Response to reviewers

8/12/2020

We wish to thank the anonymous reviewer for their feedback on the revised version of our paper. In this letter we respond to their comments and describe the changes made to the paper in response. Reviewer comments are in black and our responses in blue.

Reviewer 2

Thanks to the authors for considering my previous comments in this new version of the manuscript. Because of the additions and the responses, now the contributions, the survey design, and the model structure are clearer.

> Thank you for your kind words, and thoughtful comments for improving the paper.

I have some additional comments regarding this new version of the manuscript.

Section 3.3. Please add some comments on data about perceived social and physical conditions of the neighbourhood. It seems that the majority of respondents perceived the neighbourhood as secure, safe, and with adequate infrastructure to walk or use the bicycle.

Also, most of the respondent rated that walking and cycling conditions were good, which could be due that respondent besides the lack of adequate pedestrian and cyclist infrastructure, they mostly perceive that physical conditions of the neighbourhood regarding walking and cycling are good. This is in line with Arellana et al. (2019) that reports some heterogeneity of perceptions when evaluating conditions of infrastructure. They report differences in perceptions based on their past experiences. People used to live in zones with poor infrastructure could be more tolerant than people that live in zones with better infrastructure.

Arellana, J., Fuentes, L., Cantillo, J., & Alvarez, V. (2019). Multivariate analysis of user perceptions about the serviceability of urban roads: case of Barranquilla. International Journal of Pavement Engineering, 1-10. https://doi.org/10.1080/10298436.2019.1577420

Safety for crime = security?

> Thank you for these comments. We added some discussion on the perceptions as well as cited the article you suggest. Please see the third paragraph of section 3.3.

Section 5. I still think that there is some circularity in the use of daily cycling time to explain the probability of cycling for their commute. Please include a statement justifying this in the paper, as I understand that you are trying to identify dedicated cyclists in the sample. In this case, did you try to include a dummy variable to represent dedicated cyclists rather than including the variable as continuous?

> Thank you very much for this sugestion. We reconsidered the way we defined the level of dedication of travelers to the use of bicycles. Instead of using the level of cycling as a dummy variable in our model, we derive a finer grain classification of level of cycling as follows. To discern the differences between different types of bicyclists we use the variable "Daily Bike Time" and we classify respondents as non-bicyclists if their daily bike time is zero, and then for other respondents we divide them in quartiles by daily time spent on cycling. As seen in Table **??**, now we have five levels of commitment to cycling with Non-bicyclist as one class, and then four levels of cyclist, beginning with Cyclist Type 1 (the least intensive cyclist) and Cyclist Type 4 (the most intensive). Notably this improved the goodness of fit of the model compared to the previous one. This variation in the analysis provides richer information about the probabilities of travel by bicycle, and of course that affects other modes as well. To keep the presentation of these results manageable, and to better align them to the intent of the paper, we have decided to concentrate on active modes (walking and cycling), and removed the results and discussion concerning other modes. This change also allowed us to discuss instead the differences between students and non-students, by two different types of land use: residental and non-residential. We believe that the result is a paper with a tighter focus and better aligned with the theme of the special issue. We would like to note, in addition, that the model and code are publicly available, and that these materials can be used by any interested party to examine the results for other modes.

Also, I will prefer to include a comment that the inverse relationship makes sense (i.e. the bicycle possession and being cyclist will promote experience longer cycling time every day).

> The bicycle possession didn't come up as a significant variable in our model, so we excluded it in the final model. However, according to you suggestion we included a comment in the second paragraph of Conclusion which is as follows "The results of the study showed that regular cyclists

are more likely to use cycle as a commute mode compared to non-bicyclists, which indirectly echoes the findings of [@acheampong2017towards] and [@srinivasan2007commute] in the Global South contexts where they found cycle ownership and higher frequency of using a cycle increases the likelihood of being an active commuter."

Table 2. As you suggest in your model explanation with the cost coefficient, I will think that trip time would be a generic parameter rather than specific ones.

Thank you for this comment. This is appropriate.

Table 2. Daily bike = Daily bike duration?

Corrected the typo - replaced 'Daily Bike' with 'Daily Biking Duration'

Table 2. It seems odd to me the inclusion of the perception of cycling conditions within other transport modes (different for cycling). I understand that you include them because the software used for estimation does not allow suppressing the coefficients for the same variable in some latent functions. However, still confusing me a bit.

We can think of the coefficients for a variable like "Perception of cycling conditions in neighborhood: good", in the following way: since the mode of reference is "Walking", a positive and significant coefficient for the mode "Cycle" means that the probability of cycling increases with respect to walking. In contrast, a negative and significant coefficient for the mode "Car" means that the probability of using this mode is lower than the probability of walking. This can be a bit cumbersome to visualize, since changes in the probability of any one mode must be reflected in changes in the probabilities of every other mode. This is why we favor post-estimation simulations of the probabilities to enhance our understanding of the behavior of the model.

I don't know if I understand figures 1 to 8 correctly.

Figure 1: Looking at the graphs on the right (i.e. environment: good), it seems that they suggest that the probability of cycling is higher when the distance increases and the perception of the cycling infrastructure is poor, which seems counterintuitive. This probability is also higher when the perception of the environment is moderate compared when they have a good perception of the environment.

In the same figure, the probability of walking is greater when the travel distance increases under moderate environmental conditions and cycling infrastructure. If the perception of both the environment and cycling infrastructure increases, the probability seems to decrease, which does not make much sense.

Figure 2: Why the probability of cycling for cyclists decreases if the perception of the environment increases?

Also, analysing the three graphs on the right (i.e. environment: good), why does the probability of cycling decrease with distance when the perception goes from poor to moderate?

Figure 3: Why does the probability of walking not increase for non-cyclists when the perception of the walking conditions improved?

As mentioned above, with the change in the model, all the post-estimation plots are different now, and they focuse on walking and cycling by different cycling level of the travellers for both non-students and students in residiential and non-residential land use type. We think that the new figures and accompanying discussion are an improvement in clarity over the previous ones.

The use of an integrated choice and latent variable model could be the next step to explore the influence of perceptions in the mode choice in this context; thus, it will help to overcome the issue of including perceptual indicators directly in each mode alternative. Then, I suggest adding this recommendation in limitations and further research alternatives.

This is a wonderful suggestion. As we noted in our previous revision, level of service variables for the different modes were not available for this case study, but should such variables become available, estimating a latent class choice model would become a new avenue for research. We added this recommendation in the limitations. Please see the last paragraph of Conclusion

Check citation format consistency

> Thank you for this comment. We used Elsevier's template for citations, and assume that further formatting will happen if and when the paper is sent to production.

Finally, some new literature regarding active transportation in the Global South context could strengthen the discussion, which is already good in the paper. Some further references on this topic are:

Gutiérrez, M., Cantillo, V., Arellana, J., & Ortuzar, J. D. D. (2020). Estimating bicycle demand in an aggressive environment. International Journal of Sustainable Transportation, 1-14. https://doi.org/10.1080/15568318.2020.1734886

Arellana, J., Saltarín, M., Larrañaga, A. M., González, V. I., & Henao, C. A. (2020). Developing an urban bikeability index for different types of cyclists as a tool to prioritise bicycle infrastructure investments. Transportation Research Part A: Policy and Practice, 139, 310-334. https://doi.org/10.1016/j.tra.2020.07.010

Huertas, J. A., Palacio, A., Botero, M., Carvajal, G. A., van Laake, T., Higuera-Mendieta, D., Cabrales, S. A., Guzman, L. A., Sarmiento, O. L., & Medaglia, A. L. (2020). Level of traffic stress-based classification: A clustering approach for Bogotá, Colombia. Transportation Research Part D: Transport and Environment, 85, 102420. https://doi.org/10.1016/j.trd.2020.102420

> Thank you for sharing the references with us. We have cited them in appropriate places in the paper.