**Author’s response to reviews**

**Title:** The role of multilevel factors in geographic differences in bicycle crash risk: a prospective cohort study

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**Author’s response to reviews:** see over
6 November 2013

Professors Philippe Grandjean and David Ozonoff  
Editors-in-Chief  
Environmental Health

Dear Professors Grandjean and Ozonoff

Re: The role of multilevel factors in geographic differences in bicycle crash risk: a prospective cohort study

We appreciate the comments provided by the reviewer to improve this manuscript and have responded to each of the suggestions as noted below. Changes made in the revised manuscript are highlighted in blue.

Comments from Reviewer 1:

The 2nd version of this manuscript is identical to the first submitted version, except for 3 small additions in the text.

The answers that were given to my questions are mostly not answered and not taken into account in the new version of the manuscript.

As the manuscript did not change, I will respond to your responses in the same document.

Thank you for taking the time to review our manuscript. We responded to each of the questions raised previously and apologise if there has been any confusion. We provide additional details in this response alongside the revised manuscript to clarify and address aspects that could have been misunderstood.

# Why bothering with the meshblocks if you only use Auckland and the rest of NZ?

As we collected only the participants’ addresses in the baseline survey, we needed to translate these addresses into meshblocks in order to categorise participants by region, urban-rural status, and neighbourhood deprivation. Please see the first paragraph of the Analysis.

# Can the authors tell me where in the manuscript you explain that you used a ‘mediation analysis’?

We mentioned in the third paragraph of the Background that “This paper used data from the study to assess the relative contribution of demographic, residential, cycling and behavioural risk factors in explaining the difference in crash risks between Auckland and the rest of the country, and to identify
environmental factors that could play an important mediating role.” Figure 1 titled “A simplified causal diagram depicting the role of mediating factors” illustrates how differences in the crash risk between Auckland and the rest of New Zealand could be mediated through multiple pathways. In the fourth paragraph of the Analysis, we explained how the mediation analysis was undertaken: “The mediating role of each domain was determined by the percentage reduction in the $\beta$ coefficient after inclusion of each domain in the model using the approach described previously [30]: $100 \times (\beta_{\text{crude}} - \beta_{\text{adjusted}})/\beta_{\text{crude}}$. ” The underlined words indicate that this manuscript presented the results of a mediation analysis.

# “This manuscript therefore is not about geographic differences in crash risk”, but why does the title of your manuscript is: “… geographical differences in bicycle crash risk...”?

The title of this manuscript is “The role of multilevel factors in geographic differences in bicycle crash risk: a prospective cohort study” with the underlined words indicating the focus of this manuscript. That is, rather than describing geographic differences in crash risk per se, the analyses presented in this manuscript aimed to assess the contribution of various factors that could explain (or mediate) geographic differences in bicycle crash risk.

# You did not aggregate meshblocks in this study and categorized the study participants by region, urban-rural status and neighbourhood deprivation. You took Auckland and the rest in NZ as two groups.

As mentioned above, we collected only the participants’ addresses. With this information alone, we would not be able to categorise the participants by region, urban-rural status and neighbourhood deprivation. As such we aggregated the addresses into meshblocks. In the first paragraph of the Analysis, we provided two references (27 and 28) with more detailed information on how meshblocks were used for categorisation purposes.

# So the only novelty is that you looked into ‘more detail’ the crash risk between Auckland and the other regions.

As mentioned in the manuscript and in our previous response, the novel aspects of this manuscript include the identification of factors underlying differences in the crash risk between Auckland and the rest of New Zealand, and the relative contribution of these factors to the risk differential observed.

# Table 2 only gives the difference in absolute numbers of crashes between Auckland and the rest.

In Table 2, we presented the number of crashes experienced by the participants in Auckland and the rest of New Zealand as well as the incidence rates and crude hazard ratios.

# All put my question in a different way: are your questionnaires validated?

The questionnaire was pilot-tested and the questions related to the participants’ crash experience were validated in our previous paper (doi: 10.1186/1471-2458-13-420; reference 31 in this manuscript).

# In the second paragraph, you write that you asked for demographic characteristics, general cycling activity, crash experience and habitual risk behavior.

# Could the authors give a rational for including these parameters into your analysis?
There were differences in demographic, residential, cycling and behavioural risk factors between the Auckland participants and the rest of the cohort (Table 1). Furthermore we found that these factors predicted the risk of bicycle crashes, as reported in our previous paper (doi: 10.1016/j.ypmed.2013.05.001; reference 21 in this manuscript). Therefore we proposed that these parameters might play a mediating role in the excess crash risk in Auckland, as illustrated in Figure 1. This was the rationale for including variables in the analysis.

# Maybe that a flowchart in attachment could make this more clear.

Thank you for this suggestion. We have included a flowchart as Figure 2.

# Now I know that the baseline characteristics are presented in Table 1. You do not mention this in the text of the manuscript. The only time you refer to Table 1 is in the results section, without mentioning that these are the baseline characteristics.

We mentioned in the second paragraph of the Analysis that “Crude and adjusted differences in baseline characteristics between the Auckland participants and the rest of the cohort were assessed using PROC GLM.” Then we presented the results in Table 1 titled “Baseline characteristics of the participants in Auckland vs. the rest of New Zealand”.

We thank the editors and the reviewer for the helpful suggestions and the opportunity to respond.

Yours sincerely

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