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TRANSPORT FINDINGS

Do Travelling Academics put their Money where their Mouth is? Exploring Environmental Considerations and Mode Choices for Conference Travel

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Findings

Academics are often environmentally-minded, and they often travel internationally to share their research. Are they prone to attitude-behaviour gap? We collected data from 104 academics in Europe regarding attitudes towards online conferences, flight shame and carbon offsetting, and analysed their trip-making and mode choices in hypothetical conference travel situations. We find that while respondents and their social environments are conscious of the environmental impacts of flying, travel time considerations dominate their travel choices. Respondents are willing to buy a € 5 more expensive ticket or extend their travel by train by 30 seconds to reduce 1 kg of CO₂.

1. Questions

Attending scientific conferences is considered to be an essential part of academic activity that contributes to one's performance and professional development (Sanders et al. 2022). At the same time, there are rising concerns about the environmental externalities generated by long-distance travel, and air travel in particular (Chiambaretto et al. 2021). Recent studies have quantified the carbon footprint associated with a (sustainability science) scientific conference (Neugebauer et al. 2020), conducted a qualitative research of (sustainability) scientists' dissonance between pro-environmental attitudes and flying behaviour (Schrems and Upham 2020), and discussed alternatives for conference travel emissions (Klöver et al. 2020).

We conduct a stated-preference choice experiment as part of a survey concerning long-distance travel for attending scientific conferences and estimate choice models describing the decision to travel to a conference and the decision to do so by either train or plane. In this context, we address the questions: how concerned are academics about the environmental impacts of long-distance travel associated with attending conferences? what are the determinants of travel mode choice, and what role do carbon emissions play therein?

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2. Methods

To elicit academics' preferences towards conference travel we developed a stated-preference choice experiment in which respondents were asked to consider travelling to an international conference at the core of one's interest and having to make a choice between travelling by train or plane or opt out from travelling. For train and plane the following attributes were included: travel time, travel cost and the amount of emitted CO₂. Each respondent was confronted with 12 choice situations with fixed access, airport and egress times (see [Figure 1](#)). Next, respondents were asked to rate 14 attitudinal statements related to environmental awareness about the impacts of flying, flying behaviour, flight shame, the attitude towards online conferences and carbon offsetting on a 5-point Likert scale.

We obtain the trade-offs between travel time, travel costs and CO₂ emissions by estimating a Multinomial Logit (MNL) model using Pandas Biogeme (Bierlaire 2020). When someone chose the opt-out option, the following question asked the respondent to also choose between plane and train only, given the same attributes. This 'forced choice' is accommodated in the MNL model through availability conditions. Note that our MNL results likely underestimate the standard errors given the panel nature of our data.

3. Findings

The survey was completed in May-June 2022 by a convenience sample of 104 academics (studying primarily transport topics) residing in Europe. The dataset is available at Cats et al. (2022).

[Figure 2](#) presents the answers to the questions about respondents' environmental attitudes and behaviour. The statements are in decreasing agreement (the green bars). Remarkably, the statements with highest agreement concern the increasingly frequent discussions of environmental issues in respondents' social environments. Half of the respondents (strongly) agrees with the statement that one is flying less for environmental reasons, but only 7% indicates to have stopped flying altogether. In addition, a small majority (52%) (strongly) agrees with the statement that flying stirs one's conscience and makes one feel guilty about it. Despite these attitudinal positions, the statements describing actions – e.g., about regularly carbon-offsetting the flights – score relatively low. Finally, only limited substitution of physical conferences by online ones might be possible.

Across all choice tasks academics choose to travel to conferences by train roughly twice as often (64% of the responses) as by plane (35%). Only in roughly 1% of the situations did our respondents decide to skip the conference visit altogether. [Table 1](#) shows the results of the MNL model. The large alternative specific constants reflect the strong preference to travel to the conference as compared to skipping the trip. Travel time by plane is valued much more negatively than travel by train. This finding may, to some extent,



Train or Plane?

Dear respondent,

Welcome to this short survey! This survey is a part of a study at the TU Delft, researching the travel behavior of academics in Europe.

The survey consists of three parts. In the first part you are presented with imaginary travel situations, where you have to choose between train and plane to travel to a conference. The second part contains statements about your attitude towards the environment, flying and other subjects. The last part contains some questions about personal characteristics. If you are willing to participate in this survey, please indicate your agreement with the terms stated below.

Completing the survey will take roughly 10 minutes.

Thanks in advance for your response!

Johan van der Poel

If you have any questions, you can contact me at j.vanderpoel-2@student.tudelft.nl

Your answers will remain completely anonymous. We do not know who completed the survey, nor do we request information that could be traced back to you. Fully anonymized information will be archived in an open database so that it can be used for future research. The data analysis of the obtained data are only performed at group level (on the basis of averages) and not at individual level. If you agree to these terms, please tick the box below.

☒ I agree with these terms

Next Page 1 of 34 [Clear form](#)

Train or Plane?

[Sign in to Google](#) to save your progress. [Learn more](#)

Imagine that you are travelling internationally in Europe, to a multi-day scientific conference. The conference topic is at the core of your research interest. The figure shows an example of the choices you have to make.

The red line represents the journey by plane: 45 minutes travel time to the airport. 1.5 hours will be spent at the airport and 30 minutes to travel from the airport to the city center. The blue line represents the journey by train: 30 minutes travel time to the train station. These values are the same for every choice you have to make. The travel time inside the plane and train varies and is mentioned in the table below the figure.

You have to make the following additional assumptions:

- There are no pandemic related travel restrictions.
- The costs of the trip are paid for by the university you work at.
- You are only taking a small amount of luggage with you on the trip.

*An average-sized petrol car emits roughly 20kg CO₂ when travelling 100 kilometers (MilieuCentraal, 2022)

(example screenshot)

Back Next Page 3 of 34 [Clear form](#)

Train or Plane?

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* Required

Are you working in a research position at an European university? *

☒ Yes
☐ No

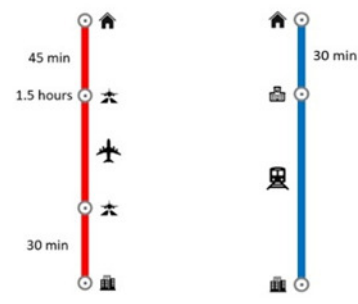
Is attending scientific conferences a part of your job? *

☒ Yes
☐ No

Back Next Page 2 of 34 [Clear form](#)

From the two presented options, which one would you choose? *

*An average-sized petrol car emits roughly 20kg CO₂ when travelling 100 kilometers (MilieuCentraal, 2022)



	Plane	Train
Travel Time (One-Way)	1.5 hours	6 hours
Travel Cost (Return)	€80	€200
CO ₂ Emission* (One-Way)	130kg	15kg

☐ Plane
☐ Train
☐ I will not travel to this conference

Back Next Page 4 of 34 [Clear form](#)

Figure 1. Survey introduction and an example of a choice situation

be confounded with the selected attribute ranges: in-vehicle travel times by train were roughly five times longer than by plane. The travel cost parameter is relatively low, with implied value of travel time of 521 €/h and 109 €/h for plane and train, respectively. This reflects the fact that employers pay for conference travel, which was also highlighted in the survey introduction. Lastly, the parameter for CO₂ emissions indicates that academics are willing to pay € 5 to reduce 1 kg of CO₂.

To provide insight into the relative importance of each attribute, [Figure 3](#) presents the range of impact of each attribute on the probability of choosing train. Departing from the probability of an ‘average train’ option (of 66%), it

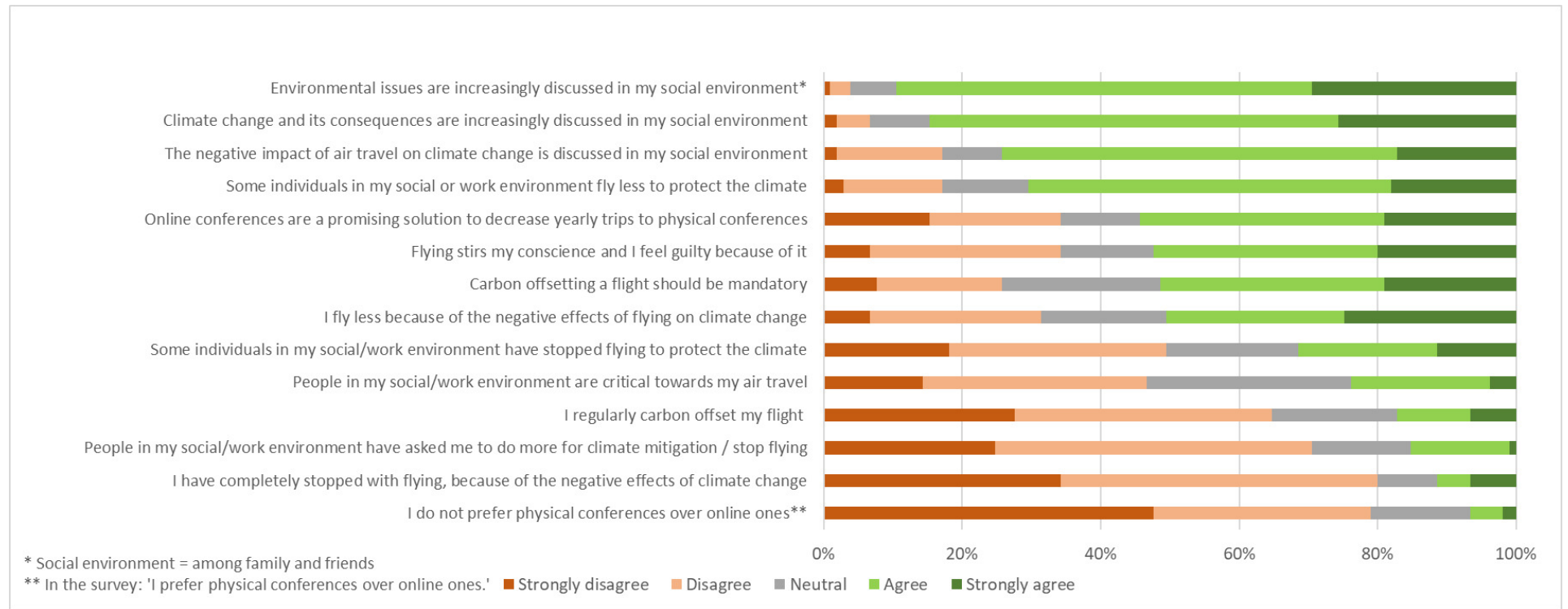


Figure 2. Responses to selected attitudinal and experience-related statements

Table 1. MNL model estimation results

Parameter	Value	Std. error	T-value	P-value
ASC Plane	10.137	0.892	11.370	0.000
ASC Train	6.157	0.354	17.373	0.000
Travel time plane (h)	-1.242	0.172	-7.206	0.000
Travel time train (h)	-0.259	0.039	-6.711	0.000
Travel cost (Eur)	-0.002	0.001	-3.418	0.001
CO ₂ emission (kg)	-0.010	0.002	-5.060	0.000

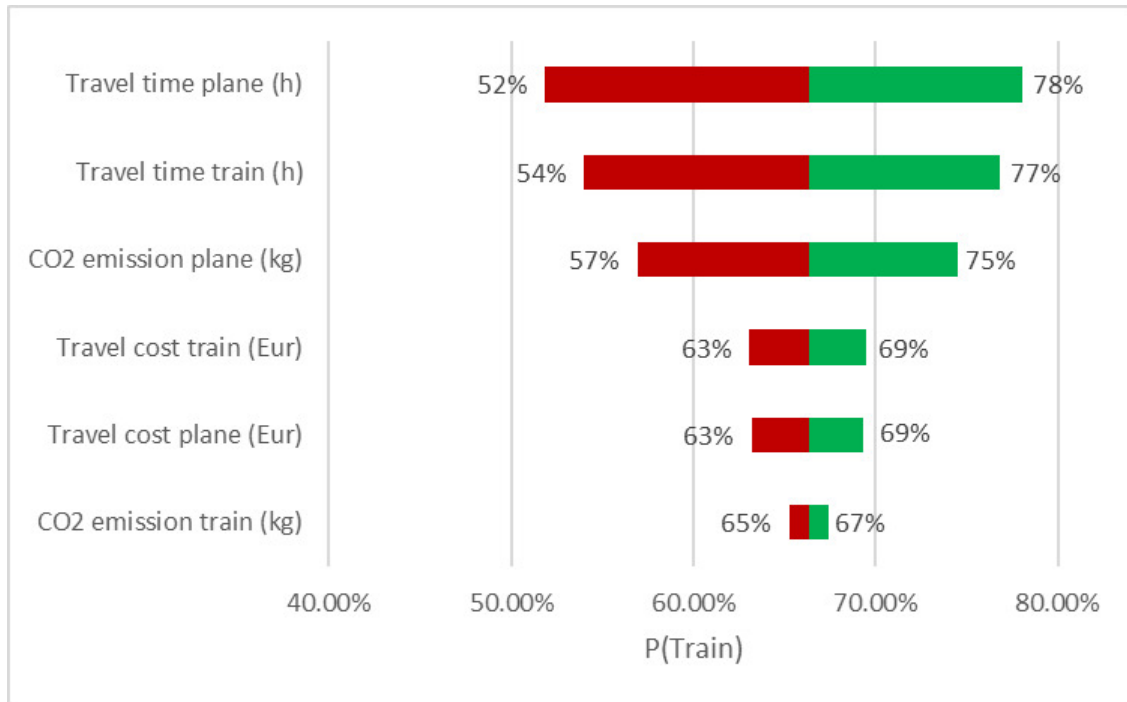


Figure 3. Impact of experiment attributes on the probability to select train

shows the impact of each attribute within the range used in the survey (e.g., the probability that train is chosen, given minimum to maximum plane travel time, ranges from 52% to 78%). Since this is based on an MNL model, the relative impact on the probabilities to choose the plane or to skip the trip are the same. As expected, travel times have the largest impact on the mode choice. However, the impact of CO₂ emissions is also considerable; the probability that train is chosen given high (173 kg) and low (87 kg) CO₂ emissions by plane ranges between 57% and 75%, respectively.

We find that academics are embedded in social and professional environments that are conscious of the environmental impacts of flying and that many feel guilty about flying. Still, these attitudes do not readily translate into behaviour (e.g. carbon offsetting, preferring online conferences). In addition, while CO₂ emissions play a role in travel mode decisions, their role is not as decisive as the one of travel time, which is the most important attribute. Note however that there is heterogeneity in our sample in terms of environmental actions, as seen, for example, by roughly 10% of respondents that have stopped flying altogether

(see [Figure 2](#)). Overall, we conclude that the so-called attitude-behaviour gap (Juvan and Dolnicar 2014), can also be observed among a segment of highly aware academics. From a policy viewpoint, this means that measures that rely on changing attitudes and/or raising awareness (e.g. through information campaigns) will have little effect on flying practices. Instead, more strict sustainable conference travel policies are likely necessary, such as travel quotas or a carbon budget.

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