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Effects of Emissions Labels on Consumer Choice of Lower-Emission Flights

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Abstract

Air travel generates disproportionate greenhouse gas emissions, without viable supply-side mitigation options. Demand-side measures, such as emissions information at the point-of-sale, are thus gaining interest. In a pre-registered experiment with a nationally representative sample (*N* = 1,000), we tested whether current emissions labelling systems shift consumers towards lower-emission flights. Participants were randomised to see either (i) no emissions information, (ii) absolute emissions values, (iii) absolute values with a relative emissions label or (iv) absolute values with a relative label and a contextual marker on the lowest-emitting flight (the number of trees needed to absorb the difference in emissions between this flight and the median). In the first task, participants selected hypothetical holidays from an online booking site. The study's focus on environmental impact was concealed. Absolute emissions values had no effect, but the relative and 'trees' labels modestly increased low-emission flight selection (4-6%-points). In the second task, participants were instructed and incentivised to select the lowest-emission flight. Absolute emissions improved identification by over 40%-points, with no further benefit of additional labels. The relative labels caused some participants to choose higher-emitting flights (e.g., long-haul flights with large relative reductions). A final task measured comprehension of labels and showed widespread confusion: two-in-three misinterpreted the reference point for relative labels and few correctly identified the factors that are considered in label calculations. Overall, the findings imply that emissions labels, as currently implemented, are unlikely to reduce aviation emissions meaningfully and risk amplifying rather than correcting misperceptions by potentially greenwashing aviation.

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1. Introduction

Most people do not fly. Those who do cause disproportionate environmental damage (Gössling & Humpe, 2020). As demand for air travel continues to rise while technological solutions (e.g., sustainable aviation fuels (SAFs)) deliver only limited near-term mitigation (Grewe et al., 2021; IEA, 2023; IATA, 2021; Sun et al., 2025), the most effective strategies for reducing emissions necessarily involve consumers flying less. Measures such as reducing the number of flights taken, avoiding long-haul flights or shifting to lower-emission transport modes offer the greatest potential for emissions reductions. Pricing mechanisms, such as carbon taxes on jet fuel or distance-based levies, are often viewed as the most effective ways to achieve behavioural shifts (Baranzini et al., 2017; Larsson et al., 2019). However, such strategies are misaligned with industry incentives, which rely on continued traffic growth for revenue, and are often opposed on the grounds of administrative complexity (Binggeli & Weber, 2013; IATA, 2025). Consequently, there is growing interest in less disruptive demand-side interventions, most notably emissions labels on booking platforms (e.g., EASA, n.d.), which seek to steer consumers towards relatively lower-emission options without affecting overall flight volumes. Our aim was to test whether these emissions labels achieve their aim of better-informed and more sustainable consumer choice.

1.1 Decarbonising Aviation

Aviation accounts for roughly 6% of global oil demand and 2.5% of global CO_2 emissions, with upward pressure on these figures as passenger numbers continue to grow (Lee et al., 2021; Qasem et al., 2024). Transport and climate experts argue that technological solutions to reduce aviation's environmental impact are insufficient(Beevor & Alexander, 2022; Braun et al., 2024; Peeters et al., 2016). Even with full implementation, these solutions will require complementary demand-side (i.e., consumer based) strategies, as projected efficiency gains are likely to be outweighed by expected passenger growth (Hu et al., 2022; IEA, 2021; Lewis et al., 2022; Sacchi et al., 2023). However, efforts to promote flight avoidance face significant barriers, including poor public understanding of aviation's climate impact (Timmons & Lunn, 2022; Wynes et al., 2020; Zheng & Rutherford, 2021) and a mismatch between environmental attitudes and flying behaviour (Alcock et al., 2017). Social norms, perceived and real benefits of travel, airfare affordability and limited viable alternatives further complicate reduction efforts (Árnadóttir et al., 2021; Cocolas et al., 2020; Oswald & Ernst, 2020; Schmidt et al., 2023).

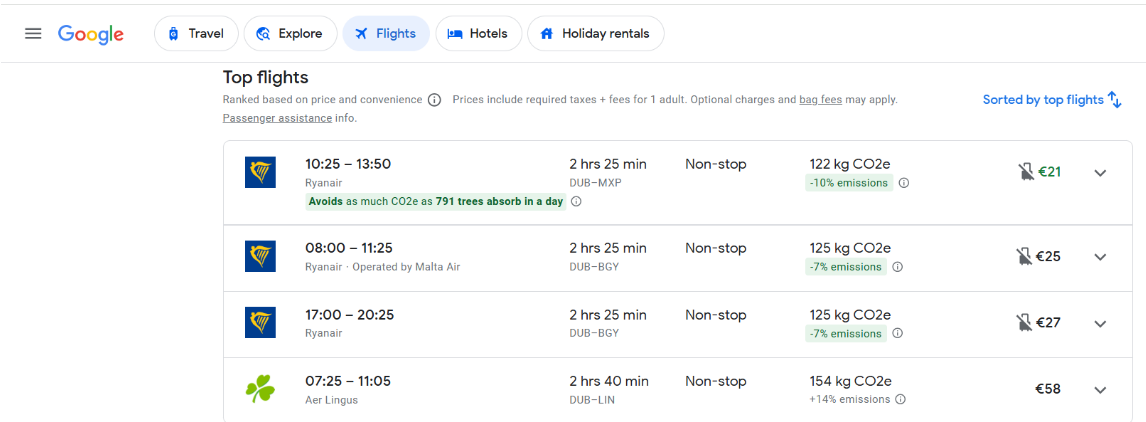
These obstacles have motivated interest in interventions that do not require travellers to reduce flying but instead guide choices within air travel. Emissions on the same flight route can vary by over 60%, depending on factors such as aircraft model, load factor and seating configuration (Iken & Aguessy, 2022; Jardine, 2009). Consequently, providing consumers with accurate emissions information could, in principle, enable them to make more sustainable choices without requiring them to alter their destination or forego air travel (Baumeister, 2017; Baumeister & Onkila, 2017).

1.2 Aviation Emissions Labels

Descriptive labels that provide sustainability information (i.e., "eco-labels") are employed in multiple sectors (e.g., food, electronics) to guide consumers towards lower-impact options while preserving freedom of choice (Czarnezki et al., 2018). When salient and easily understood, such labels shift consumers towards sustainable options (e.g., Majer et al., 2022; Osman & Thornton, 2019; Stadelmann & Schubert, 2018; Timmons et al., 2024). They can also indirectly stimulate improvements in industry sustainability, by encouraging competition for sought-after ratings (Taufique et al., 2022).

In aviation, platforms like Skyscanner and Google Flights have introduced emissions labels that display, for example, the absolute kg of CO_2 equivalent (CO_2e)[1] of an itinerary or its emissions relative to the route median (Figure 1-A). Some labels further contextualise "avoided" emissions using relatable analogies, such as the number of trees needed to absorb the equivalent emissions. Reflecting growing policy interest in demand-side strategies, EU lawmakers adopted regulations in 2024 that establish a voluntary environmental labelling system for flights, intended to enable passengers to make "more sustainable choices" while ensuring they are "actively aware of the impact of their travel choices" (EASA, n.d.; European Commission, 2024).[2] Air France-KLM was the first airline group to commit to piloting the scheme (European Commission, 2025).

Figure 1-A Example of Google Flights Search Results with Emissions Labelling



[1] CO_2 equivalent is a metric used to quantify the total climate impact of greenhouse gas emissions as a single figure. It converts non-CO_2 greenhouse gases into an equivalent quantity of CO_2, based on their global-warming potential.
[2] Regulation (EU) 2023/2405 of the European Parliament and of the Council of 18 October 2023 on ensuring a level playing field for sustainable air transport (ReFuelEU Aviation).

Source: Google Flights

Emerging evidence suggests that these labels can influence consumer choice, though most findings come from discrete choice experiments in highly controlled environments. Choices are sensitive to eco-labels that display absolute emissions combined with letter-and-colour graded, or that highlight the “greenest flight” alongside CO_2 values (Carroll et al., 2022; Sanguinetti & Amenta, 2022; UK Department of Transport, 2026; see also Baumeister et al., 2022). Labels showing relative emissions also boost preferences for lower-emission fights (UK Department of Transport, 2026; Song et al., 2024). These studies relied on simplified choice environments that differed from actual booking environments, with participants primed to think about the environment. An analysis using choice sets closely modelled on the Google Flights interface found similar effects of emissions labels, although price dominated decisions when the hypothetical choice concerned a self-funded trip (Crosby et al., 2024). Finally, to our knowledge, just one study has analysed real-world consumer data, from Skyscanner in 2019. Results showed that relative emissions labels increased conversion rates for labelled low-emission flights, but only when these flights did not compromise other features (Zhang & Ursu, 2025).

Despite these somewhat promising findings, current label designs pose a meaningful risk of misinterpretation. Absolute emissions labels present precise quantities that many consumers lack the knowledge (and possibly motivation) to interpret (UK Department of Transport, 2026; Gössling & Buckley, 2016; Thøgersen & Nielsen, 2016; Roa-Goyes & Pickering, 2024). Relative labels, while typically simpler and effective in other contexts (Camilleri et al., 2019; Muller et al., 2019; Stadelmann & Schubert, 2018) risk conveying an exaggerated impression of environmental harm reduction. For example, high-emission products like SUVs may appear environmentally friendly when labelled relative only to other SUVs (Hille et al., 2018) and consumers struggle to identify this form of greenwashing (Timmons, Whelan & Kelly, 2024). In aviation, Google Flights’ method of comparing emissions to the median flight for that specific journey (including multi-stop routes) may obscure the impact of longer flights or exaggerate reductions on routes with many multi-stop options or with only seasonal non-stop routes (e.g., “-43% emissions” for a direct flight from Dublin to Tokyo). Rather than informing consumers, such labels risk functioning as a form of greenwashing by communicating relative performance while masking the real environmental cost of flying. This concern is heightened by the frequent omission of factors such as SAF usage, cargo weight, and flight altitude in emissions calculations.[3]

[3] Since this research was conducted, the EASA labelling scheme has updated its website to indicate that cargo and fuel type will be included in its calculations (see https://www.flightemissions.eu/en/frequently-asked-questions). However, these factors remain omitted by labelling schemes currently employed in the market.

1.3 Current Study

This study builds upon previous literature with a pre-registered experimental test of labels currently employed in the market. Participants used a hypothetical holiday booking interface in which we investigated their choices under different emissions labelling systems. We extend prior research in four ways. First, we enhanced realism by simulating the choice environment of popular flight-booking sites (Crosby et al., 2024; Morales et al., 2017) and expanded this to the entire experimental interface. Second, whereas participants in previous studies were often aware of the study's environmental focus, we employed decoy choice tasks and framed the study as an exploration of online shopping to mitigate demand effects that can bias effect sizes (Carlsson et al., 2018). Third, we presented a novel test of label features (e.g., absolute emissions vs. relative emissions vs. salient markers) as they appear in the market on Google Flights. Given the platform's widespread use and the resemblance of its labelling system to the European Commission's developing framework, this constitutes a practical and policy-relevant test.[4] Fourth, for the first time, we included one choice task in which consumers were incentivised to choose the flight with lowest emissions. This task tested for confusion between relative and absolute emission information, enabling us to distinguish between two competing explanations for the modest effects observed in prior work: limited motivation to choose sustainably or shortcomings in the label design (Rihn et al., 2019; Yokessa & Marette, 2019). We also directly measured understanding of the labels, with a focus on the assumptions that consumers make about them.

Thus, our core research questions are:

RQ1: *Do consumers choose lower-emission flights when emissions labels are visible?*

RQ2: *Can consumers correctly identify lower-emission flights when emissions labels are visible?*

RQ3: *Do consumers understand emissions labels, as they are currently employed in the market?*

We also explore several secondary research questions, including how emissions labels interact with consumer characteristics (e.g., gender, age, frequent flyer status, concern about the environmental impact of flying). We further investigate whether emissions labels influence perceptions of the environmental impact of flying, shape beliefs about emissions responsibility or influence support for mitigation policies.

[4] See annex document for further detail: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14142-Flight-Emissions-Label_en

2. Method

Participants used two versions of an online "one-stop shop" for holidays, to address RQs 1 and 2. Each version contained flights, accommodation and activities at various destinations. In the first shop, participants selected their preferred combination of options, whereas in the second they acted as "buyer's agents," where their task was to make purchases to match another person's preferences. Participants were randomised by the software into one of four emissions information conditions, detailed below, and remained in the same condition for both the free choice and buyers agent stages of the task. Only flights choices were of interest; accommodation and activity choices served as decoys. The study concluded with a survey to answer RQ3 and facilitate exploratory analyses. All shopping environments were programmed using Gorilla Experiment Builder and were laptop, tablet and mobile compatible (Anwyl-Irvine et al., 2020). The preregistration and full materials are available in the Appendix and on the project's Open Science Framework page (https://osf.io/8sn5h/).

2.1 Participants

One thousand adults[5] in Ireland were recruited by two market research agencies to be broadly nationally representative (Table 2-A).[6] The final sample slightly underrepresents those with secondary education or below and overrepresents those with at least degree-level educational attainment, although results are not sensitive to educational attainment. All statistical models include socio-demographic controls and descriptive statistics are weighted by age, gender, education and living area.

We set the target sample size to 1,000 to allow for approximately 250 participants per labelling condition, as expected effect sizes were uncertain but there is little additional increase in point estimate precision above groups of this size (Guadagnoli & Velicer, 1988). Participants received €4 for completing the study and could earn raffle entries for one of two €100 Mastercard vouchers through incentivised tasks. The median completion time was 22 minutes and data were collected in August and September 2024. The study was run in accordance with institutional ethics policy.

[5] Attrition was higher than usual, likely reflects the involved nature of the study compared to standard surveys. It also differed between the panels. A total of 741 participants were recruited from one panel, but 23 (3.1%) failed an attention check, 41 (5.5%) exited during the main holiday booking task and 299 (40.4%) exited across other stages. A total of 1,607 were recruited from the other panel, but 80 (5%) failed the attention check, 182 (11.3%) exited during main holiday booking task, and 722 (44.9%) exited during other stages. Data from these participants were not accessed.

[6] RedC Live (https://www.redclive.ie/) and Bounce Insights (https://www.bounceinsights.com/). RedC Live is a panel of over 40,000 members with an additional 200-500 added per month via online and offline recruitment efforts (including probability sampling and advertisements). Data quality has been validated against real outcomes (e.g., https://redcresearch.com/wp-content/uploads/2024/01/Slide2-1024x576-1.jpg). Bounce Insights holds a proprietary panel of over 10,000 users, primarily via its dedicated mobile app. Bounce maintains its panel through online advertising, word-of-mouth and a referral program. User verification and response tracking are used to ensure panel quality.

Table 2-A sample sociodemographic information

		n	%	CSO Estimate
Gender	Men	465	46.5	49.0
	Women	530	53.0	51.0
	Non-Binary/Other	5	.5	-
Age	18-39 years	375	37.5	36.8
	40-59 years	375	37.5	36.5
	60+ years	250	25.0	26.7
Education	Secondary or below	317	31.7	43.9
	Tertiary below degree	297	29.7	28.6
	Degree or above	386	38.6	27.5
Region	Leinster (incl. Dublin)	571	57.1	55.7
	Munster	274	27.4	26.7
	Connacht/Ulster	155	15.5	17.6

Sources: CSO & authors' analysis.
Note: The Census does not record non-binary as a gender. We proxied socio-economic status through "social grade," a market research measure based on the occupation of the chief income earner in the household. However, the Census does not record social grade, so we instead use here educational attainment. The discrepancy between our sample and the Census on educational attainment is likely partially driven by there being very few individuals aged 80+ in our sample—.7% vs. a population level of 3.1%.[7]

Most participants had flown before (98.3%) and had booked a flight online (93.9%). In the preceding year, 22.0% had not flown, 43.5% had taken one or two flights, 19.4% had taken three or four flights, and 15.0% took 5 or more return flights (combining personal and business trips). Looking ahead, 16.4% were not planning to fly in the coming months, while 54.5% of those intending to fly had actually booked a flight.

2.2 Materials and Design

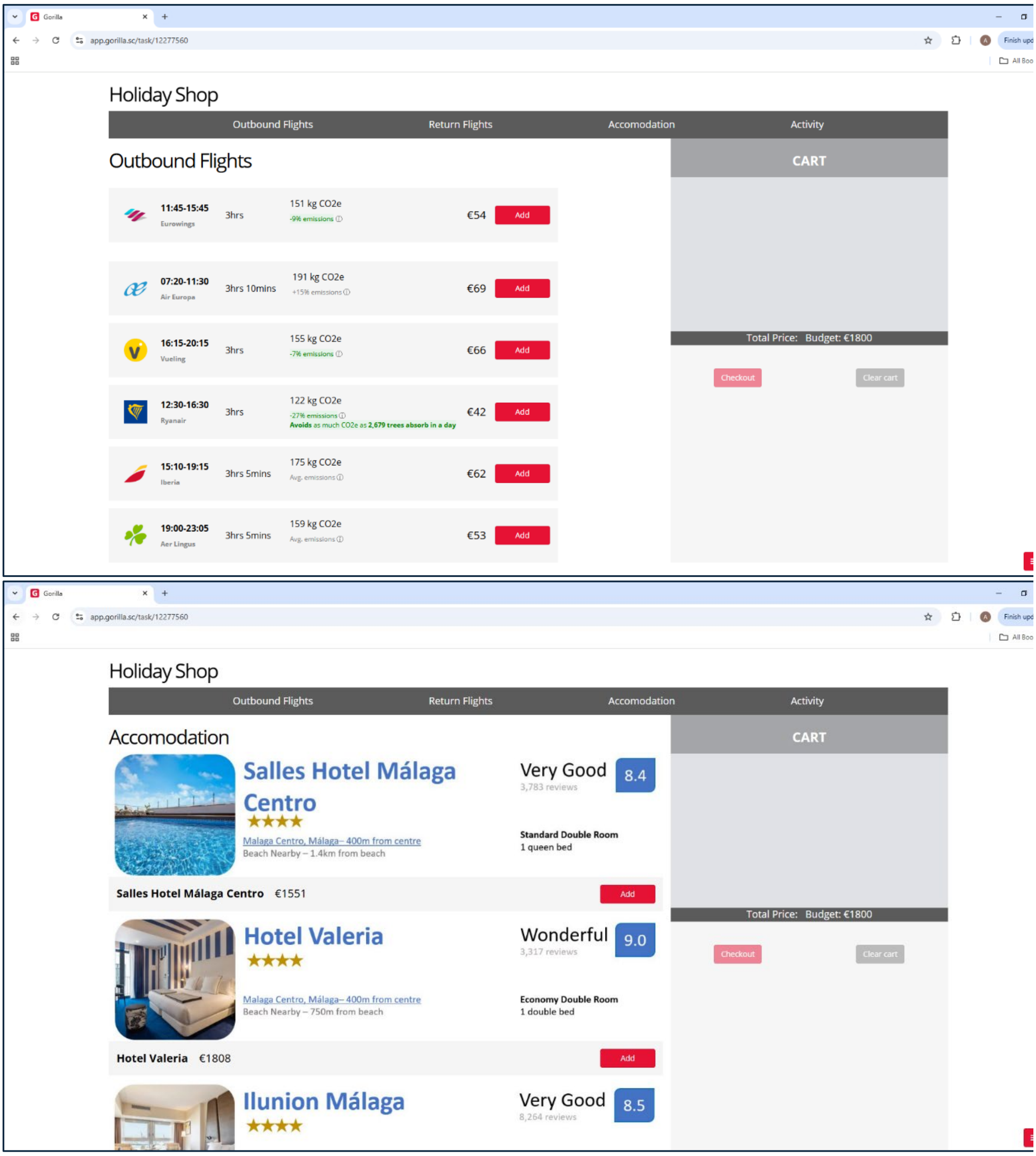
2.2.1 Holiday Booking Site

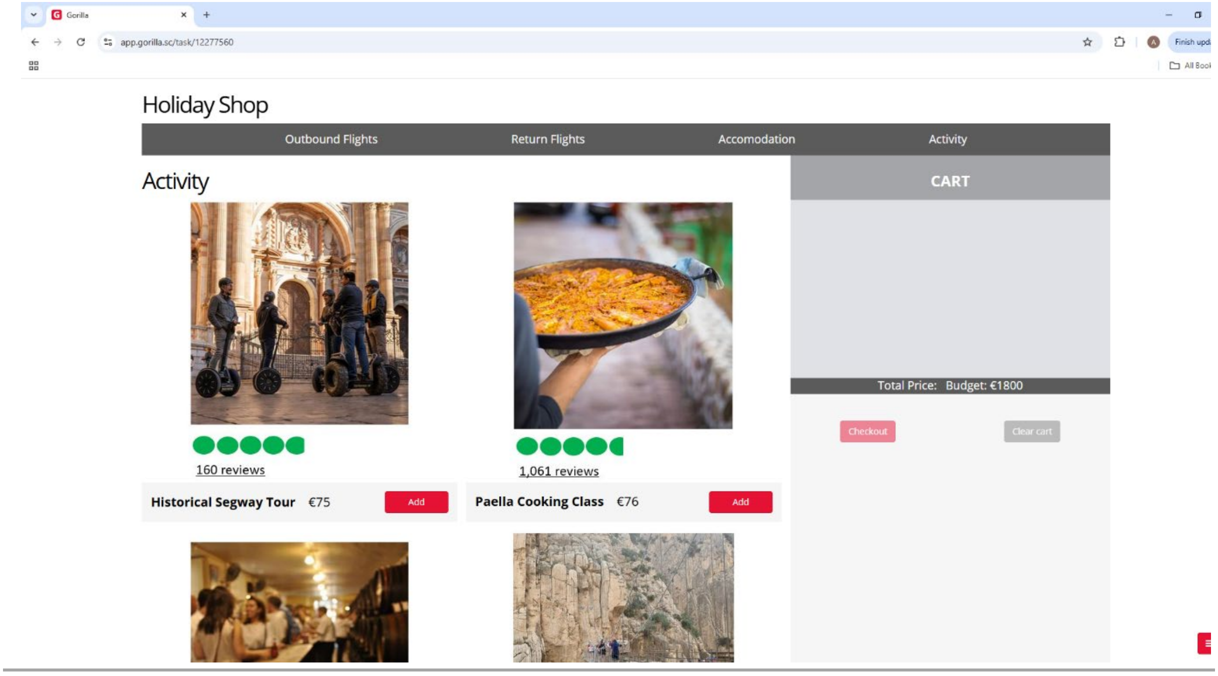
To reduce experimenter demand, participants were initially informed that the study was about online shopping. They first completed a hypothetical choice task using a simulated clothing store, which included no environmental information. Participants then accessed the first "one-stop shop" for booking holidays. Our interest was in flight choices. Accommodation and activity pages were included as decoys to mask the primary aim (Figure A-1 in Appendix). Participants booked hypothetical trips to three popular destinations for Irish holidaymakers: Málaga (Spain), New York City (USA) and

[7] Source: Eurostat

Santorini (Greece), presented in randomised order. Participants were informed that we were "interested in how people make decisions about holidays they book". They were instructed on how to use the site, told that they would be assigned a budget and asked to use the site as they normally might. For flights, baggage was included in displayed prices, and participants could book outbound and return flights with separate airlines. Figure 2-A shows an example of pages from the Málaga site.

Figure 2-A Sample Pages from Holiday Booking Task





Flight pages (outbound and return for the three destinations) mimicked Google Flights' layout, using real market data from July 2024. To construct each page, six real flight times were randomly assigned to real airlines (e.g., one participant could see the 07:20 flight to Málaga run by Ryanair, whereas another could see it run by Vueling), thus controlling for brand-preference effects. Emissions reflected actual flight durations. Emissions were highest for flights to and from New York City, followed by Santorini and Málaga.

Price information was based on market prices, but distributions were destination specific to allow exploratory tests of emissions labels at different levels of market price dispersion. Flights to and from Málaga were distributed ±30% around the mean, Santorini flights were distributed ±10%, and New York flights were ±3%. Prices were randomly assigned to flights within these ranges. Flights to New York were most expensive, followed by Santorini and Málaga, whereas return flights from Santorini were most expensive, followed by New York and Málaga. Table 2-B presents descriptive statistics of price and emissions from the flights (see Table A-2 in Appendix for further details on airlines and times).

Participants were assigned a randomly-determined budget for use across all choices within a destination, to reinforce the ostensible aim of the study and enhance realism. Budgets allowed participants choice of any flight and activity but constrained some accommodation choices. For example, a budget might allow only the cheapest accommodation in Málaga but provide more flexibility in New York City.

Participants needed to add one outbound flight, one return flight, one accommodation and one activity to their cart to complete the task. Participants could remove individual items or clear the entire cart but were prevented from adding multiple flights per trip segment or from checking out without a full cart. Items exceeding their budget also triggered an error message.

Table 2-B Summary statistics for flights in the holiday booking site

	Outbound						Return					
	Price €			Emissions kg CO_2e			Price €			Emissions kg CO_2e		
Destination	*Range*	*M*	*SD*	*Range*	*M*	*SD*	*Range*	*M*	*SD*	*Range*	*M*	*SD*
Málaga	42-69	57.67	9.97	122-191	158.83	23.36	159-236	184.17	30.95	122-196	156.67	24.15
New York City	390-407	397.00	6.72	320-527	375.33	79.22	263-280	271.67	7.53	321-527	383.50	76.18
Santorini	118-143	126.67	10.21	232-262	245.83	10.83	267-317	290.33	16.95	232-252	243.33	8.14

Source: Authors' analysis.

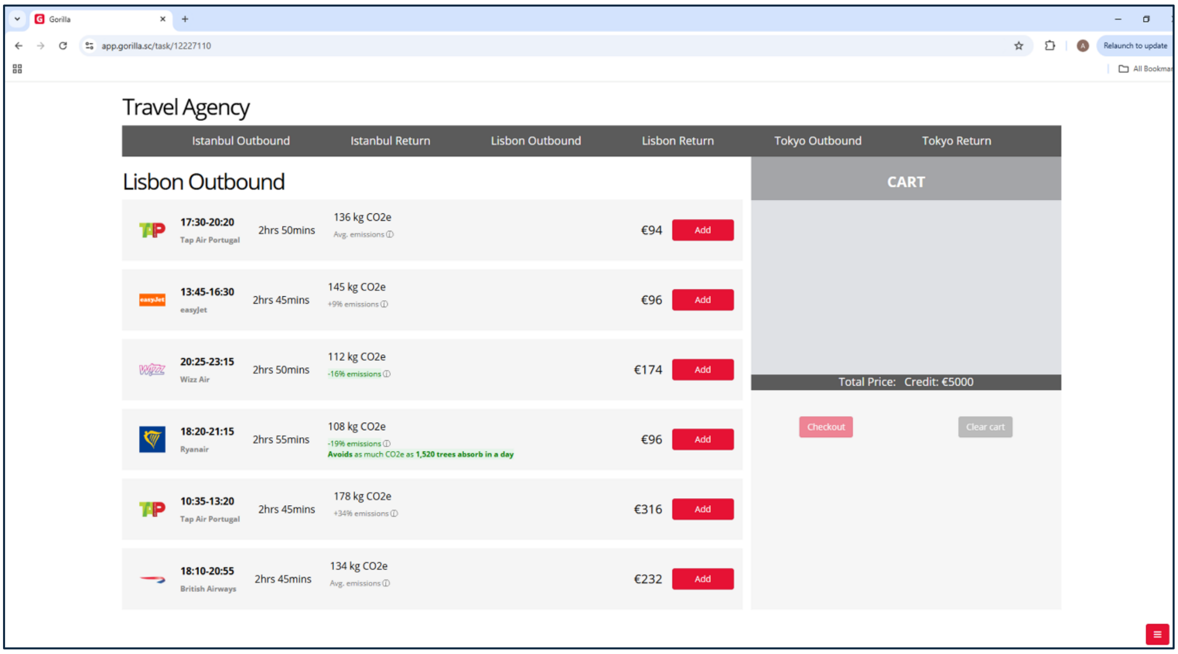
2.2.2 Buyer's agent site

To answer RQ2, participants completed a second holiday booking exercise, but this time they acted as a travel agent, tasked by a customer to book an environmentally friendly holiday. Instructions outlined that price was not an issue and that having "as little environmental impact as possible" was the customer's priority. To incentivise following the instructions, participants were told that choosing the most environmentally friendly holiday would earn additional entries to the €100 Mastercard voucher raffle. Before proceeding, participants completed an attention check, in which they had to identify "environmental friendliness" as the customer's priority from a list of alternatives[8]. Incorrect responses redirected participants to the instructions and a repeat of the attention check; failure on second attempt resulted in removal from the study.

This booking task featured six flight tabs (outbound and return to three different destinations: Lisbon, Istanbul and Tokyo). Each tab offered six flights, again configured using real data with random combinations of airlines, flight times and price. Destination tabs were presented in random order and participants were free to browse all sets. They completed the task by adding one outbound and one return flight to the same destination and pressing the checkout button. The cart functioned similarly as before, but without budget constraints. After selecting flights, they chose accommodation and an activity on a separate page, to prevent these choices from influencing perceptions of the environmental impact of flights. Figure 2-B presents an example of the Buyer's Agent Flight Site.

[8]Accommodation, airline, destination, environmental friendliness, local food, price and timing.

Figure 2-B Buyer's agent flight site



As shown in Table 2-C, flights to and from Tokyo were the most emitting, followed by Istanbul and then Lisbon.[9] No combinations from Tokyo had lower emissions than combinations available from the other two destinations.

Table 2-C Descriptive statistics for flight emissions from buyer's agent task

	Outbound			Return		
	Emissions kg CO_2e			Emissions kg CO_2e		
Destination	*Range*	*M*	*SD*	*Range*	*M*	*SD*
Tokyo	533-1126	847.33	231.75	533-1126	847.33	231.75
Istanbul	155-242	185.17	30.55	153-236	183.83	28.76
Lisbon	108-178	135.5	25.33	108-180	145.33	28.16

Source: Authors' analysis.

2.2.3 Emissions Information

The only difference between experimental conditions in both tasks was the presentation of flight emissions information. Participants were randomised by the computer software to one of four conditions and remained in the same condition

[9] Flights to/from Tokyo were the longest (*Min*. = 13hrs 35mins, *Max*. = 14 hrs 50mins), followed by Istanbul (*Min*. = 3hrs 50mins, *Max*. = 4 hrs 40mins), with Lisbon the shortest (*Min*. = 2hrs 40mins, *Max*. = 2hrs 50mins).

throughout the study. The conditions incrementally added emissions information and were based on those employed in the market. In the "Control" condition (*n* = 247), participants saw only the airline, time/duration and price for each flight. In the "Absolute" condition (*n* = 252), the kilograms of CO_2e associated with each flight was presented between the flight duration and price. In the "Relative" label condition (*n* = 251), the absolute CO_2e values were accompanied by a label indicating each flight's emissions relative to the median itinerary on the route ("+/- X% emissions"), with below-median emissions highlighted in green text. Finally, the "Trees" condition (*n* = 250) added a conversion of the amount of CO_2e "avoided", relative to choosing the median itinerary, into the number of trees required to absorb the equivalent CO_2e in one day,[10] displayed in bold green text only on the lowest-emission flight in the set. Figure 2-B presents an example of each label element together (Trees condition). Table A-3 (Appendix) summarises the median emissions by route.

2.2.4 Emission Label Comprehension

After the booking tasks, participants completed comprehension questions to answer RQ3. Participants were first shown an example relative emissions label for flight from Dublin to Malta with "-26% emissions." They were asked if they had ever seen a similar label before when shopping for flights online (Yes; No—never seen when shopping for flights; No—never shopped for flights online). They were then asked to interpret the label, selecting from five options: 26% less emissions than (i) the average non-stop flight between Dublin and Malta, (ii) the average of all flights (including multi-stop or indirect) between Dublin and Malta, (iii) the average of all flights (including to other destinations), (iv); all other modes of transport between Dublin and Malta (i.e., compared to ferry and train or travelling by car), or (v) that they don't know. Correct responses earned an additional raffle entry.

Next, participants indicated which of ten factors they expected to be incorporated when calculating a flight's emissions. Four of the ten factors were included in Google's Travel Impact Model (TIM)[11] in July 2024 (great circle distance between destinations, plane type, class breakdown of seats and seats expected to be sold) and six were not (actual distance to be travelled, fuel type used, expected cargo weight, in-flight services, all CO_2 and non-CO_2 emissions and in-flight entertainment). As we anticipated few participants would have detailed knowledge of TIM, we elicited expectations rather than knowledge.

2.2.5 Other measures

Participants completed a series of other measures throughout the study. Following the holiday booking task but before the buyer's agent task, participants responded to an open-text question about what they believed to be the study's purpose. Responses allowed us to estimate experimenter demand before the focus on flying's environmental

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[10] The calculation assumes an absorption rate of 1kg/CO_2e/day for every 60 trees. Source: EPA

[11] https://github.com/google/travel-impact-model

impact was revealed. They also rated their interested in the selected holiday packages and the booking system's ease of use on 7-point scales (Not at all – Very). These questions were designed as decoys to reinforce the study's ostensible purpose.

Participants then reported on their own flying experience, including if they had ever flown, booked flights online, frequency of personal and business flights in the past year, and any plans to fly in the coming months. Participants also ranked the importance of the following factors when they book flights: Airline (e.g., reputation, baggage policy); Environmental impact; Flight times (i.e., early morning vs. late at night); Price; Duration/number of stopovers.

Following the Buyer's Agent task, participants identified which of five emissions labels they saw in the booking task (a relative emissions label was included, seen by the relative and trees conditions), to gauge attention to the labels. They also rated their perceptions of government, airline and consumer responsibility for reducing aviation's environmental impact and their personal feelings of discomfort, unease, and guilt from flying, on 7-point scales. They also indicated whether they limit their flying because of its environmental impact.

To measure perceptions flying's impact, participants ranked seven actions based on their carbon footprint impact (adapted from Wynes et al., 2020 and Timmons & Lunn, 2022): Using only renewable energy sources for a year [1]; avoid an average-emission long-distance return flight (8+ hours) [2]; drive a hybrid car instead of conventional (petrol/diesel) for a year [3]; avoid a lower-emission long-distance return flight (8+ hours) [4]; switch to a plant-based diet (no meat, eggs or dairy) [for a year] [5]; recycle as much as possible for a year [6]; use only reusable shopping bags for a year [7].[12]

The final stage investigated support for hypothetical policies to "reduce the environmental impact of flying" (e.g., "a ban on private jets"), with responses on 7-point scales (Not-at all – Very much). This section featured an additional experimental manipulation, to be reported separately.

The study concluded with standard sociodemographic questions and open-text questions for any comments.

[12] We also piloted a novel impact estimation task. Participants were asked to estimate, using slider scales from 0-100%, how much of an individual's "annual carbon budget" (assuming an equal budget for everyone in the world) they thought would be consumed by an "average", and then "lower-than-average" emissions return flight from Dublin to New York. Responses indicated that this question was confusing, with many participants (32.8%) reporting higher emissions from the lower-than-average than the average flight. As such, and as pre-registered, we drop this measure from reporting.

3. Results

3.1 Do consumers choose lower-emission flights when emissions labels are visible?

Participants rated the site as easy to use (*M* = 2.2 out of 7, *SD* = 2.01; lower scores denoting greater ease), and reported strong interest in the holidays they had booked (*M* = 5.9 out of 7, *SD* = 1.48; higher scores denoting greater interest).

Our primary interest was whether participants chose lower-emission flights when emissions labels were visible. To analyse choices, we generated a dataset of the six flights chosen by each participant (one outbound and one return for each destination) in the holiday booking task. The dependent variable is the chosen flight's CO_2e emissions (kg) rank, from 1 (lowest emissions) to 6 (highest) within that destination and direction (i.e., outbound or return). For controls, we include the flight's price rank and categorical variables for the airline, destination and direction (with the latter two functioning as fixed effects for the choice set). Our predictor variable is the emissions labelling condition of the participant: no labels (Control), Absolute, Relative or Trees.

Turning first to descriptives of choices, Table 3-A shows the share of flights chosen across price rank and emissions rank independently, with rank 1 being the cheapest/lowest-emitting and so on. Participants displayed strong price sensitivity, with preferences diminishing as the price rank increases. In contrast, emissions preferences appear stable beyond the lowest-emission flight. Table 3-B presents a detailed breakdown of emissions of selected flights by destination and condition. Participants also displayed some sensitivity towards the airline, with Ireland's national carrier (Aer Lingus) capturing the largest share of airlines chosen across destinations (see Table A-4 in Appendix).

Table 3-A Share of Selected Flights by Price and Emissions Rank.

Rank	Price %	Emissions %
1	30.74	24.41
2	18.84	14.76
3	15.99	15.44
4	13.69	14.46
5	11.96	14.88
6	8.78	16.04

Source: Authors' analysis.
Note: Ranking from 1-6, lowest to highest price/emissions. Responses are weighted on gender, age, education and urban/rural.

Table 3-B Descriptive statistics for emissions of selected flights by condition

Destination	Metric	Control	Absolute Labels	Relative Labels	Trees Labels
Málaga	Outbound Rank	3.55 (1.92)	3.51 (1.91)	3.30 (1.92)	3.21 (1.88)
	Return Rank	3.45 (1.83)	3.42 (1.91)	3.21 (1.87)	3.20 (1.80)
	Total Emissions kg CO_2e	315.46 (31.26)	315.66 (35.46)	310.26 (35.38)	307.96 (36.26)
New York City	Outbound Rank	3.25 (1.83)	3.34 (1.78)	3.05 (1.77)	2.83 (1.78)
	Return Rank	3.40 (1.79)	3.59 (1.68)	3.20 (1.72)	3.02 (1.62)
	Total Emissions kg CO_2e	758.55 (108.05)	760.41 (107.77)	737.48 (101.79)	721.98 (83.97)
Santorini	Outbound Rank	3.45 (1.85)	3.39 (1.72)	3.21 (1.74)	3.11 (1.80)
	Return Rank	3.36 (1.68)	3.40 (1.64)	3.30 (1.75)	3.19 (1.83)
	Total Emissions kg CO_2e	488.84 (13.03)	488.20 (12.39)	486.70 (12.58)	485.34 (13.75)

Source: Authors' Analysis
Note: Values displayed are mean and SD (in brackets). Responses are weighted on gender, age, education and urban/rural. Possible ranking from 1-6, lowest to highest emissions.

We model flight choice using mixed-effects ordinal logistic regression models, with random effects at the participant-level to account for within-participant correlations in choice. Model 1 in Table 3-C regresses the emissions rank of selected flights on label condition, controlling for flight-level variables (mentioned above) and participant characteristics: age, gender, degree, household income, region, urban/rural, personal flying activity and previous use of online flight booking sites. We find that exposure to Absolute labels has no effect on the emissions rank of chosen flights. Exposure to Relative labels and Trees labels, however, both result in choice of lower-emission flights. As expected, postestimation tests revealed a significant difference between coefficients on Absolute and Relative labels (χ^2 (1) = 6.73, p = .01) and Absolute and Trees labels (χ^2 (1) = 20.68, p < .001). However, we find no significant difference between those on Relative and Trees labels (χ^2 (1) = 3.78, p = .052).

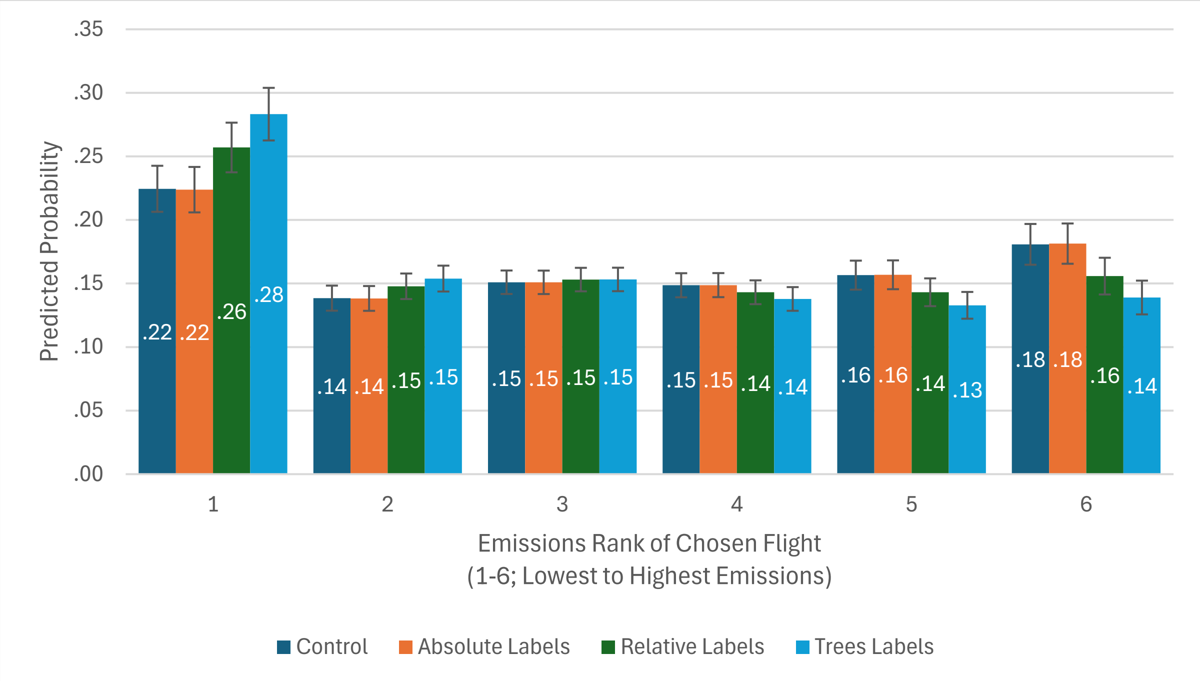
Table 3-C Regressions predicting emissions rank of choice in holiday booking task (1) and correct choice in buyer's agent task (2)

	(1)	(2)
	Emissions Rank of Chosen Flight	Correct Choice
Label Condition (*Ref:* No Labels)		
Absolute Labels	0.01	5.27***
	[-0.13 - 0.15]	[3.29 - 7.26]
	p = .871	*p* < .001
Relative Labels	-0.17*	4.94***
	[-0.31 - -0.03]	[2.95 - 6.92]
	p = .016	*p* < .001
Trees Labels	-0.31***	5.27***
	[-0.45 - -0.17]	[3.29 - 7.25]
	p < .001	*p* < .001
Flight Characteristic Controls [a]	Yes	NA
Participant Characteristic Controls [b]	Yes	Yes
Constant	-	-6.21***
	-	[-8.29 - -4.14]
	-	*p* < .001
Observations	6,000	1,000

Source: Authors' analysis.
Note: 95% Confidence intervals in square brackets
[a] Controlling for price, airline, destination and direction (outbound or return).
[b] Controlling for age, gender, degree, household income, region, urban/rural, own flying activity and previous use of online flight booking sites.

Figure 3-A presents the marginal effects of each label condition on the probability of selecting flights at each emissions rank. In line with the above results, we see no difference between the Absolute and Control conditions. The Relative and Trees labels, on the other hand, increased the likelihood of choosing the lowest-emissions flight, compared to the Control condition (18.18% and 27.27% increases, respectively), and decreased the likelihood of choosing the highest emissions flight (11.11% and 22.22% decreases, respectively).

Figure 3-A Marginal effects of label condition on probability of choosing flights at each emissions rank



Source: Authors' analysis.
Note: Error bars are 95% confidence intervals.

3.1.1 Robustness Checks and Exploratory Analyses

We ran pre-registered robustness checks on this model, excluding participants who (i) suspected the study's focus on sustainability when probed in the open-text question (*n* = 44), (ii) failed to identify the correct label in the multiple-choice question at the end of the study (*n* = 379), or (iii) had never shopped for flights online (*n* = 78). Results (reported in columns 1-3 in Table A-5 in the Appendix) show that our main findings are robust to these exclusions; in fact, the label effects appear larger in model 2, which includes only those who correctly identified the labels.

As pre-registered, we ran further exploratory analyses on the interaction between labels and four participant characteristics: gender, age, frequent flyer status and importance ascribed to environmental impact in personal flight choices.[13] Results (reported in columns 4-7 in Table A-5 in the Appendix) suggest that the main effects are broadly consistent across all groups. However, there is some evidence that trees labels are more effective among participants who prioritise environmental impact in their personal flight decisions.

3.1.2 Summary

Results show no significant effect of seeing information on absolute emissions associated with flights, but a statistically significant effect of seeing the relative emissions (with and without the conversion of the lowest-emission flight "savings"). To contextualise these effects, we compare the emissions reductions between those in the Control condition and those who saw the Trees labels. If all participants in the Trees condition had chosen the lowest-emitting flight, emissions would have decreased by 213 kg CO_2e across the three holidays (a 13.64% reduction—roughly equivalent to low-emission return flights from Dublin to Lisbon). Instead, participant choices (Table 3-B) show a mean reduction of just 47 kg CO_2e (a 3% decrease—less than a quarter of the possible savings).

3.2 Can consumers correctly identify lower-emission flights when emissions labels are visible?

The Buyer's Agent task investigated whether emissions labels help participants identify lower-emission flights when explicitly instructed and incentivised to prioritise environmental impact. Participants could choose from one of three destinations, and within each destination, they chose from one of six outbound and one of six return flights. This produced a choice set of 108 pairs (6 outbound*6 return*3 destinations). The lowest-emitting pair —the correct choice—was a specific Lisbon round trip emitting 108kg CO_2e each way. The Relative labels indicated "-19% emissions" and "-21% emissions" for outbound and return, respectively. In the Trees condition, both were highlighted with a message indicating that choosing them would avoid "as much CO_2e as 1,520 trees absorb in a day".

Just 0.3% of participants in the Control condition chose correctly. This is unsurprising, given that they saw no emissions information. However, the share who chose correctly was 43.2% in the Absolute condition, 33.4% in the Relative condition and 41.5% in the Trees condition.

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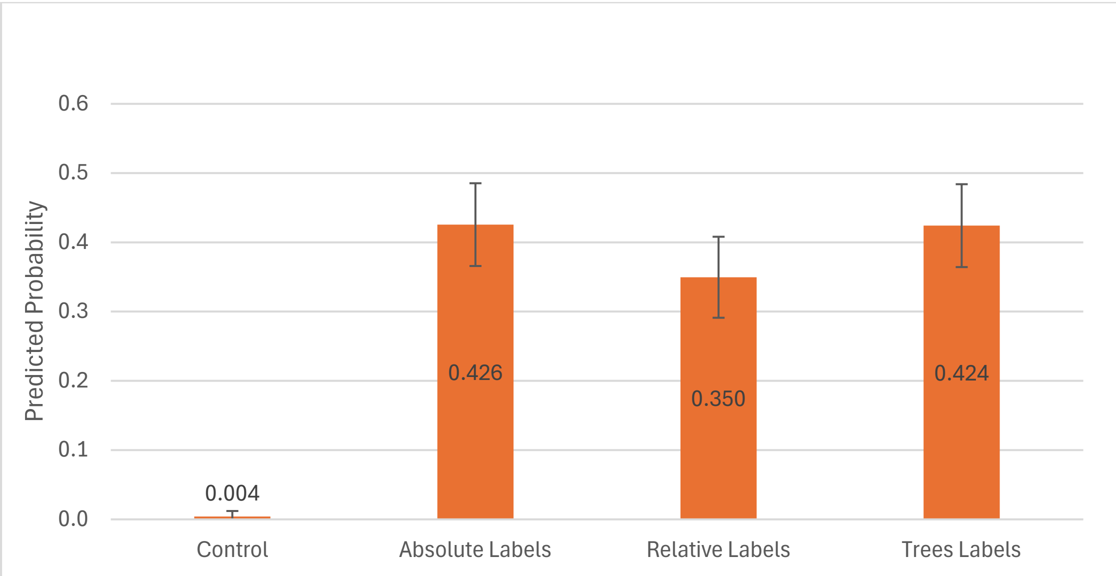
[13] We had pre-registered analysis of whether labels have stronger effects among those who ranked environmental impact as one of their top two factors when booking holidays (possible ranks: 1-5), assuming sufficient cell sizes. Just 64 (6.4%) of the sample meet this criterion, however, and we instead create a binary variable, with one group comprising those who rank environmental impact in their top 4 (31.3%), and the other comprising those who ranked environmental impact last (68.7%). Weighted mean rank, in order of importance, was as follows: Price (M = 1.67, SD = .99), flight time (M = 2.58, SD = 1.13), airline (M = 3.11, SD = 1.13), duration (M = 3.20, SD = 1.20) and environmental impact (M = 4.44, SD = .98).

To quantify the impact of emissions labels on the likelihood of correctly identifying the lowest-emissions flights, we use a binary logistic regression. Column 2 in Table 3-C reports results from a model that regresses whether the participant chose correctly onto emissions label condition with the same participant-level controls as above. In line with the simple proportions, we see a significant, positive effect of all label conditions ($p < .001$ for all), with the largest coefficients on Absolute and Trees labels. Postestimation tests revealed no significant difference between coefficients on Absolute and Relative labels (χ^2 (1) = 3.13, p = .077); Absolute and Trees labels (χ^2 (1) = 0.00, p = .97); or on Relative and Trees labels (χ^2 (1) = 3.01, p = .083).

Figure 3-B presents the marginal effects of each additional emissions label from this model. The Absolute and Trees labels increased the likelihood of correct identification over the Control condition by 42 percentage points, while the Relative labels did so by 35 percentage points.

Figure 3-B Marginal effects of label conditions on probability of correctly identifying lowest-emission flights



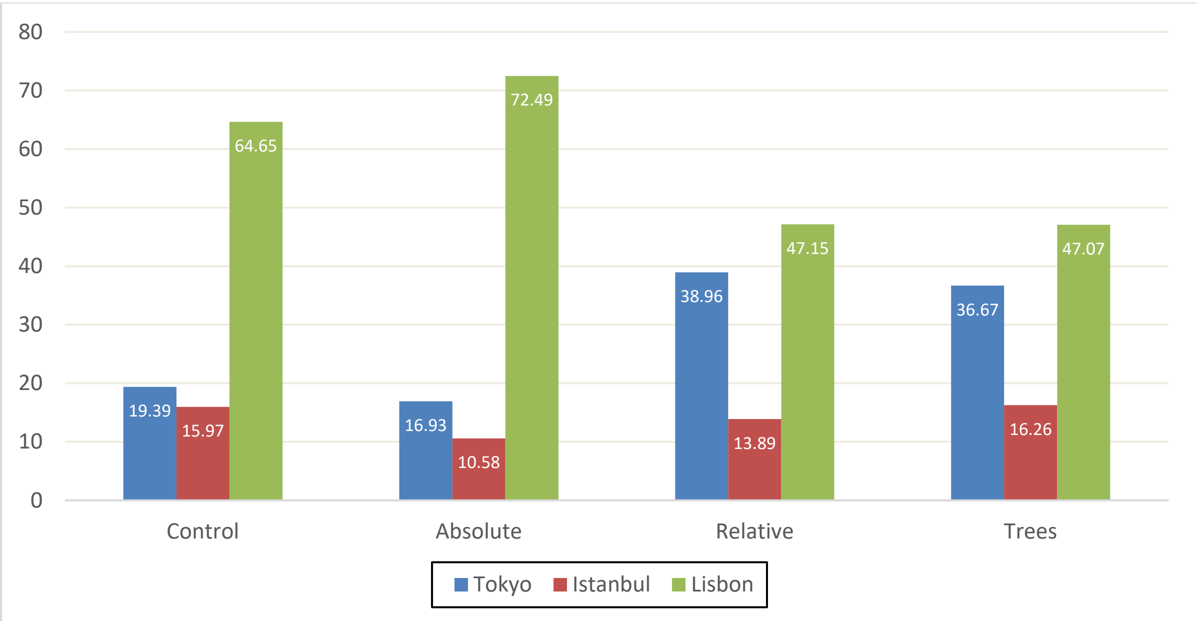
Source: Authors' analysis.
Note: Error bars are 95% confidence intervals.

3.2.1 Exploratory Analyses

To further understand the influence of emissions labels on identification, we examined the destinations chosen across experimental conditions (Figure 3-C). In the Control condition almost two-thirds of participants selected flights to Lisbon (the shortest in duration), with the remainder split between Istanbul and Tokyo. A similar pattern appears in the Absolute labels condition, albeit a greater share (72.3%) choose Lisbon. However, in the Relative and Trees conditions, Lisbon's selection rate drops significantly (~47%) while the share choosing Tokyo more than doubles, reaching approximately 38% Istanbul remains the least likely choice across all conditions (10.6%-16.3%).

Thus, while the overall rate of correct flight identification was comparable across the three emissions-labelling conditions, destination selection patterns reveal differing effects on accuracy within each condition. Specifically, while Relative and Trees labels seem to direct some participants away from shorter flights, those who choose the correct destination are better able to correctly identify lower-emitting flights. Indeed, for participants selecting flights to Lisbon, just 0.42% of the Control condition identified the correct pair, compared to 59.6% with Absolute labels, 70.9% with Relative labels, and 88.3% with Trees labels.

Figure 3-C Destination choice by label condition (%)



Source: Authors' analysis.
Note: Responses are weighted on gender, age, education and urban/rural.

3.2.2 Summary

The findings suggest that, while most participants in the Control condition correctly inferred that the nearest destination (Lisbon) likely offered the lowest-emission, the Absolute labels helped them to identify the specific lowest-emission flights within that destination. The Relative and Trees, however, introduced confusion for some participants, shifting them away from the nearest destination towards flights with the largest relative "savings", which are ultimately more polluting. Conversely, for participants who correctly chose the nearest destination, the more salient Relative and Trees labels enhanced their accuracy in flight selection.

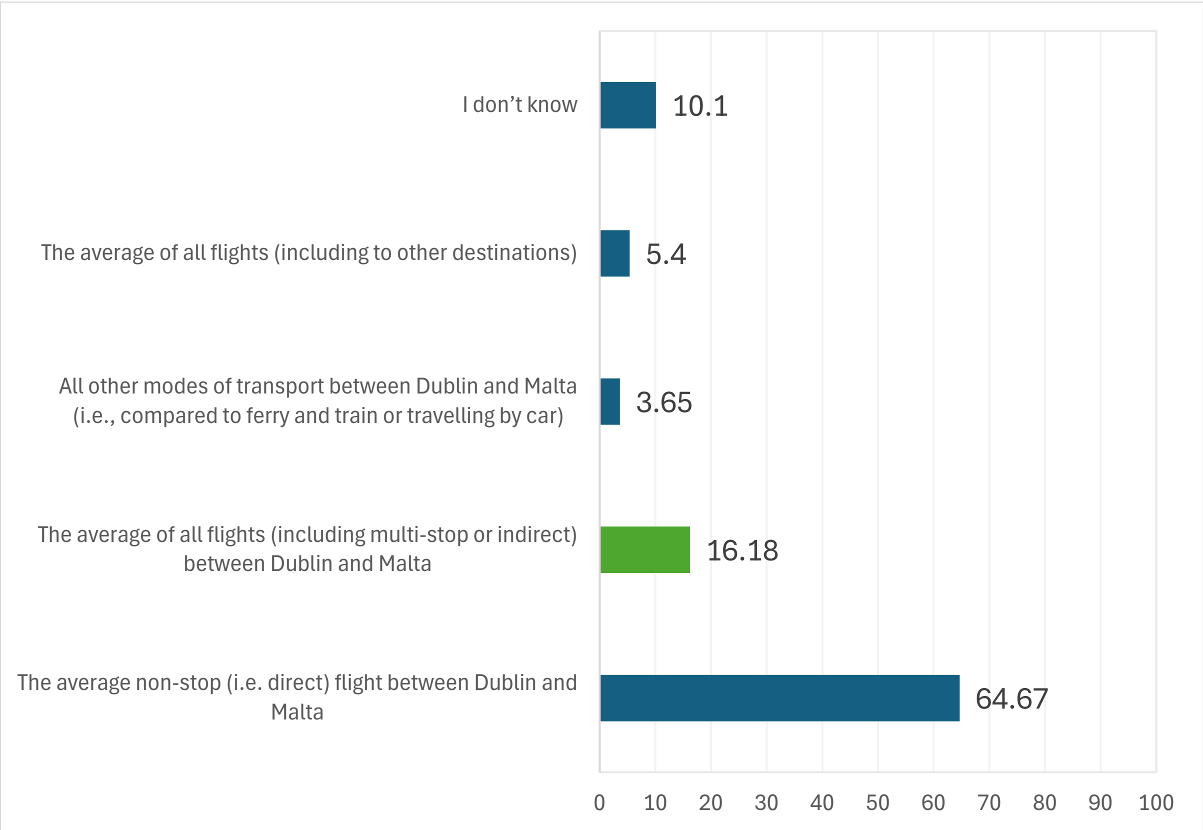
To demonstrate the emissions implications of these effects, we calculated the average emissions of flights chosen in each condition. Participants in the Absolute condition chose flights with the lowest emissions (M = 455.46 kg CO_{2e}, SD = 480.18). In contrast, average emissions were at least 25.7% higher in the other conditions (Control: M =

573.09 kg CO_{2e}, *SD* = 543.10 ; Relative: *M* = 635.67 kg CO_{2e}, *SD* = 516.20; Trees: *M* = 572.54 kg CO_{2e}, *SD* = 435.99). Notably, the Relative and Trees labels led to flight choices with emissions equal to or exceeding those in the Control condition, where no emissions information was provided.

3.3 Do consumers understand emissions labels, as they are currently employed in the market?

Next, we report descriptive statistics on consumer understanding of aviation emissions labels. Despite 30.2% of the sample reporting that they had seen relative emissions labels when booking flights before (61.4% had not, and 8.4% had never searched for a flight online), just 16.2% correctly identified that the calculation is relative to the average on the same route, including multi-stop (Figure 3-D). (Note that the share answering correctly did not significantly differ based on having seen labels before or not (p = .158).) The vast majority (64.7%) expected the calculation to include only flights on the same route with the same number of stops.

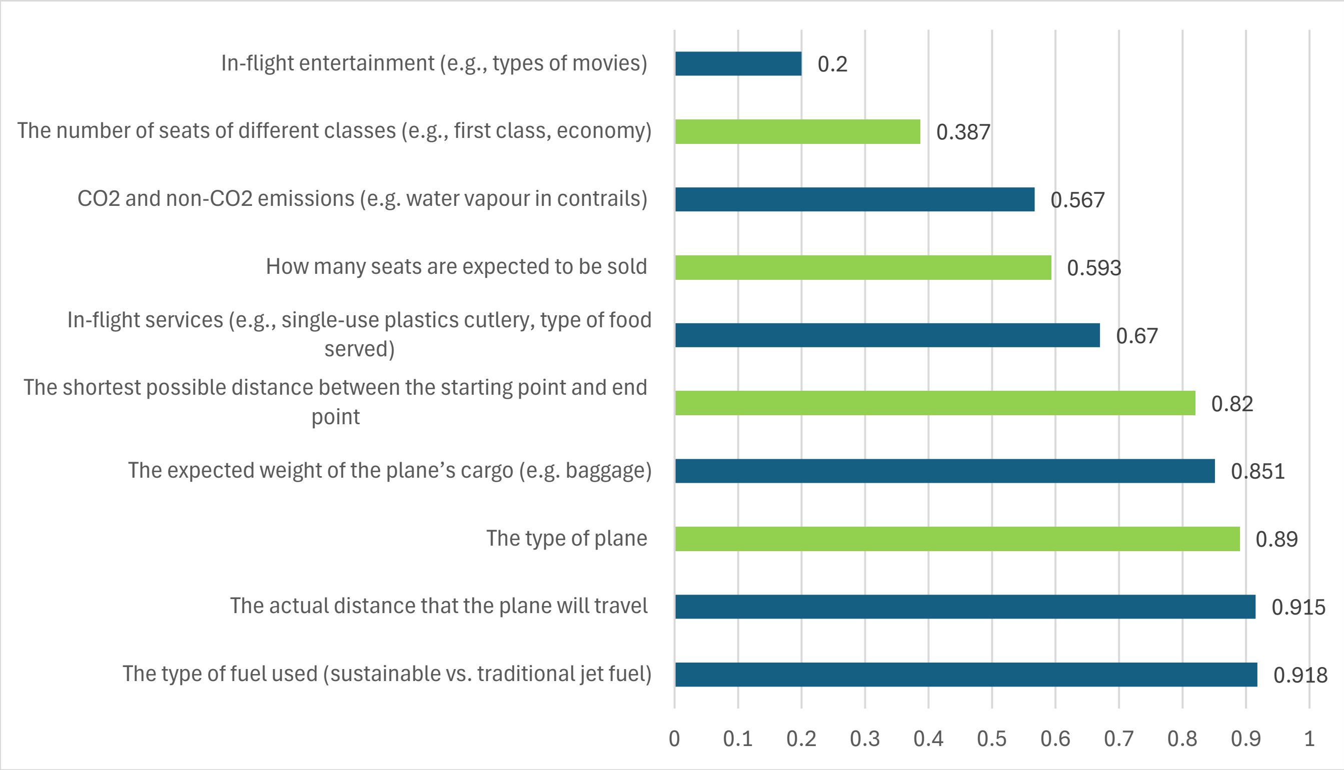
Figure 3-D Share (%) of responses to question on meaning of relative label.



Source: Authors' analysis.
Note: Responses are weighted on gender, age, education and urban/rural.

Understanding of what flight factors are considered when calculating emissions labels is similarly poor. Participants were shown 10 factors, and the mean number of correct answers was significantly worse than chance (M = 3.93, SD = 1.27; t (999) = 26.63, p < .001). Figure 3-E displays the share of participants who expected each factor to be used in calculations, with the actual factors used represented by green bars. Accuracy varies widely: 89% correctly identified plane type as a factor used in calculations, whereas 91.8% incorrectly answered that fuel type is used. Looking just at the factors that are used in calculations, on average, 67.3% of participants correctly identified them as being so, whereas for the factors that are not, on average just 20.4% of participants responded correctly.

Figure 3-E Proportion of participants expecting factors to be used for emission label calculations



Source: Authors' analysis.
Note: Actual Factors are Represented with Green Bars. Responses are weighted on gender, age, education and urban/rural.

3.3.1 Summary

Results imply that consumers do not understand the labels currently employed in the market. They expect relative labels to be calculated in comparison to flights that contain the same number of stops. In other words, for those booking direct flights, they expect any relative emission label to be calculated relative to other direct flights. Consumers also expect far more emission-relevant factors to be incorporated into calculations.

3.4 Other Measures

Finally, we report results from the effects of exposure to emissions labels on secondary measures included in the study. For brevity, we present relevant charts in the Appendix (Figures A-1, -2, -3). The Appendix also reports the findings from regression models that test for label effects on respective outcome variables, with participant characteristic controls.

3.4.1 Responsibility

Using 1-to-7 scales, participants judged that the airline industry is most responsible for reducing the environmental effects of air travel (M = 5.29, SD = 1.74), followed by governments (M = 4.76, SD = 1.79) and then consumers (M = 4.32, SD = 1.72). A repeated measures ANOVA revealed significant differences in these scores, $F(2, 1{,}998) = 144.39$, $p < .001$, with post-hoc pairwise comparisons showing that all three scores differed significantly from one another (ps < .001 for all). Results from regression models show no effect of label exposure on any of the three responsibility scores (Columns 1-3, Table A-6).

3.4.2 Perceptions of Flying

Participants reported that they were mostly not limiting how much they fly because of the environmental impact (M = 3.1, SD = 1.93; 1 being the modal response (31.8%)). Participants who had flown (98.3%) indicated moderate levels of discomfort (M = 3.7, SD = 1.82), unease (M = 3.4, SD = 1.81), and guilt (M = 3.5, SD = 1.90) about flying due to its environmental impact (Figure A-2). There are no effects of label exposure on an index (α = .91, M = 3.51, SD = 1.70) of these perception measures (Column 4, Table A-6),

3.4.3 Environmental Impact Knowledge

Participants ranked seven pro-climate actions by their impact in reducing one's carbon footprint (Figure A-3). The proportions correctly estimating the impact of both aviation options are close to chance (14.3%). We find no effect of label exposure on underestimating the climate impact of avoiding an average-emission flight (Column 5, Table A-6).

3.4.4 Policy Support

Participants indicated their level of support (1 "Not at all" to 7 "Very much") for seven hypothetical policies proposed to reduce the environmental impact of flying. There was high consistency between ratings of policies and thus we generated a policy support index for each participant by averaging their responses (α = .83, M = 4.5, SD = 1.38). Again, we find no significant effect of label exposure (Column 6, Table A-6).

3.5 Summary

Emissions labels appear to have no effect on outcomes beyond flight choice. We find no evidence that they affect judgements of responsibility for mitigating the environmental impact of flying, support for pro-climate aviation policies, perceptions of one's own flying, nor on perceptions of flying's impact (which appears no better than chance).

4. Discussion

The aim of this study was to investigate whether aviation emissions labels, as they appear in the market, encourage consumers to select lower-emissions flights (RQ1), assist consumers in identifying the lowest-emissions flights (RQ2), and are understood by consumers (RQ3).

Taking RQ1 first, our results support prior evidence that emissions labels can lead to lower-emission flight choices within the same route (e.g., Crosby et al., 2024). Importantly, we extend this evidence to show the effect persists even when experimental interest in environmental information is concealed and when the decision-environment mimics the real world, mitigating biases (e.g., social desirability and demand effects) that may have inflated estimates in previous studies (Morales et al., 2017).

However, the effect on emissions was modest: on the long-haul flight from Europe to the US, labels led to a hypothetical reduction of just 36 kg CO_2e. Moreover, labels only influenced choices when emissions were highly salient, through relative comparisons, colouring or explicit markers on the "lowest-emission" flights. Participants did not spontaneously notice or prioritise absolute emissions information.

The incentivised buyer's agent task allowed us to determine whether limited behavioural effects result from *ability* or *motivation*. Here, absolute emissions labels proved sufficient for participants to identify the lowest-emission flights correctly within destinations (RQ2). This indicates that consumers are generally capable of interpreting absolute emissions information when motivated to do so.

Relative and Trees labels, however, did not further improve accuracy. For some participants, these labels seemed to create confusion: larger relative reductions were misinterpreted as indicating lower absolute environmental impact. Relative labels increased the likelihood of choosing longer, more polluting flights. This suggests that while such labels can nudge choices in simplified within-route comparisons, they may produce systematic misinterpretations in more complex decision contexts.

Importantly, exploratory analyses showed that, for consumers who had correctly inferred that flying to nearer destinations generates lower emissions, relative labels and markers on the lowest-emission flight were helpful. The effect sizes generated by those with incorrect priors, however, means this benefit does not compensate for the overall pattern of misunderstanding.

The inference that consumers misunderstand flight emissions labels is strengthened by our findings for RQ3. Fewer than 1-in-6 participants correctly identified the reference point for relative labels. Participants scored worse than chance when asked to identify whether certain factors were included in label emissions calculations. These findings imply that current labels may inadvertently create false impressions of environmental virtue of selected flights, rather than supporting informed decision-making, and are thus consistent with definitions of greenwashing.

Exposure to emissions labels did little to affect other consumer perceptions and attitudes. We found no significant effects on ascribed responsibility for reducing the climate-related impact of aviation, on perceptions of personal flying behaviour, or on knowledge of flying's relative environmental impact. Notably, consumers feel they themselves should bear the least amount of responsibility for reducing aviation-related climate change, attributing greater responsibility to industry and governments. This may reflect overconfidence in technological solutions over demand-side measures (Peeters et al., 2016). Our findings align with evidence that consumers misperceive flying's environmental impact (Wynes et al., 2020; Zheng & Rutherford, 2021), which we further show is not rectified through emissions labelling. Overall, while emissions labels show some promise in nudging flight choices under certain conditions, their broader effects on consumer understanding appear limited.

4.2 Implications

Our findings have nuanced implications. While salient emissions labels can modestly shift choices within routes, their overall effect on emissions is small. Moreover, comprehension of how emissions labels are calculated and what they are compared against is low. Some consumers misinterpret larger relative reductions in emissions as signalling lower absolute environmental impact – a misperception that may inadvertently guide them toward higher-emission destinations. This risk is compounded by well-documented general underestimation of aviation's environmental impact (e.g., Wynes et al., 2020). Together, these findings imply that current labelling strategies risk amplifying rather than correcting misperceptions.

Improving label design may help. Since most consumers assume that the relative comparison is made against flights with the same number of stops, the most straightforward solution may be to align label comparisons with consumer expectations. Correcting misperceptions about what relative reductions actually mean is a harder problem, but arguably a more important one. Genuinely informing consumers about destination-level differences in emissions would require more substantive label redesign. Doing so could also be a particularly effective demand-side lever: long-haul flights (over 4,000 km) account for just 5.1% of flights but 39% of fuel burned, and long-haul seat-kilometres have grown by 163% since the mid-1990s (Dobruszkes et al., 2024).

The buyer's agent task suggests that consumers can identify lower-emission flights when motivated to do so. This raises the possibility of using organisational travel policies to create demand for lower-emission options. Employers or governments could require employees booking work travel to select the lowest-emission flight within routes where rail or rail-and-sail options are not available. Such policies could be particularly influential because they target a high-frequency and lucrative segment of the market, potentially creating incentives for airlines to compete on emissions performance alongside price and convenience. However, any such approach would need to first test for potential licensing effects (Tiefenbeck, Staake, Roth & Sachs, 2013). Organisations may feel justified in flying more than otherwise because they have selected the lowest-emission option available, thereby undermining the environmental benefits.

Our findings also underscore the importance of pricing as a demand-side strategy. Participants were notably price-sensitive, even in a hypothetical choice task, consistent with other evidence (Carroll et al., 2022). This implies that emissions labels alone are unlikely to internalise the environmental costs of aviation. Pricing instruments that target the highest-emitting flights could be achieve greater reductions (Larsson et al., 2019), though political and logistical challenges remain (IATA, 2025) and such instruments may need to be combined with wider policy changes (de Bruin & Yakut, 2022).

4.3 Limitations and Future Research

These implications should be interpreted in light of this study's limitations. Like others, our choice task relied on hypothetical decisions (e.g., Crosby et al., 2024). To mitigate potential hypothetical bias, we made efforts to minimise demand effects by concealing the purpose of the study and creating a realistic decision-environment. Further, we found participants were highly price sensitive, showed preferences for a national carrier, found the interface easy to use and displayed strong interest in the hypothetical holidays, further supporting the task's credibility.

Nevertheless, stronger implications for policy could be obtained through testing incentive-compatible preference elicitations. For example, lottery mechanisms are sometimes employed in labelling studies in other domains, in which participants are randomly selected to receive products they choose (e.g., Timmons et al., 2024). However, applying such methods to real flights raises ethical concerns, given the environmental impact of flights. A more appropriate mechanism might involve analysing platform data on real bookings. For example, we noted when designing materials for this study that the Trees label did not appear consistently on Google Flights - which may reflect ongoing experimentation. Findings from such A/B testing could hold important inferences for informing consumer and climate policy.

4.4 Conclusion

Commercial air travel poses significant challenges for global emissions reduction. It is both inherently difficult to decarbonise and expected to grow as incomes rise in developing nations. Viable demand-side solutions are crucial (IEA, 2021). Our findings suggest that emissions labels, as currently implemented, are unlikely to meaningfully contribute to this effort. The observed behavioural changes and resulting emissions reductions are modest. Additionally, widespread misperceptions of labels mean current market labels may operate in ways consistent with greenwashing, potentially undermining the stated aims of programmes like the EU-level labelling scheme to inform passengers of the impact of their travel choices (EASA, n.d.). More robust interventions, such as pricing mechanisms or polices targeting high-emission flights (or flyers), will likely be required.

References

Alcock, I., White, M. P., Taylor, T., Coldwell, D. F., Gribble, M. O., Evans, K. L., Corner, A., Vardoulakis, S., & Fleming, L. E. (2017). 'Green' on the ground but not in the air: Pro-environmental attitudes are related to household behaviours but not discretionary air travel. *Global environmental change : human and policy dimensions*, *42*, 136–147. https://doi.org/10.1016/j.gloenvcha.2016.11.005

Anwyl-Irvine, A. L., Massonnié, J., Flitton, A., Kirkham, N., & Evershed, J. K. (2020). Gorilla in our midst: An online behavioral experiment builder. *Behavior Research Methods*, *52*, 388-407. https://doi.org/10.3758/s13428-019-01237-x

Árnadóttir, Á., Czepkiewicz, M., & Heinonen, J. (2021). Climate change concern and the desire to travel: How do I justify my flights? *Travel behaviour and Society*, *24*, 282-290. https://doi.org/10.1016/j.tbs.2021.05.002

Baumeister, S. (2017). 'Each flight is different': Carbon emissions of selected flights in three geographical markets. *Transportation Research Part D: Transport and Environment*, *57*, 1-9. https://doi.org/10.1016/j.trd.2017.08.020

Baumeister, S., & Onkila, T. (2017). An eco-label for the airline industry? *Journal of cleaner production*, *142*, 1368-1376. http://dx.doi.org/10.1016/j.jclepro.2016.11.170

Baumeister, S., Zeng, C., & Hoffendahl, A. (2022). The effect of an eco-label on the booking decisions of air passengers. *Transport Policy*, *124*, 175-182. https://doi.org/10.1016/j.tranpol.2020.07.009

Baranzini, A., Van den Bergh, J. C., Carattini, S., Howarth, R. B., Padilla, E., & Roca, J. (2017). Carbon pricing in climate policy: seven reasons, complementary instruments, and political economy considerations. *Wiley Interdisciplinary Reviews: Climate Change*, *8*(4), e462. https://doi.org/10.1002/wcc.462

Beevor, J., & Alexander, K. (2022). *Missed Targets: A brief history of aviation climate targets of the early 21st century.* https://static1.squarespace.com/static/5d30896202a18c0001b49180/t/6273db16dcb32d309eaf126e/1651759897885/Missed-Targets-Report.pdf

Binggeli, U., & Weber, M. (2013). *A short life in long haul for low-cost carriers*. McKinsey & Company, Travel Transport & Logistics. https://www.mckinsey.com/industries/travel/our-insights/a-short-life-in-long-haul-for-low-cost-carriers

Braun, M., Grimme, W., & Oesingmann, K. (2024). Pathway to net zero: Reviewing sustainable aviation fuels, environmental impacts and pricing. *Journal of Air Transport Management*, *117*, 102580. https://doi.org/10.1016/j.jairtraman.2024.102580

Camilleri, A. R., Larrick, R. P., Hossain, S., & Patino-Echeverri, D. (2019). Consumers underestimate the emissions associated with food but are aided by labels. *Nature Climate Change*, *9*(1), 53-58. https://doi.org/10.1038/s41558-018-0354-z

Carlsson, F., Kataria, M., & Lampi, E. (2018). Demand effects in stated preference surveys. *Journal of Environmental Economics and Management*, *90*, 294-302. https://doi.org/10.1016/j.jeem.2018.06.003

Carroll, J., Brazil, W., Howard, M., & Denny, E. (2022). Imperfect emissions information during flight choices and the role of CO_2 labelling. *Renewable and Sustainable Energy Reviews*, *165*, 112508. https://doi.org/10.1016/j.rser.2022.112508

Cocolas, N., Walters, G., Ruhanen, L., & Higham, J. (2020). Consumer attitudes towards flying amidst growing climate concern. *Journal of Sustainable Tourism*, *29*(6), 944–963. https://doi.org/10.1080/09669582.2020.1849234

Crosby, P., Thompson, D., & Best, R. (2024). Air travellers' attitudes towards carbon emissions: evidence from the Google Flights interface. *Journal of Sustainable Tourism*, 1–24. https://doi.org/10.1080/09669582.2024.2412161

Czarnezki, J. J., Pollans, M. J., & Main, S. (2018). Eco-labeling. *Available at SSRN 3230440*. https://dx.doi.org/10.2139/ssrn.3230440

de Bruin, K., & Yakut, A. M. (2022). The impacts of aviation taxation in Ireland. *Case Studies on Transport Policy*, *10*(4), 2218-2228. https://doi.org/10.1016/j.cstp.2022.09.017

Department of Transport. (2026). *Exploring the effect of carbon labels on consumer flight choice. https://assets.publishing.service.gov.uk/media/697b83732ff8d10a830d5d6e/flight-carbon-emissions-eco-labelling-research.pdf*

Dobruszkes, F., Mattioli, G., & Gozzoli, E. (2024). The elephant in the room: Long-haul air services and climate change. *Journal of Transport Geography*, *121*, 104022. https://doi.org/10.1016/j.jtrangeo.2024.104022

European Commission. (2024). *EU introduces Flight Emissions Label for more informed and sustainable travelling.* https://ec.europa.eu/commission/presscorner/detail/en/ip_24_6523

European Commission. (2025). *The EU Flight Emissions Label takes a flight forward with first airlines committing to the scheme.* https://transport.ec.europa.eu/news-events/news/eu-flight-emissions-label-takes-flight-forward-first-airlines-committing-scheme-2025-07-11_en

European Union Aviation Safety Agency. (n.d.) *Environmental Labelling Scheme for Aviation*. https://www.easa.europa.eu/eco/aviation-environmental-label/topics/the-case-for-an-environmental-label-in-aviation

Gössling, S., & Buckley, R. (2016). Carbon labels in tourism: persuasive communication?. *Journal of Cleaner Production*, *111*, 358-369. https://doi.org/10.1016/j.jclepro.2014.08.067

Gössling, S., & Humpe, A. (2020). The global scale, distribution and growth of aviation: Implications for climate change. *Global Environmental Change*, *65*, 102194. https://doi.org/10.1016/j.gloenvcha.2020.102194

Grewe, V., Gangoli Rao, A., Grönstedt, T., Xisto, C., Linke, F., Melkert, J., Middel, J., Ohlenforst, B., Blakey, S., Christie, S., Matthes, S., & Dahlmann, K. (2021). Evaluating the climate impact of aviation emission scenarios towards the Paris agreement including COVID-19 effects. *Nature communications*, *12*(1), 3841. https://doi.org/10.1038/s41467-021-24091-y

Guadagnoli, E., & Velicer, W. F. (1988). Relation of sample size to the stability of component patterns. *Psychological bulletin*, *103*(2), 265–275. https://doi.org/10.1037/0033-2909.103.2.265

Hille, S. L., Geiger, C., Loock, M., & Peloza, J. (2018). Best in Class or Simply the Best? The Impact of Absolute versus Relative Ecolabeling Approaches. *Journal of Public Policy & Marketing*, *37*(1), 5-22. https://doi.org/10.1509/jppm.15.030

Hu, Y. J., Yang, L., Cui, H., Wang, H., Li, C., & Tang, B. J. (2022). Strategies to mitigate carbon emissions for sustainable aviation: A critical review from a life-cycle perspective. *Sustainable Production and Consumption*, *33*, 788-808. https://doi.org/10.1016/j.spc.2022.08.009

Iken, N., & Aguessy, F. X. (2022). Calculating the greenhouse gas emissions of flights: a comparative study of existing protocols. *IOP Conference Series: Earth and Environmental Science*, *952*(1), 1-10. https://doi.org/10.1088/1755-1315/952/1/012002

International Air Transport Association. (2021). *Net-Zero Carbon Emissions by 2050*. https://www.iata.org/en/pressroom/pressroom-archive/2021-releases/2021-10-04-03/

International Air Transport Association. (2021). *Taxes and addressing CO2 emissions. Fact Sheet.*. https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet-taxes-environment/

International Energy Agency. (2021). *Do we need to change our behaviour to reach net zero by 2050?* https://www.iea.org/articles/do-we-need-to-change-our-behaviour-to-reach-net-zero-by-2050

International Energy Agency. (2023). *Aviation*. https://www.iea.org/energy-system/transport/aviation#tracking

Jardine, C. N. (2009*). Calculating the carbon dioxide emissions of flights*. Final report, Environmental Change Insitute, Oxford University Centre for the Environment. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=2a9fba810293fe675d61b48c2be10db0179b6130

Larsson, J., Elofsson, A., Sterner, T., & Åkerman, J. (2019). International and national climate policies for aviation: a review. *Climate Policy*, *19*(6), 787-799. https://doi.org/10.1080/14693062.2018.1562871

Lee, D. S., Fahey, D. W., Skowron, A., Allen, M. R., Burkhardt, U., Chen, Q., ... & Wilcox, L. J. (2021). The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. *Atmospheric environment*, *244*, 117834. https://doi.org/10.1016/j.atmosenv.2020.117834

Lewis, K. C., Brown, N. L., Goldner, W. R., Haq, Z., Hoard, S., Holladay, J. E., & Wolcott, M. P. (2022). The motivations for and the value proposition of sustainable aviation fuels. *Frontiers in energy research*, *10*, 1005493. https://doi.org/10.3389/fenrg.2022.1005493

Majer, J. M., Henscher, H. A., Reuber, P., Fischer-Kreer, D., & Fischer, D. (2022). The effects of visual sustainability labels on consumer perception and behavior: A systematic review of the empirical literature. *Sustainable Production and Consumption*, *33*, 1-14. https://doi.org/10.1016/j.spc.2022.06.012

Morales, A. C., Amir, O., & Lee, L. (2017). Keeping it real in experimental research—Understanding when, where, and how to enhance realism and measure consumer behavior. *Journal of Consumer Research*, *44*(2), 465-476. https://doi.org/10.1093/jcr/ucx048

Muller, L., Lacroix, A., & Ruffieux, B. (2019). Environmental labelling and consumption changes: a food choice experiment. *Environmental and resource economics*, *73*, 871-897. https://doi.org/10.1007/s10640-019-00328-9

Osman, M., & Thornton, K. (2019). Traffic light labelling of meals to promote sustainable consumption and healthy eating. *Appetite*, *138*, 60–71. https://doi.org/10.1016/j.appet.2019.03.015

Oswald, L., & Ernst, A. (2020). Flying in the Face of Climate Change: Quantitative psychological approach examining the social drivers of individual air travel. *Journal of Sustainable Tourism*, *29*(1), 68–86. https://doi.org/10.1080/09669582.2020.1812616

Peeters, P., Higham, J., Kutzner, D., Cohen, S., & Gössling, S. (2016). Are technology myths stalling aviation climate policy? *Transportation Research Part D: Transport and Environment*, *44*, 30-42. http://dx.doi.org/10.1016/j.trd.2016.02.004

Qasem, N. A., Mourad, A., Abderrahmane, A., Said, Z., Younis, O., Guedri, K., & Kolsi, L. (2024). A recent review of aviation fuels and sustainable aviation fuels. *Journal of Thermal Analysis and Calorimetry*, *149*(10), 4287-4312. https://doi.org/10.1007/s10973-024-13027-5

Rihn, A., Wei, X., & Khachatryan, H. (2019). Text vs. logo: Does eco-label format influence consumers' visual attention and willingness-to-pay for fruit plants? An experimental auction approach. *Journal of Behavioral and Experimental Economics*, *82*, 101452. https://doi.org/10.1016/j.socec.2019.101452

Roa-Goyes, S., & Pickering, G. J. (2024). Promoting a sustainable diet through carbon labeling of food: Insights from young consumers in the Americas. *Sustainable Production and Consumption*, *44*, 179-187. https://doi.org/10.1016/j.spc.2023.12.013

Sacchi, R., Becattini, V., Gabrielli, P., Cox, B., Dirnaichner, A., Bauer, C., & Mazzotti, M. (2023). How to make climate-neutral aviation fly. *Nature Communications*, *14*(1), 3989. https://doi.org/10.1038/s41467-023-39749-y

Sanguinetti, A., & Amenta, N. (2022). Nudging Consumers Toward Greener Air Travel by Adding Carbon to the Equation in Online Flight Search. *Transportation Research Record*, *2676*(2), 788-799. https://doi.org/10.1177/03611981211046924

Schmidt, F., Sidders, A., Czepkiewicz, M., Árnadóttir, Á., & Heinonen, J. (2023). 'I am not a typical flyer': narratives about the justified or excessive character of international flights in a highly mobile society. *Journal of Sustainable Tourism*, *32*(6), 1217–1240. https://doi.org/10.1080/09669582.2023.2214344

Song, H., Wu, H., & Zhang, H. (2024). Can nudging affect tourists' low-carbon footprint travel choices?. *International Journal of Contemporary Hospitality Management*, *36*(5), 1534-1556. http://dx.doi.org/10.1108/IJCHM-09-2022-1175

Stadelmann, M., & Schubert, R. (2018). How do different designs of energy labels influence purchases of household appliances? A field study in Switzerland. *Ecological economics*, *144*, 112-123. https://doi.org/10.1016/j.ecolecon.2017.07.031

Sun, X., Baumeister, S., Martin-Domingo, L., Douglas, I., Efthymiou, M., Hansen, M., ... & Wandelt, S. (2025). From hero to zero: Barriers to achieving IATA's 2050 sustainability targets. *Transport Policy*, 103830. https://doi.org/10.1016/j.tranpol.2025.103830

Taufique, K. M., Nielsen, K. S., Dietz, T., Shwom, R., Stern, P. C., & Vandenbergh, M. P. (2022). Revisiting the promise of carbon labelling. *Nature Climate Change*, *12*(2), 132-140. https://doi.org/10.1038/s41558-021-01271-8

Thøgersen, J., & Nielsen, K. S. (2016). A better carbon footprint label. *Journal of Cleaner Production*, *125*, 86-94. https://doi.org/10.1016/j.jclepro.2016.03.098

Tiefenbeck, V., Staake, T., Roth, K., & Sachs, O. (2013). For better or for worse? Empirical evidence of moral licensing in a behavioral energy conservation campaign. *Energy Policy*, *57*, 160-171. https://doi.org/10.1016/j.enpol.2013.01.021

Timmons, S., and Lunn, P. (2022). Public understanding of climate change and support for mitigation. *ESRI Research Series 135*. https://doi.org/10.26504/rs135

Timmons, S., Shier, A. J., Poluektova, O., & Lunn, P. D. (2025). Fashion, fast or slow? Effects of binary and graded eco-labels on sustainable clothing purchases. *Journal of Cleaner Production*, 146575. https://doi.org/10.1016/j.jclepro.2025.146575

Timmons, S., Whelan, A., & Kelly, C. (2024). An experimental test of a greenwashing inoculation intervention in Ireland: Effects of 'pre-bunking'on identification, consumer trust and purchase intentions. *Sustainable Production and Consumption*, *47*, 318-328. https://doi.org/10.1016/j.spc.2024.03.030

Wynes, S., Zhao, J., & Donner, S. D. (2020). How well do people understand the climate impact of individual actions? *Climatic Change*, *162*, 1521-1534. https://doi.org/10.1007/s10584-020-02811-5

Yokessa, M., & Marette, S. (2019). A review of eco-labels and their economic impact. *International Review of Environmental and Resource Economics*, *13*(1-2), 119-163. https://doi.org/10.1561/101.00000107

Zhang, S., & Ursu, R. (2025). Carbon Labels and Consumer Flight Choices. http://dx.doi.org/10.2139/ssrn.5732982

Zheng, X. S., & Rutherford, D. (2021). Variation in aviation emissions by itinerary: The case for emissions disclosure. *ICCT Working Paper 2021*,(27). https://theicct.org/sites/default/files/publications/variation-aviation-emissions-itinerary-jul2021-1.pdf

Appendix

Table A-1 Accommodation and activity details from holiday booking task

	Hotels			Activities		
Destination	Name	Rating	Price €	Name	Description (shortened)	Price €
Málaga	Hotel Valeria	4 stars. Rated "Superb – 9.0"	1808	The Genuine MálagaWine & Tapas Tour	Guided walking tour with wine and tapas.	75
	Hotel Málaga Vibes	3 stars. Rated "Fabulous – 8.8"	1356	Full Day Tour to Caminito del Rey from Málaga	Day trip to a canyon with a guided tour along the elevated route.	56
	Ilunion Málaga	4 stars. Rated "Fabulous – 8.6"	1679	Málaga Paella Cooking Class	Group trip to food market to buy ingredients, followed by a paella and gazpacho cooking class.	64
	Salles Hotel Málaga Centro	4 stars. Rated "Very Good – 8.4"	1551	Málaga 3-hour Historical Segway Adventure	Guided Segway tour of Málaga's most famous historical sites.	75
New York City	Aliz Hotel Times Square	4 stars. Rated "Very Good – 8.0"	2312	New York in One Day Guided Sightseeing Tour	Guided tour of New York's main attractions by bus and ferry.	93
	Artezen Hotel	4 stars. Rated "Superb – 9.1"	2413	Skip-the-Line Metropolitan Museum of Art - Exclusive Guided Tour	Personalised tour of New York's most famous museum, guided by an art historian.	124
	U Hotel Fifth Avenue	3 stars. Rated "Good – 7.9"	2008	Guided Food Tour of Chinatown and Little Italy	Guided eating tour of New York's most famous food neighbourhoods.	118

	The New Yorker by Wyndham	4 stars. Rated "Good – 7.7"	2211	Manhattan Architecture Yacht Cruise	Tour of Manhattan coastline in a period-style yacht, guided by a trained architect.	109
Santorini	Sea View Beach Hotel	4 stars. Rated "Fabulous – 8.9"	1442	Classic Catamaran Cruise with Meal, Drinks and Transfers	Small group catamaran tour of Santorini's coast with a buffet meal, wine and snorkelling.	115
	Smaragdi Hotel	3 stars. Rated "Superb – 9.3"	918	Santorini Wine Adventure with 12 Wine Tastings, Tapas and Sunset	Guided half-day tour of three vineyards complete with tasting and tapas.	120
	Pantheon Hotel	4 stars. Rated "Fabulous – 8.9"	1312	Santorini ATV-Quad Experience Tour	Small-group tour of Santorini's main attractions and beaches by all-terrain-vehicle.	130
	Marillia Hotel	4 stars. Rated "Superb – 9.2"	1572	Scuba Diving Experience in Santorini	Exploration of Santorini's volcanic reef with beginner scuba experience (program designed by Scuba Schools International).	90

Source: Authors' Analysis

Table A-2 Flight airlines, time/duration and emissions from holiday booking task

		Outbound		Return	
Destination	Airlines	Time/Duration	Emissions kg CO_2e	Time/Duration	Emissions kg CO_2e
Málaga	Ryanair	12:30-16:30 / 3 hours	122	12:00-14:05 / 3 hours 5 mins	166
	Air Europa	11:45-15:45 / 3 hours	151	18:25-20:30 / 3 hours 5 mins	122
	Iberia	16:15-20:15 / 3 hours	155	23:50-01:55^{+1} / 3 hours 5 mins	155
	Vueling	19:00-23:05 / 3 hours 5 mins	159	22:05-00:10^{+1} / 3 hours 5 mins	151

	Eurowings	15:10-19:15 / 3 hours 5 mins	175	12:40-14:45 / 3 hours 5 mins	196
	Aer Lingus	07:20-11:30 / 3 hours 10 mins	191	06:20-08:25 / 3 hours 5 mins	150
New York City	Aer Lingus	11:05-13:29 / 7 hours 24 mins	320	16:55-04:25^{+1} / 6 hours 30 mins	321
	American Airlines	16:45-19:20 / 7 hours 35 mins	323	21:05-08:50^{+1} / 6 hours 45 mins	342
	Delta	10:00-12:40 / 7 hours 40 mins	326	21:35-09:15^{+1} / 6 hours 40 mins	347
	KLM	20:05-22:45 / 7 hours 40 mins	370	12:20-23:50 / 6 hours 30 mins	355
	United Airlines	23:30-02:10^{+1} / 7 hours 40 mins	386	09:15-20:55 / 6 hours 40 mins	409
	JetBlue	10:45-13:28 / 7 hours 43 mins	527	20:25-08:20^{+1} / 6 hours 55 mins	527
Santorini	Ryanair	06:15-12:35 / 4 hours 20 mins	232	13:15-15:55 / 4 hours 40 mins	232
	EasyJet	17:15-23:45 35 / 4 hours 30 mins	237	21:40-00:15^{+1} / 4 hours 35 mins	237
	Wizz Air	21:30-03:50^{+1} / 4 hours 20 mins	243	10:25-13:05 / 4 hours 40 mins	240
	Aegean	10:30-16:50 / 4 hours 20 mins	249	20:05-22:45 / 4 hours 40 mins	249
	Lufthansa	12:10-18:45 / 4 hours 35 mins	252	17:20-20:00 / 4 hours 40 mins	250
	Aer Lingus	14:15-20:45 / 4 hours 30 mins	262	06:20-09:05 / 4 hours 40 mins	252

Source: Authors' Analysis

Note: The same airlines were used for outbound/return flights for each destination, and were randomised across time/duration and emissions combinations.

Table A-3 Median emissions for each route across tasks, used for labelling from holiday booking task

	<u>**Outbound**</u>	<u>**Return**</u>
Task/Destination	Median Route Emissions kg CO_2e	Median Route Emissions kg CO_2e
<u>**Holiday Booking**</u>		
Málaga	166	169
New York City	450	435
Santorini	313	299
<u>**Buyer's Agent**</u>		
Tokyo	898	928

Istanbul	193	193
Lisbon	133	136

Source: Authors' Analysis
Note: Information taken from Google Flights.

Table A-4 Airline choice across destinations and directions in holiday booking task

Airline	Outbound %	Return %
Málaga		
Aer Lingus	42.86	39.24
Ryanair	21.35	23.85
Eurowings	12.29	13.27
Iberia	8.42	7.66
Air Europa	7.87	7.32
Vueling	7.21	8.66
New York City		
Aer Lingus	48.99	51.04
United Airlines	15.07	13.61
American Airlines	9.75	9.40
KLM	10.56	9.53
Delta	9.26	8.78
JetBlue	6.37	7.64
Santorini		
Aer Lingus	41.73	42.14
Ryanair	19.36	19.76
Lufthansa	17.85	15.78
Aegean	7.79	8.65
Wizz Air	6.16	5.56
easyJet	7.10	8.1

Source: Authors' Analysis
Note: Responses are weighted on gender, age, education and urban/rural.

Table A-5 Mixed effects ordinal logistic regressions predicting whether or not a flight was chosen with exclusions for robustness checks (1-3) and label x select sociodemographic interactions (4-7)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Exc. Correct Purpose	Exc. Misidentified Label	Exc. Never Shopped Online for Flights	Gender	Age	Own Flying Activity	Environmental Importance – Personal Flight Bookings
Label							

Condition (*Ref:* No Labels)							
Absolute Labels	0.03	-0.08	0.06	0.03	-0.04	0.10	-0.05
	[-0.11 - 0.16]	[-0.26 - 0.10]	[-0.09 - 0.20]	[-0.18 - 0.23]	[-0.33 - 0.24]	[-0.20 - 0.40]	[-0.21 - 0.11]
	p = .712	*p* = .403	*p* = .428	*p* = .800	*p* = .767	*p* = .523	*p* = .531
Relative Labels	-0.15*	-0.30**	-0.17*	-0.15	-0.12	-0.15	-0.10
	[-0.29 - - 0.01]	[-0.48 - - 0.12]	[-0.31 - - 0.02]	[-0.35 - 0.05]	[-0.39 - 0.16]	[-0.46 - 0.16]	[-0.26 - 0.06]
	p = .037	*p* = .001	*p* = .022	*p* = .148	*p* = .397	*p* = .332	*p* = .229
Trees Labels	-0.27***	-0.43***	-0.26***	-0.20	-0.23	-0.43**	-0.15
	[-0.41 - - 0.13]	[-0.61 - - 0.25]	[-0.40 - - 0.11]	[-0.41 - 0.01]	[-0.52 - 0.05]	[-0.73 - -0.13]	[-0.32 - 0.02]
	p < *.001*	*p* < *.001*	*p* < *.001*	*p* = .064	*p* = .113	*p* = .005	*p* = .087
Label Condition X Gender (*Ref:* No Labels X Male)							
Absolute Labels X Female				-0.03			
				[-0.30 - 0.25]			
				p = .860			
Relative Labels X Female				-0.04			

				[-0.32 - 0.24]			
				p = .795			
Trees Labels X Female				-0.21			
				[-0.49 - 0.08]			
				p = .154			
Label Conditions X Age (*Ref:* No Labels X 60+)							
Absolute Labels X <40					0.20		
					[-0.16 - 0.56]		
					p = .283		
Absolute Labels X 40-59					-0.06		
					[-0.42 - 0.30]		
					p = .752		
Relative Labels X <40					0.11		
					[-0.25 - 0.47]		
					p = .544		
Relative Labels X 40-					-0.25		

59							
					[-0.61 - 0.11]		
					p = .166		
Trees Labels X <40					-0.14		
					[-0.51 - 0.22]		
					p = .440		
Trees Labels X 40-59					-0.07		
					[-0.43 - 0.29]		
					p = .689		
Label Conditions X Own Flying Activity (*Ref:* No Labels X No Flights in Previous 12 Months)							
Absolute Labels X 1-4 Flights						-0.19	
						[-0.54 - 0.16]	
						p = .287	
Absolute Labels X 5+ Flights						0.17	
						[-0.28 - 0.62]	
						p =	

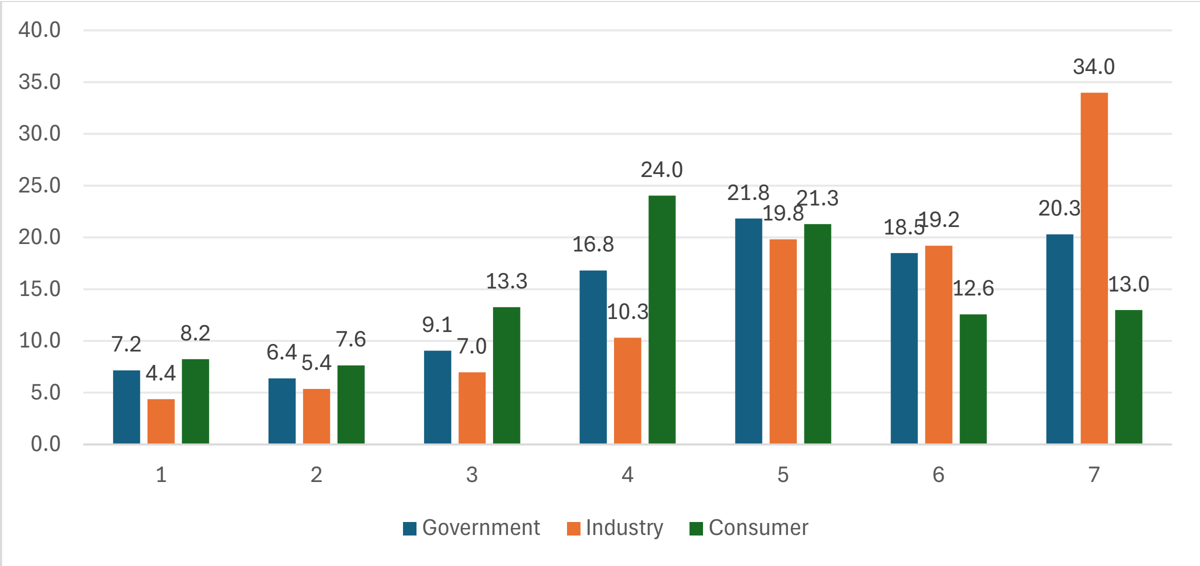
						.464	
Relative Labels X 1-4 Flights						-0.10	
						[-0.45 - 0.26]	
						p = .589	
Relative Labels X 5+ Flights						0.24	
						[-0.22 - 0.69]	
						p = .314	
Trees Labels X 1-4 Flights						0.09	
						[-0.26 - 0.43]	
						p = .623	
Trees Labels X 5+ Flights						0.39	
						[-0.07 - 0.86]	
						p = .096	
Label Conditions X Flying Environmental Concern (*Ref*: No Labels X Low Concern)							
Absolute Labels X High Concern							0.22
							[-0.08 - 0.52]
							p = .158
Relative Labels X High Concern							-0.24
							[-0.54 -

							0.06] *p* = .119
Trees Labels X High Concern							-0.41**
							[-0.71 - -0.12] *p* = .006
Flight Characteristic Controls[a]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Participant Characteristic Controls[b]	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,416	22,356	33,192	6,000	6,000	6,000	6,000
Number of groups	956	621	922	1,000	1,000	1,000	1,000

*** p<0.001, ** p<0.01, * p<0.05

Source: Authors' analysis.
Note: 95% Confidence intervals in square brackets
a Controlling for price airline, destination and direction (outbound or return)
b Controlling for age, gender, degree, household income, region, urban/rural, own flying activity, previous use of online flight booking (save for model 3 wherein not having booked flights online was n exclusion condition) sites and importance of environmental impact in personal flight choice.

Figure A-1 Distribution (%) of scores for ascribed responsibility of each group for reducing environmental impact of air travel



Source: Authors' analysis.
Note: Responses are weighted on gender, age, education and urban/rural.

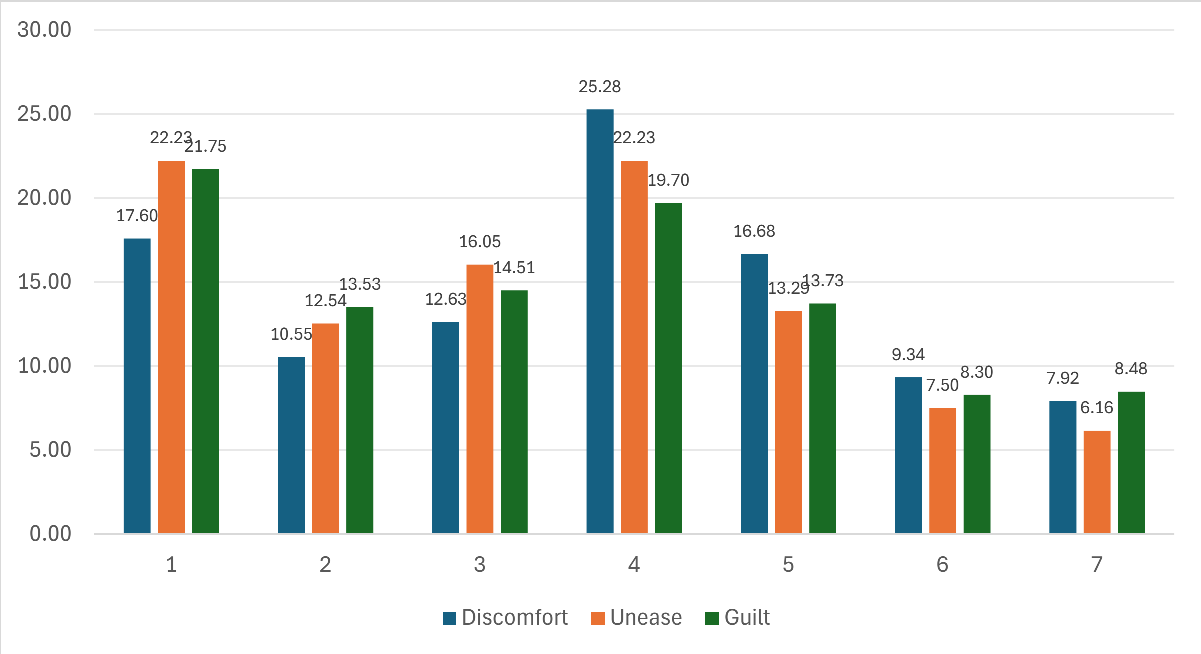
Table A-6 OLS/LPM regressions predicting additional measures

	(1) Responsibility - Government	(2) Responsibility - Industry	(3) Responsibility - Consumer	(4) Own Flying Index	(5) Underestimate Flying's Impact	(6) Policy Support Index
Label Condition (*Ref:* No Labels)						
Absolute Labels	-0.00	0.02	-0.13	-0.13	-0.03	-0.21
	[-0.31 - 0.31]	[-0.28 - 0.32]	[-0.43 - 0.17]	[-0.43 - 0.16]	[-0.11 - 0.06]	[-0.45 - 0.03]
	p = 1.000	*p* = .889	*p* = .390	*p* = .378	*p* = .546	*p* = .081
Relative Labels	0.03	0.22	0.05	-0.16	-0.01	0.10
	[-0.28 - 0.34]	[-0.08 - 0.53]	[-0.25 - 0.35]	[-0.46 - 0.14]	[-0.10 - 0.08]	[-0.14 - 0.33]
	p = .849	*p* = .150	*p* = .744	*p* = .286	*p* = .824	*p* = .418
Trees Labels	0.11	0.24	0.03	-0.15	-0.05	-0.04
	[-0.20 - 0.42]	[-0.06 - 0.54]	[-0.27 - 0.33]	[-0.44 - 0.15]	[-0.14 - 0.04]	[-0.28 - 0.19]
	p = .488	*p* = .122	*p* = .846	*p* = .328	*p* = .280	*p* = .733
Participant Characteristic Controls [a]	Yes	Yes	Yes	Yes	Yes	Yes
Policy Frame Control	NA	NA	NA	NA	NA	Yes
Constant	4.95***	5.41***	3.99***	3.90***	0.64***	4.62***

	[4.44 - 5.46]	[4.91 - 5.91]	[3.50 - 4.49]	[3.40 - 4.39]	[0.49 - 0.78]	[4.22 - 5.02]
	p < .001	*p* < .001	*p* < .001	*p* < .001	*p* < .001	*p* < .001
Observations	1,000	1,000	1,000	983	1,000	1,000
R-squared	0.04	0.04	0.04	0.04	0.02	0.05
*** p<0.001, ** p<0.01, * p<0.05						

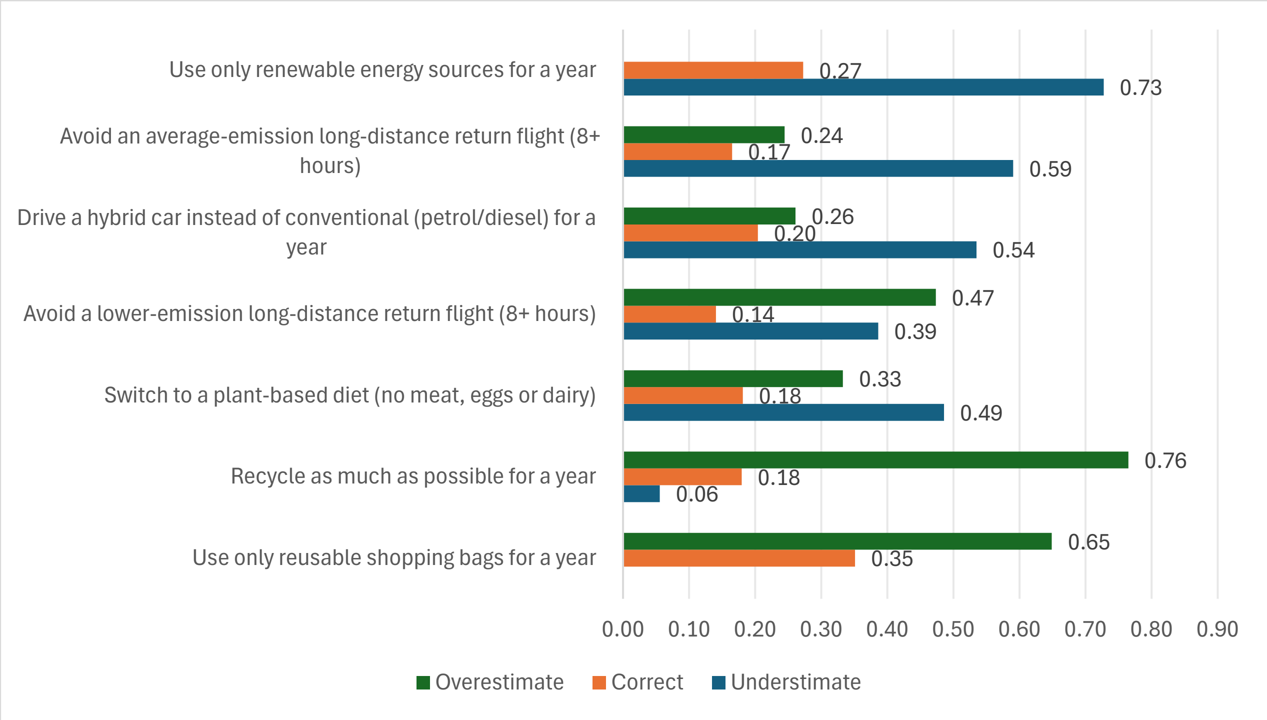
Source: Authors' analysis.
Note: 95% Confidence intervals in square brackets
a Controlling for age, gender, degree, household income, region, urban/rural, own flying activity, previous use of online flight booking

Figure A-2 Distribution (%) of scores for perceptions of own flying



Source: Authors' analysis.
Note: Responses are weighted on gender, age, education and urban/rural.

Figure A-3 Share of answer type for each pro-climate action rank



Source: Authors' analysis.
Note: Responses are weighted on gender, age, education and urban/rural.