Reviewer’s report

Title: The contribution of area-level walkability to geographic variation in physical activity: a spatial analysis of 95,837 participants from the 45 and Up Study living in Sydney, Australia

Version: 1 Date: 10 Apr 2017

Reviewer: Nick Garrett

Reviewer’s report:

The article is generally well written and the analysis appears to be generally applicable. However,

1. I feel that the authors have overstated the importance of this article, and in addition as the first reviewer has stated the conclusions are interesting but not especially novel.

2. As a bio-statistician I am always wary of research when a model utilizes the estimates of another model without taking into account the amount of variation in the original first stage model. I recognize that this process is frequently undertaken (as evidenced by one of the references referred to #62). This is especially concerning when the estimates perform so much better than the raw prevalence rates. I would at the very least want to know some measure of the goodness of fit or predictive value of the first stage logistic models. The more ideal situation would be to run a single model that incorporates both the individual factors as well as the postal area information including the spatial elements, however I do recognize that such a model is quite complex and not generally available off the shelf.

3. I also note that there was only an 18% response rate which does raise questions about the representative of the sample, especially when the estimates get aggregated to the postal code level. There is some reference to the representativeness of the sample in the discussion, however appears to under rate its effect as the relative effect measures are considered to be representative. This may be true of the first stage of the analysis with the logistic regression, however may be more critical in the second stage spatial modelling. The use of some weightings to adjust the sample in order to match postal code population distributions might be an important consideration.

4. on page 15 there is a statement about the exponentially increasing expose-response gradient between walkability and sufficient walking. Given that the walkability measure is categorised into quartiles this statement is a bit of a stretch. It is possible to state that there is some evidence of an exponential gradient not that there was one observed. To then link this to the statement that this suggest a threshold effect is also a bit of a stretch as a threshold effect generally assumes that there none or minimal effect until a certain level is achieved.

5. as a bio-statistician I would have liked to some p-values in the conditional auto-regressive model summaries, as a number of the variables don't appear to be statistically significant. However, I recognize that the discussion of the model diagnostics in the text does effectively
cover the same model measures, but the tables on there own don't easily demonstrate which models are the optimal.

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