reply: Thank you for your suggestion, we have added the information requested in the print abstract (line 34) and main paper abstract (lines 60-61).

2. Could the authors define active commuting in the introduction? There remains some confusion in the field that active commuting refers to work-related travel specifically, and not travel more generally, and it would be good to (very) briefly make this clear.

Author reply: Thank you for this suggestion. We have added further information in the introduction in order to make this clear to the readers (line 81).

3. Could the authors expand on ‘Cycling and mixed mode cycling, weekly commuting distance was derived from self-reported one way commuting distance and the weekly number of round trips’ providing information on how these questions were asked and why they were not asked for walking?

Author reply: Thank you for spotting this. We made an error in the text here and should written ‘walking’ instead of ‘mixed-mode cycling’. We have now amended this error and expanded the text here as follows (lines 130-132):

“For walking only and cycling only, weekly commuting distance was derived from self-reported one-way commuting distance (multiplied by two to obtain round trip distance) and the weekly number of round trips.”

4. Looking at the median distance it seems that commuters were not travelling great distances and yet there were substantial health benefits. Perhaps this warrants a comment in the discussion.

Author reply: thank you for this suggestion. We have now added the following comment to the discussion (lines 207-209):

“In the present cohort, associations with lower CVD risk were only evident amongst the walking commuters who covered more than 6 miles per week, equivalent to 2 hours of weekly walking (or 24 mins per day so 12 mins walk to and from work) commuting at a typical walking pace of 3 miles per hour.”

5. In the discussion the authors write that the models controlled for ‘leisure time physical activity’ however from my understanding of the methods section this is not entirely correct. The models controlled for specific types of physical activity. Given my point above this is an important distinction.

Author reply: Thank you for your comment. We have now revised our discussion of this point as follows (lines 236-239):

“We adjusted for occupational physical activity and some aspects of leisure-time physical activity (walking for pleasure, strenuous sport and DIY), but do not have a measure of overall non-commuting activity, so may not have fully adjusted for potential contributions of non-commuting physical activity on the measured health outcomes.”

6. In the discussion the authors right that ‘In the UK Biobank is relatively representative of the general population with respect to age, sex, ethnicity and deprivation within the age range recruited but is not representative in other regards’. Although a reference is provided it would be useful to highlight what is meant by ‘in other regards’.

Author reply: Thank you for this suggestion. We have now clarified this (lines 224-226) as follows:

“UK Biobank is relatively representative of the general population with respect to age, sex, ethnicity and deprivation within the age range recruited but is not representative in other regards, such as prevalence of obesity and comorbidities, which may indicate a ‘healthy volunteer’ selection bias.”

7. To my mind another limitation is the fairly crude measure of commuting behaviour. Could the authors briefly mention this?

Authors reply: Thank you. This is an important point. Errors in classification of commuting behaviour would have acted to attenuate the association between active commuting and health outcomes (non-differential measurement error). Thus, the real association between active commuting and health outcomes is likely to be at least as strong as observed here. We have now commented on this in the discussion (lines 228-231) as follows:

“Mode and distance of commuting was self-reported, rather than objectively-measured; however any errors introduced by misclassification of commuting behaviour would have acted to attenuate the association between active commuting and health outcomes (30).”

.

Additional Questions:

Please enter your name: Shannon Sahlqvist

Job Title: Senior Lecturer

Institution: IPAN, School of Exercise and Nutrition Sciences, Deakin University

Reimbursement for attending a symposium?: No

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Reviewer: 3

Recommendation:

Comments:

Overall the authors have done a nice job with the revisions. I believe their responses were thorough and I believed they addressed mine and the other reviewers' concerns adequately.

Author reply: Thank you. We are pleased that we have been able to adequately address your concerns.

Additional Questions:

Please enter your name: Melissa Bopp

Job Title: Associate professor

Institution: Pennsylvania State University

Reimbursement for attending a symposium?: No

A fee for speaking?: No

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