A large scale, app-based behaviour change experiment persuading sustainable mobility patterns: methods, results and lessons learnt

Response to reviewers

We thank the reviewers for their insights on our manuscript and their useful suggestions to improve it. Below we summarize our responses, also showing the changes we consequently introduced into the test. All the changes text are indicated in red, both in the following table and in the manuscript.

Reviewer 2

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| 1 | The question that remains and that I would like to see addressed in the paper is how are (could be) carpooling initiatives taken into account in the approach? | The GoEco! app is not capable of automatically detecting the number of users travelling in the same car, therefore ridesharing or car-pooling routes cannot be automatically accounted for by the app, as well as the related benefits in terms of reduced energy consumption and CO₂ emissions. Therefore, the feedback on one’s own mobility impact is meant as a reference, for comparison with the other transport modes. We revised the text in order to introduce this concept. | Line 103  
Soon after validation, the users are provided with feedback about the individual routes they have travelled (kilometers and travel time, as well as CO₂ emissions produced and energy consumed, estimated based on the Mobitool consumption and emissions factors available for Switzerland [36], that depend on the transport mode used and on the amount of kilometers travelled, independently on the vehicle’s occupancy rate). To get more realistic estimates of impact, users are also allowed to set the average fuel consumption value of their car, expressed in fuel liters per 100 kilometers, which is then used by GoEco! to customize the Mobitool estimates. Once per week, they are also given a summary of their mobility patterns and impacts (average weekly kilometers and travelling time, percentage use of transport modes). After four weeks of app use, they are also provided with information about their "baseline mobility patterns", namely how they travel on average and the related impact on energy consumption and CO₂ emissions. |
|  | alternatively, partnerships could be created with any of the existing carpooling or car-sharing companies or, more generally, with companies offering Mobility-as-a-Service solutions [61], requiring their customers to enable location tracking services. Such a collaboration would not only simplify the location tracking, but also allow integrating their services into the | | Line 682  
Alternatively, partnerships could be created with any of the existing carpooling or car-sharing companies or, more generally, requiring their customers to enable location tracking services. Such a collaboration would not only simplify the location tracking, but also allow integrating their services into the |
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| 2 | **Line 92 and Line 557:** (Not) Citing a work as “currently under review” does not seem the most appropriate procedure. I do not know the journal's policy on this matter. Perhaps that under review paper could be published in the arXiv preprint. Obviously, in case it gets accepted while this paper is still under revision, you should simply update it. We thank the reviewer for noticing this. In the meanwhile, our other paper was accepted, therefore at both lines we introduced the correct reference ([33]).

| 3 | **Line 96:** Moves app is not properly referenced or presented, besides it is shut down since July 2018. We updated the text in order to better refer to the Moves app. Since Moves has been discontinued, we opted for referring to a conference paper of ours, where we briefly presented Moves. **Line 95** By exploiting basic activity tracking features provided by the commercial app Moves [35] (discontinued since July 2018), GoEco! ...

Figures: Figure 1 and Figure 2 are not mentioned in the text. We thank the reviewer for noticing this. We added references to both figures. **Line 91** Since the app is largely presented in another work [34], here we limit ourselves to introduce its key features, following the overview provided in Table 1. **Line 589** The recommendations we collected through the final GoEco! questionnaire and interviews, reported in details in another work [34], can be summarized as follows: |
| 4 | We thank the reviewer for noticing this. We added references to both figures. |
Overall, as shown in Figure 2, the experiment is designed around three mobility tracking periods:

Table 2 and Table 3 should show the “average difference between periods” as \( \text{XC} - \text{XA} \). We would be looking for negative values in CO2 and Energy consumption per km, meaning there was a decrease between those periods. Table 4 would be revised accordingly.

We thank the reviewer for this suggestion. We modified values in Tables 2, 3 and 4 accordingly, and also modified the other parts of the text where the “before/after” comparison was mentioned (replacing it with “after/before”).

Hypothesis 1 (H1) states that, after treating individuals with the use of the GoEco! app, (i) average CO2 emissions per kilometer and average energy consumption per kilometer are lower than before the intervention, and (ii) the after/before difference between these variables is higher than the after/before difference between the same variables, calculated in the same period for a comparable group of individuals, that are not treated with the GoEco! app.

In Zurich, instead, no statistically significant after/before difference is found for any of the considered variables.

Values in Table 2 are modified

Values in Table 3 are modified

Values in Table 4 are modified