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THE IMPACT OF DEMOGRAPHIC FACTORS ON FLIGHT SHAME

RESEARCH ON A NEW PHENOMENON

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ABSTRACT

This study aims to gain new insights into the phenomenon of flight shame ('flygskam'), a new phenomenon spreading among air passengers who are more aware of the climate consequences of their flying behaviour. In particular, the research shows new insights into demographic characteristics, with special attention to age. After revising the still scarce literature on the topic, an online questionnaire was implemented. The final sample consists of 228 individuals. The analytical framework was based on descriptive statistics and cluster analysis (k-means). The results showed that older individuals experienced more flight shame than younger ones. In addition, these respondents with higher awareness had a higher level of education and were more environmentally active. Income and gender were found not statistically significant, explaining awareness differences. The final finding was the correlation between 'green' individuals and seeking alternatives. This study contributes to understanding flight shame by providing a new perspective on individual characteristics.

***Keywords*:** Flight shame; flygskam; demographics; climate change; sustainability

PLAGIARISM STATEMENT

The content of this document is the sole responsibility of the author, who declares that he/she has not committed plagiarism and that all references to the work of other authors have been correctly cited in the text.

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Julia Dekker

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LIST OF ABBREVIATIONS

CO2	Carbon dioxide
LCC	Low-Cost Carrier
SGDs	Sustainable Development Goals

1. INTRODUCTION

Emerging research shows that concerns about climate are increasing among individuals (Gößling et al., 2019). In 2018, these concerns were the subject of a public debate in Sweden after a well-known journalist wrote an article about his flight behaviour. The journalist wrote about his awareness of the impact of flying on the climate and, therefore, his decision to stop flying. However, this was after other public figures, such as singer Malena Ernman and her daughter, climate activist Greta Thunberg, stopped flying in 2016 (The Guardian, 2020). That well-known people stopped flying sparked a movement in Sweden. As of 2019, this had become a public debate known as 'flygskam', literally translated as flight shame. In recent years, flight shame has become more widespread. *Figure 1* presents the increasing research interest in this phenomenon within two mainstream repositories.

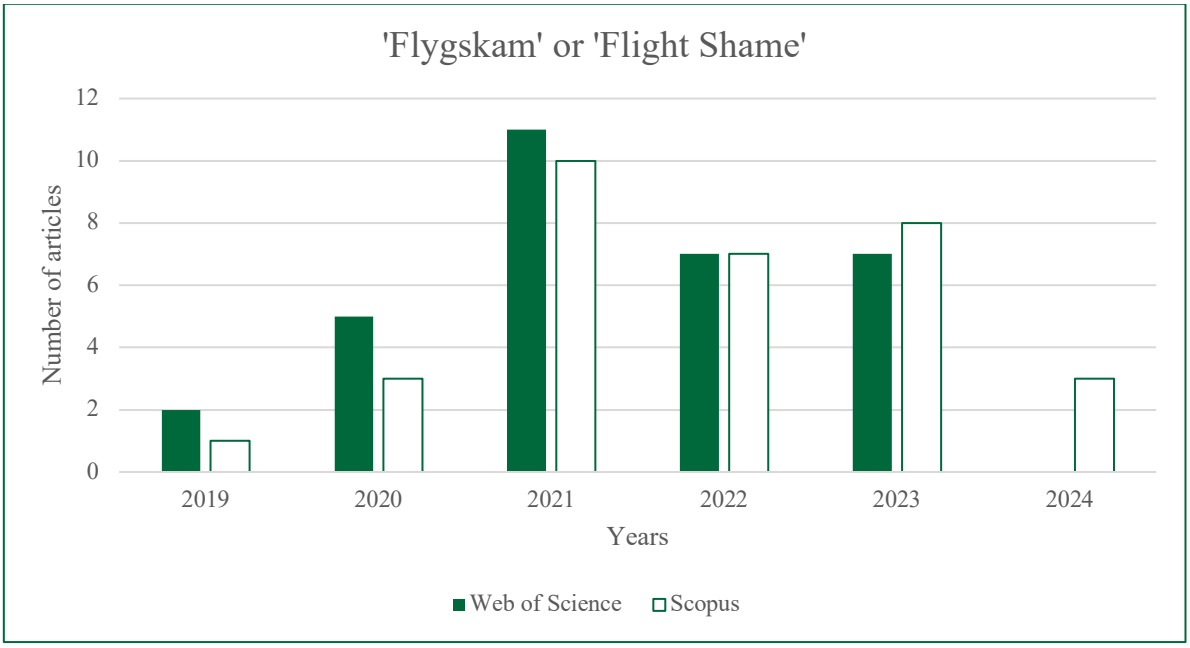

Figure 1. Search strings 'Flygskam' or 'Flight Shame'

Source: Web of Science and Scopus. Own elaboration

Flight shame is associated with several feelings in these studies. According to Wolrath Söderberg and Wormbs (2019), guilt is subjected to this concept. Moreover, Mkono (2020) relates flight shame to a general feeling of eco-guilt. Shame is also a feeling that arises with flight shame (Henley, 2021). According to Chiambaretto et al. (2021), flight shame is due to a lack of knowledge about the actual impact of air travel on the climate. In addition, it also depends on the distance flown and the purpose of the trip (Gößling et al., 2019; Schmidt et al., 2023). Finally, flight shame is generally related to how sustainable people see themselves (Randles & Mander, 2009). In sustainable attitudes and behaviours, research has been done on the effects of demographic characteristics (Morrison & Beer, 2016; Hondroyiannis et al., 2024 and Jagers, 2009). In the research area of flight shame, insufficient research has been done to establish this correlation. This study provides a demographic profile of the factors that influence and contribute to flight shame, with a particular focus on age.

The past few years have changed people's awareness and behaviour and turned them into sustainable actions. Examples include recycling, more vegetarians and vegans, and a rising focus on renewable energy (Wolrath Söderberg & Wormbs, 2019). All these actions help to mitigate the changing climate. That is incredibly necessary because climate change is happening much faster than people can keep up with their sustainable actions. Excessive CO2 emissions led to a rise in the temperature on Earth. The warming causes rising sea levels and climate change (Ministerie van Algemene Zaken, 2024). Over the past decades, the Earth's temperature has increased by 0.2°C. If the temperature rises by over two °C, public health and nature will be affected by severe negative consequences. The international community has set the limit at a maximum increase of 1.5°C to limit global warming to some extent (Europese Commissie, n.d.).

Therefore, the growth of the aviation industry has become a rising concern among governments, policymakers, and air travellers. Nowadays, the aviation industry is accountable for 2-3% of the total CO2 emissions (Ministerie van Algemene Zaken, 2024). The predicted growth curve of the aviation industry has far exceeded that of the last decade. The expectation is that by 2050, CO2 emissions will triple (Graver et al., 2020). One of the main drivers is the tourism sector, with an accountability of 0,5% of total emissions (Debbage & Debbage, 2019). In that vein, some governments, like the Spanish one in 2024, have started to study the possibility of banning or reducing short-haul (domestic) flights (less than 2 hours). This is reachable if a train alternative exists and the demand is insufficient to justify it (Ledsom, 2024). Additionally, the French government started an initiative to ban similar flights within its country (BBC News, 2023). Some private and public companies (e.g., universities) are also considering it, and these examples highlight the rapidly spreading awareness of this topic.

The industry’s growth is due to a shift in the commercial strategy of airlines. The industry started with the so-called legacy carriers. The rise of the Low-Cost Carriers (LCC) in early 1970 ensured a new business model for the airline industry. In the preceding years, the legacy carriers had a monopoly in the industry. The formation of the LCC constituted a response and represented a broadening accessibility for the aviation industry, particularly to individuals with limited financial resources. The new business model created a competitive environment driven by profitability (Kazda & Mrázová, 2015). The change in the industry by the upcoming LCC opened the industry to new segments of customers. Previously, flying was only accessible to the wealthy class due to the high ticket prices. For the last two or three decades, flying has been accessible to almost everyone, and it is seen as a norm. The issue is whether this norm can remain normalized if it is accompanied by flight shame. In that vein, analysing air transportation, and especially flying attitudes may help undertake actions helping to prevent undesired effects on the climate. For instance, as suggested above, policymakers could better regulate how routes are created based on demand and acceptable distances.

Regarding environmentally conscious behaviour, recycling is one of the most well-known actions. When entering recycling in Google, there are over 900 million results. Flying less due to the consequences of emissions is also seen as environmentally conscious behaviour. By searching for ‘flight shame’, Google searches gave 40.3 million results. Besides being a tremendous difference in the number of results, these concepts are entirely different. Recycling

is all about a win-win situation (Shi et al., 2024). Consumers recycle the items, and consequently, they end up at a recycling company. Consumers contribute to a circular economy and recycling companies profit from processing the items. In contrast, increasing flight shame could eventually decrease the number of flights (Chiambaretto et al., 2021). Consumers will contribute to reducing emissions, but the airlines will lose revenue. Consequently, there is a win-lose situation resulting from flight shame. Hence, airlines would not take action to increase their clients' awareness.

The remaining sections provide a literature review of flight shame (Section 2). Section 3 is dedicated to the methodology used in this research. Furthermore, Section 4 presents the survey results, and Section 5 describes the discussion. The final section, Section 6, presents the conclusion of this research.

1.1 Research Objective

This research aims to understand the factors influencing flight shame, namely individual characteristics. The research will gain insights into the demographic characteristics such as age, income, and education that affect flight shame. It also addressed the key factors regarding environmentally conscious behaviour and attitudes towards air travel. The literature on flygskam and flight shame is analysed to set a theoretical framework surrounding this topic. The framework will be augmented with relevant variables that have influenced this phenomenon.

Only dozens of studies have been conducted in the research field of flight shame, and this is just the beginning. With this new phenomenon, it is essential to understand the characteristics of individuals who experience flight shame. This research will provide innovative insight into these demographic factors, with special attention to age. In addition, airlines will be able to gain an insight into the characteristics of (their) consumers. This will allow them to tailor their offering to consumer demand better. This is necessary because a growth of flight shame can lead to a decrease in flights.

1.2 Research Questions

In line with the research objective outlined in paragraph 1.1, the research questions are as follows:

'What individual characterises determine higher levels of flight shame?'

'Is age important to determine flight shame?

1.3 Sustainable Development Goals

The United Nations set the Sustainable Development Goals (SDGs) in 2015 (United Nations, n.d.). These goals were part of the 2030 agenda to aim for sustainable development. The following subparagraphs will show the two SGDs with the highest degree of interface regarding

flight shame. The last subparagraph will briefly provide an overview of the aviation industry regarding the SGDs.

1.3.1 #12 Responsible Consumption and Production

SDG 12 is focused on responsible consumption and production, which involves lowering environmental impact within the entire supply chain of products and services by reducing waste and the need for resources. The industry is capitalizing on this by making the aircraft used today as much as 85-90% recyclable (Air Transport Action Group, n.d.). The connection between this goal and flight shame is the impact of air travel on the environment. The aviation industry contributes to climate change through carbon emissions. The airlines and their aircraft are primarily responsible for generating carbon emissions. Additionally, from a consumer perspective, a critical evaluation of travel behaviour is required to reconsider sustainable options.

1.3.2 #13 Climate Action

Undertaking urgent action to combat the impacts of climate change is the goal to achieve SDG 13. As a result, there has been a rise in sea level and a corresponding escalation of global warming effects. Therefore, adequate actions are essential to prevent further deterioration. The prime action is sustained and rapid emissions reduction. Through new technologies and improved efficiency, the average flight today produces 54% less CO2 than in 1990 (Air Transport Action Group, n.d.). However, this is insufficient due to the industry's growth. The aviation industry is one of the most significant contributors to environmental pollution. Therefore, measures will have to be taken to reduce emissions. The phenomenon could cause people to behave more consciously, which may be the beginning of a new movement. Individuals must be aware of the climate's impact and be willing to change their behaviour. Once more individuals are eager to fly less or stop flying, the emissions of the entire industry will be positively impacted.

1.3.3 Aviation Industry

According to the Air Transport Action Group (ATAG), the aviation industry matches with 15 out of the 17 SDG's. On the one hand, the industry is committed to initiating sustainable change, such as using renewable fuels (#7) and providing 87.7 million jobs by industry (#8). On the other hand, resources are also being implemented to do more in developing countries. For instance, coins are collected on planes from passengers and used in UNICEF's Change for Good initiative. This is used to fight child poverty worldwide (#1) (Air Transport Action Group, n.d.).

2. LITERATURE REVIEW

This section is devoted to establishing a theoretical framework to form the foundation for this research. First, it addresses the concept of flight shame. After that, it discusses the factors that influence this phenomenon. Furthermore, it describes the concerns and responsibilities of individuals who experience flight shame. Finally, it ends with air travel behaviour and demographic characteristics.

2.1 Flight Shame / Flygskam

Flight shame is a relatively new concept. It initially originated in Sweden and was derived from the Swedish word 'flygskam'. In 2018, this concept was recorded for the first time in a public debate. Afterward, 'flygskam' would be added to the Swedish language as an official word (Institutet för språk och folkminnen (Isof), 2018). According to this first definition, 'flygskam' is a 'feeling that from an environmental point of view, flying is a reprehensible act'. Since the first use, many definitions of flight shame have been provided. The Chief Economist of the International Air Transport Association (IATA), which collaborates with 260 airlines, describes flight shame as a trend towards making air travel socially unacceptable due to its carbon cost (Topham, 2019).

The emerging literature is providing new, additional insights into this phenomenon. Thus, flight shame is the growing concern about the environmental impact of flying, given that air transportation contributes to global warming through its carbon emissions. There are specific pollutants derived from air transportation that are less common in other areas. However, carbon emissions are the most comparable among different activities, thus the one being mainly used in this study. As such, frequent flying in Europe has become controversial and a socially undesirable activity. As a result of flight shame, individuals tend to fly less to reduce their carbon emissions (Gößling et al., 2019).

Wolrath Söderberg and Wormbs (2019) describe flight shame as a feeling of guilt about the environmental effects of flying to the point that 'Flygskam' has emerged as a symbolic movement among Swedes not to travel by plane anymore. However, the research of Becken et al. (2021) indicates that flight shame has not led to a significant social change, and it has remained with a small group of advocates. Furthermore, the study of Wolrath Söderberg and Wormbs (2019) highlights the personal conflict that individuals experience regarding their air travel and their moral awareness that they should 'do the right thing'. This paradox exists for many other everyday activities, especially environmental-related ones. Similarly, Mkono (2020) concludes that flying is a reprehensible action in light of climate change, engendering a form of eco-guilt. Likewise, Henley (2021) claims that flight shame is the feeling of being ashamed, embarrassed even, to use a plane as a form of transportation given its environmental impact.

Both shame and guilt are increasingly present in environmental discourse. The research of Tangney et al. (2014) describes the differences between guilt and shame. Although guilt and shame are self-conscious emotions that arise from personal failures, they differ significantly. Guilt-related feelings involve explicit behaviour related to 'what I did'. Whereas feelings

associated with shame focus on 'who I am'. Concerning the definition of flight shame, numerous theories previously discussed address the sense of shame. However, the study by Andersen (2022) reports guilt would be more applicable in flight shame, as it encompasses actions with an environmental impact. Acknowledging the relevance and mutual influence of guilt and shame, the valid definition in this research will include both sentiments.

Definitions of flight shame or flygskam have emphasized different aspects of the phenomenon. The definition combines the ideas underpinning the above concept description to set a baseline for this research. Thus, henceforth, in this thesis, flygskam will be understood as **a feeling of shame and guilt towards air transportation that results in environmentally conscious and responsible behaviour based on social and personal norms, necessity, and perception.** This definition is based on the theories of Gößling et al. (2020), Wolrath Söderberg and Wormbs (2019), Mkono (2020), Henley (2021), Chiambaretto et al. (2021) and Hesse and Rünz (2020). Essential to highlight is that the presence of one element of this definition can indicate flight shame. Therefore, it is not mandatory to meet all conditions, as one or more variables can cause flight shame. All relevant theories have been incorporated into the definition to provide a complete overview and a comprehensive understanding.

2.2 Factors that Contribute to Flight Shame

After establishing the definition, it is crucial to identify the factors that contribute to the development of flight shame. The research of Gößling et al. (2019) points out that passengers often describe trips as meaningful and highly valued. Therefore, air transportation trips are usually considered essential or inevitable for leisure, business, or visiting family and friends. According to Pan and Truong (2020), the main reason for air travel for younger people is leisure. The nature of the trip in connection with flight shame leads to the first hypothesis:

H1a: *Individuals justifying their trip as necessary experience less flight shame.*

Besides the essential nature of flying, the length of the flight is another important factor contributing to flight shame. Long-haul flights are seen as inevitable. To that end, these flights are considered necessary (Gößling et al., 2019). On other distances, alternatives are gradually being considered (Schmidt et al., 2023). This means that business meetings can be conducted online, making flying unnecessary. Another alternative is the use of public transportation. Flight duration and costs are aspects that individuals take into consideration, but low-cost carriers continue to make air transportation more affordable than traveling by train (Gößling et al., 2019). Flight shame is reduced by considering alternatives to a more sustainable option. Therefore, the second hypothesis is stated as follows:

H1b: *Individuals weighing alternatives when planning a trip experience more flight shame.*

Chiambaretto et al. (2021) research showed that 90% of the respondents overestimate the total emission of the aviation industry. Additionally, this research relates flight shame to the fact that a lack of knowledge of the environmental impact of air transport may create misperceptions. Such misunderstandings are the drivers of extreme flight shame. In this regard, the authors identify the challenges airlines face in providing passengers with more knowledge about the

impact of air transport. Indeed, Hesse and Rünz (2020) report that companies are often accused of greenwashing, reflecting a combination of a lack of knowledge on the part of passengers and misleading communication. The degree of knowledge of flight shame leads to the third hypothesis:

H1c: *Individuals with less knowledge about the impact of aviation emissions experience more flight shame.*

2.3 Concerns and Responsibility

Before the flight shame phenomenon, concerns about climate change were already growing among individuals. This resulted in sustainable consumer behaviour. These are often referred to as 'green consumers' and find themselves in an undesirable situation due to the friction experienced between the personal benefits of air travel and concerns regarding climate change. Higham et al. (2013) relate this feeling to the 'flyers dilemma'. According to Schrems and Upham (2020), this concept relates to the cognitive dissonance theory. Cognitive dissonance arises when experiencing inconsistencies between attitudes and behaviours. This study showed that environmental attitude could contradict personal flying behaviour.

Furthermore, the research of McDonald et al. (2015) states that there is a difference between attitudes and behaviour. The participants in this research identified themselves as 'green consumers'. And showed four strategies for coping with personal conflicts and travel behaviour while mitigating the differences in attitudes and behaviour. The research presented the following four strategies:

1. No change in travel behaviour
2. Reducing flying
3. Compensate by changing other behaviour
4. Stop flying

Randles and Mander (2009) highlight in their article that even people who identify themselves as green consumers fly. Those people justify their choices by compensating in different areas in their daily lives. Although this behaviour is not directly related to air travel. These practices can be sustainable food consumption changes, for example, becoming vegetarian or vegan. Through this approach, they strive for balance in their sustainable choices and justify their behaviour. Environmentally conscious leads to an increase in feelings of flight shame. This is consistent with the following hypothesis:

H1d: *Individuals identifying as 'green' experience more flight shame.*

2.4 Behaviour

The article by Cohen et al. (2011) describes how excessive air travel tourism has led to alleged 'Binge Flying'. This consumer behaviour regarding the frequency of leisure air travel will be regarded as a new facet of behaviour addiction. Research supports this statement, where

addiction is seen as a short-term satisfaction while forgoing the long-term consequences (Clark & Calleja, 2008). Regarding travel behaviour, air travel for leisure fulfils short-term satisfaction but neglects the long-term consequences of environmental impact.

Noteworthy within the research conducted by Cohen et al. (2011) was the observation that individuals judge others' short-haul travel behaviour without being willing to change or be critical of their behaviour. This aligns with the findings that people are concerned about climate change but reluctant to change air travel behaviour. To cope with their worries, they are in denial and feel guilty to justify their behaviour. According to the research by Barr et al. (2010), this pattern appears in situations where individuals cannot control or change behaviours. This research links the suppression of feelings and continuing flying to behavioural addiction to air travel (Cohen et al., 2011).

2.5 Demographic Characteristics

The term 'frequent flyer' originated in 1980 when airline companies wanted to reward their most loyal customers. The airlines rewarded the customers based on the miles flown in a specific timeframe. The research of Young et al. (2014) states that frequent flyer programs have transformed into an instrument for measuring social status. LCC claims they enabled flying for everybody, even the lowest income groups. However, the most frequent flyers are individuals with the highest incomes and belong to the higher social class (Randles & Mander, 2009). The research of Gößling et al. (2020) supports this statement and shows a relationship between an increase in air travel and income. Individuals with the highest income (>5000 euro) fly an average of three times more than individuals in the lowest income group (<1500 euro). The study by Pan and Truong (2020) investigates LCC passenger segmentation. This research shows that older people with the highest average education level and income often fly LCC. On average, this group flies more than three times a year. These theories correspond to the following hypothesis:

H2a: *Individuals with higher incomes fly more and experience more flight shame.*

According to Jagers (2009), the education level significantly impacts the development of environmentally conscious attitudes. This research measured the willingness to pay environmental taxes based on education level. In most cases, individuals with higher education are more willing to pay taxes. From a similar perspective, Hondroyiannis et al. (2024) researched circular economy with a connection to education level. These findings have been substantiated by the findings from Jagers (2009). Both studies identified a correlation between levels of education and environmentally conscious behaviour. This aligns with the following hypothesis:

H2b: *Individuals with higher education exhibit more environmentally conscious behaviour and flight shame.*

Finally, age represents another demographic characteristic relevant to environmentally conscious behaviour. According to research, younger people report their behaviour as less

sustainable than the elderly (Centraal Bureau voor de Statistiek, 2024). Moreover, the study indicated that the younger generation (18-35 years old) engages in air travel more recurrently than the older generation (36-55 years old). Regarding flight shame, this research additionally shows that 1 out of 5 individuals experience it in the youngest generation. Half of this group does not experience guilt while flying. These findings are consistent with Morrison and Beer's (2016) research on sustainable consumption. This study found a relationship between environmental awareness and age. Awareness increases with age thanks to a growth in knowledge about the impact of climate change on the products they buy. Most of the knowledge is in age group 40-60 years old. Therefore, this age group makes better sustainable purchases than younger. These theories lead to the final hypothesis:

H2c: *Older people experience more flight shame than younger people.*

Figure 2 represents the proposed framework of this study, consisting of two sets of variables: individual attitudes and (self) perceptions and the demographic characteristics of the respondents.

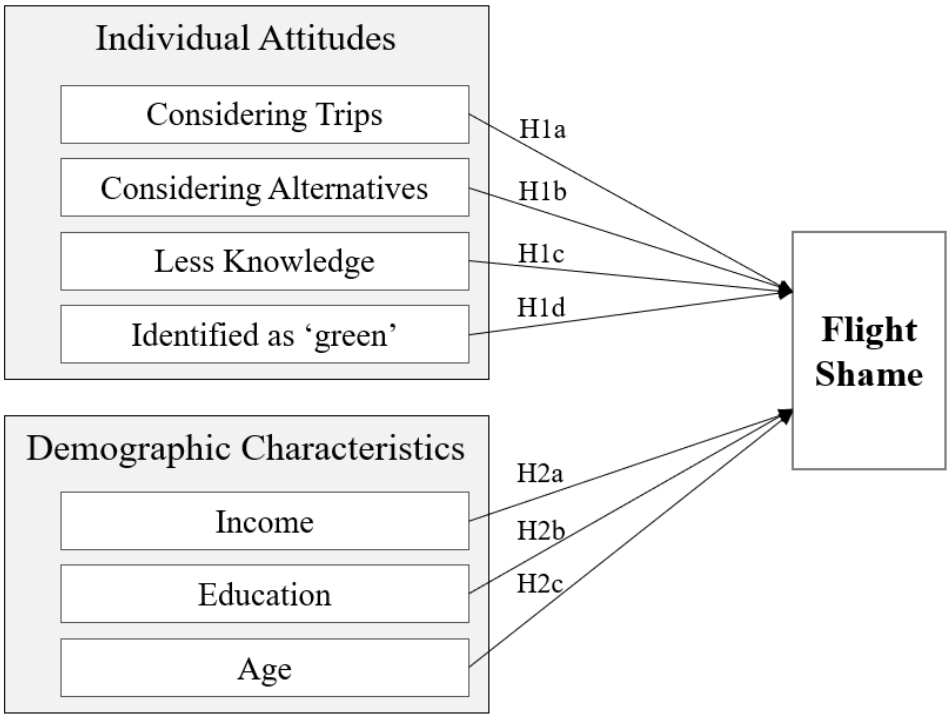

Figure 2. Proposed Framework

Source: Own elaboration

3. METHODOLOGY

This section explains the applied methodology for conducting this research and answering the research question. It starts with the research objective, introducing how the variables will be connected to flight shame. The following section describes the research approach and design, followed by the questionnaire design. Furthermore, the data collection and analysis will be presented. Finally, the methodological limitations are discussed.

3.1 Research Objective

This research aims to identify the profile of individuals who experience flight shame based on demographic characteristics such as age, income, and education level. Furthermore, the research will examine how demographic factors and relevant variables relate to the respondents' level of flight shame. The variables vary from flight frequency to distance, level of knowledge, and the link to other sustainable behaviours.

3.2 Research Design

This research focuses on the collection of quantitative data through a survey. With the questionnaire, the primary data of this research will be collected. The research philosophy of this research is positivism. A core feature of positivism is establishing a cause-and-effect relationship through a survey. In his study, different demographic factors and flight shame are questioned in the survey. The objective factors are quantifiable; therefore, correlations can be established. This will be conducted using a deductive approach that compares the results with theory. Subsequently, the data will be used with different statistical tests. Control questions play an important role here, ensuring the data's validity. Through the control questions, it can be concluded that the respondents understood the question correctly and gave the correct answer (Saunders et al., 2012). In that vein, several controls were included in the survey, especially questions related to attitudes and behaviour.

3.3 Questionnaire Design

To gain insights into the respondents' demographical characteristics, the first part of the questionnaire, questions 1-9, serves to collect demographic data. The operationalization of the demographic characteristics is stated in *Annex* 1. The second part, questions 11-17, will focus on travel behaviour and go into detail about the travel behaviour of the respondents. The third and last part will show twelve statements. The statements are measured on a 5-point Likert scale ranging from 'strongly disagree' and 'strongly agree' (Saunders et al., 2012). Additionally, the third part consists of a question regarding environmental behaviour. The survey's final question will allow the participants to leave a question or comment. The operationalization of parts 2 and 3 can be retrieved in *Annex* 2.

3.4 Data Collection

The research methodology encompasses quantitative methods. Starting on 29 May 2024, an online survey will be conducted to retrieve the data. Gathering the desired number of respondents requires two weeks. The questionnaire is completed by Microsoft Forms in English

and two additional translations: Dutch and Spanish. This method of data collection will provide insights globally. The questionnaire is completed independently, making it a self-completed and web-based questionnaire (Saunders et al., 2012). Noteworthy is that the questionnaire is anonymous. Due to data protection, only the author has access to the data.

After the questionnaire was designed (*Annex* 3), a pre-test was conducted with five participants to avoid misunderstanding or miswording. The participants' feedback allowed for the completion and implementation of the questionnaire. The survey was distributed through the author's network and approached on several social media platforms. In total, 231 participants answered the survey[1].

3.5 Analytical Framework

The data is initially processed in Excel. The data from all questions are recoded to the needs except for question 18. This question includes 12 statements, measured on a 5-point Likert scale. However, five of the twelve questions are reverse-coded (*Annex* 2), and some are used as controls to detect individuals' inconsistencies. During the data preparation, the answers are reversed. All the ages (above 18) are relevant for this research; therefore, two under-age observations are removed. Additionally, one observation is dropped due to a lack of matching with the control questions. Thus, the final sample of this study is 228, being the individual unit of analysis.

After the data preparation phase, the data is processed in Excel to produce the descriptive statistics in *Table* 1. Then, the data is exported for use in Rstudio. In this statistical package, k-means cluster analysis is carried out. Cluster analysis is a technique for finding sub-groups in a data set (University of Cincinnati, n.d.). By creating the clusters, similar groups with the same characteristics are created, showing internal homogeneity among the selected variables. K-means minimized the variance within each cluster. In other words, it groups individuals that are similar to each other while being different from individuals in other clusters. For robustness, hierarchical clustering was also used, and the results were strongly aligned with the k-means method.

3.6 Methodological Limitations

Given the time, budget, and access possibilities, the implemented methodology is valid for this research. Despite this, it leads to certain limitations for the research. The respondents are approached in the author's personal network. Therefore, due to the cluster analysis, the sampling method is based on non-probability (Saunders et al., 2012). As a result, it might be possible that the results have biases concerning the majority coming from the Netherlands. However, the sample shows representable observations regarding other relevant demographic characteristics similar to the average population.

[1] As of July 2024, the number of answers is 235.

4. RESULTS AND DATA ANALYSIS

In the following section, the results of the survey are presented. The first part of the section consists of the sample characteristics and the variables used in the subsequent analyses. The second part addresses the flying attitudes through cluster analysis. The final section discusses the results and hypotheses.

4.1 Sample Characteristics

This subparagraph discusses descriptive statistics. *Table* 1 shows the complete overview of the descriptive statistics. The first section consists of the demographic characteristics. The age of the respondents varies between 19 and 82 years old, and the mean age is 37.35. The distribution between the groups below and above 30 years old is the same, with both being 50%. Regarding gender, 63% of the respondents are women and 37% are men. The average level of education in the questionnaire is 3.9, equivalent to a bachelor's degree. In addition, the attributed income is an average of 2.73, which fits within the interval € 61,000 - 90,000 in the survey. The last demographic characteristic is income, which is about easily making it to the end of the month financially. The majority indicated this to be easily achieved.

The following section describes flying behaviour. The first variable is the average number of flights taken per year. The numbers vary between 0-30 flights per year. The mean number of flights taken per year is 3.21. The majority (71%) indicated that leisure is the main reason for air travel. The following two variables are control questions to test the respondents' estimation ability regarding aviation emissions. The first variable compared a car's emission versus a plane over the distance from Amsterdam and Barcelona (*Annex* 4). Here, 62% of respondents overestimated the actual emissions. The second variable was about the total emissions of the aviation industry, again significantly overestimated by 84%. This is close to the findings of Chiambaretto et al. (2021), where 90% of the respondents overestimated the total aviation emissions. The results of the airline preference show that the majority, 62%, indicate a preference for an LCC airline when booking a flight. In the last variable of this section, respondents were asked if they had ever heard of flight shame. 65% of respondents said they were familiar with this phenomenon.

The third section presents the statement's result on flying attitudes based on a Likert scale of 1-5. The responses are coded with the lowest scores corresponding to the least flight shame experienced and the highest scores corresponding to the most flight shame experienced. The last section concerns the degree of sustainable behaviour. The first variable gives the number of sustainable actions. On average, respondents participate in 5.74 sustainable actions. Below the number of actions, the different actions are shown. Eating local or seasonal food is done the least at 34%. In contrast, in the highest percentage, 79% of respondents separate waste.

Table 1. Descriptive Statistics (N = 228)

	Type	Min	Max	Mean	Median	Sd
Demographic characteristics						
Age	continuous	19	82	37.35	31	14.99
Young	dummy (1, <30)	0	1	0.50	0	0.50
Gender	dummy (1, female)	0	1	0.63	1	0.48
Education*	ordinal	0	7	3.90	4	1.98
Income*	ordinal	1	5	2.73	3	1.27
End of the month	*Likert* (1-5)	1	5	3.70	4	1.02
Flying Behaviour						
Air travels	continuous	0	30	3.21	2	4.00
Reason	dummy (1, leisure)	0	1	0.71	1	0.46
Distance*	Dummy (1, short-medium)	0	1	0.55	0	0.68
Trip emissions	dummy (1, overestimation)	0	1	0.59	1	0.49
Industry emissions**	dummy (1, overestimation)	0	1	0.84	1	0.36
Airline preference**	dummy (1, LCC)	0	1	0.62	1	0.49
Ever heard of flight shame	dummy (1, yes)	0	1	0.65	1	0.48
Flying Perspectives						
Regret	*Likert* (1-5)	1	5	1.87	2	0.96
Consider impact	*Likert* (1-5)	1	5	2.67	2	1.29
Shame	*Likert* (1-5)	1	5	2.57	2	1.37
Guilt	*Likert* (1-5)	1	5	2.19	2	1.10
Effects climate	*Likert* (1-5)	1	5	3.44	4	1.29
Responsible climate	*Likert* (1-5)	1	5	2.82	3	1.26
Unavoidable	*Likert* (1-5)	1	5	2.95	3	1.23
Long distance	*Likert* (1-5)	1	5	4.15	4	1.04
Alternatives	*Likert* (1-5)	1	5	3.41	4	1.25
Travel less	*Likert* (1-5)	1	5	2.83	3	1.20
Excessive	*Likert* (1-5)	1	5	4.06	4	0.98
More sustainable	*Likert* (1-5)	1	5	3.35	3	1.02
Sustainable Behaviour						
Number of actions	continuous	0	12	5.74	6	2.96
Reducing consumption	dummy (1, yes)	0	1	0.37	0	0.48
Reusing items	dummy (1, yes)	0	1	0.58	1	0.49
Separate waste	dummy (1, yes)	0	1	0.79	1	0.41
Recycling	dummy (1, yes)	0	1	0.63	1	0.48
Eating less meat	dummy (1, yes)	0	1	0.58	1	0.49
Using renewable energy	dummy (1, yes)	0	1	0.44	0	0.50
Using public transportation	dummy (1, yes)	0	1	0.42	0	0.49
Walking/biking short distances	dummy (1, yes)	0	1	0.68	1	0.47
Save energy at home	dummy (1, yes)	0	1	0.49	0	0.50
Save water at home	dummy (1, yes)	0	1	0.39	0	0.49
Eat locally or seasonally	dummy (1, yes)	0	1	0.34	0	0.47

Source: Own elaboration

Education: 0 = No education; 1 = Primary education; 2 = Secondary education; 3 = associate's degree; 4 = bachelor's degree; 5 = professional degree; 6 = master's degree; 7 = Doctorate

Income: 1 = € 0-30,000; 2 = € 31,000-60,000; 3 = € 61,000-90,000; 4 = € 91,000-120,000; 5 = > € 120,000

* Due to incomplete responses, the number of respondents for these questions is slightly lower than the full sample size. Emission aviation industry, N = 224, and Airline preference, N = 221.

4.2 Clustering Flying Attitudes

The flying attitudes analysis was developed by clustering individuals' answers to the attitudinal questions in the survey. Six out of 12 statements in question 18 indicate the individuals' degree of awareness (including shame) about their impact on climate with flying. These six dimensions were:

1. I **regret** flying most of the time.
2. I regularly consider the **impact** of my flying habits on the climate.
3. I never experience **shame** while flying.
4. Often, I experience **guilt** about my impact on the environment regarding my flying behaviour.
5. I never really thought about the **effects** of my flying behaviour on the climate.
6. I rarely feel **responsible** for the impact on the climate while flying.

All were answered on a scale of 1 to 5 (5 strongly agree), but some needed to be recoded to measure the same type of attitudes towards flying. Consequently, items 3, 5, and 6 were inversely recoded. Therefore, an individual with higher scores would be considered more aware or concerned about the environmental effects of flying.

The flying attitudes analysis is presented in a cluster analysis (k-means). The clusters consist of respondents with the same characteristics. The analysis was forced for three clusters, as different methods of clustering identification indicated between 2 and 3 clusters as the potential optimal number. *Table* 2 presents the average values of the variables of interest for each one of the three clusters identified. The clusters have been named Cluster 1: Green (G), Cluster 2: Blue (B), and Cluster 3: Red (R) for better understanding.

Table 2. Results of the Cluster Analysis

Variables	Total	Clusters (k3)			Mean Tests		
		GREEN (G)	**BLUE** (B)	**RED** (R)	G-B	G-R	B-R
N	228	57	98	73			
Regret	1.87	3.12	1.61	1.25	***	***	***
Impact	2.67	4.14	2.57	1.66	***	***	***
Shame	2.57	3.46	2.58	1.86	***	***	***
Guilt	2.19	3.51	1.91	1.53	***	***	***
Effects Climate	3.44	4.42	3.87	2.11	***	***	***
Responsible Climate	2.82	3.67	3.17	1.68	***	***	***

*, ** and *** denote significance at the 10%, 5% and 1% level, respectively, in the mean t-tests
Source: Own elaboration

Based on *Table* 2 results, below are presented the definitions of these clusters according to their average scores for the selected statements:

- ***Green***: individuals with a very high level of awareness. Their average scores surpass, for all the items, the value of 3 out of 5 points.
- ***Blue***: individuals with a medium-level awareness. Their average scores for all the items are present intermediate values.
- ***Red***: individuals with a very low level of awareness. This group presents the lowest average scores for all the items, with only one score higher than 2 out of 5.

To test for the validity of this final clustering, mean t-test analysis was carried out for all the items among all clusters. As shown in the right-hand side of the table, all these differences were statistically significant at a 1% level.

4.3 Demographic Characteristics and Flying Behaviour

This subparagraph will present the cluster analysis based on demographic characteristics and flying behaviour. The results are presented in *Table* 3. With an average age of 41.81 years, cluster G is the oldest. Clusters B and R are very close to each other, with an average of 36 years old. Variable Young corresponds to whether the age is under 30 years old. Cluster G has only 32% under the age of 30 years old. In clusters B and R, the majority are under 30 years old. The gender distribution is almost equally divided into all the clusters. The majority are women. In income, cluster G has the highest level, which means that this cluster has the highest income, and the difference is statistically significant compared to cluster B. Despite the differences in incomes, all clusters indicate that they 'easily' make it to the end of the month financially; the scores are around the average (3.70) of the complete sample.

Statistically speaking, age and education are the most essential variables defining awareness differences. As the literature review has discussed, these results fit many other previous results. Interestingly, gender is not statistically relevant to finding differences between clusters.

On average, cluster G travels the most by plane annually (3.84 trips). Cluster B follows with 3.12 trips per year. The lowest number of trips is in cluster R, with an average of 2.84. The variable Reason indicates the purpose of the trip. In clusters B and R, it is stated that the main reason for air travel is leisure. For cluster G, this number is significantly lower. This suggests that these respondents also use air transport for other purposes, such as business or visiting family and friends. The variable Distance indicates whether most flights are short, medium, or long-haul. Clusters B and R mostly fly medium to long-haul flights. In contrast, respondents from cluster G most often fly short haul.

Cluster G's only significant difference compared to the others is the reason to fly. As stated, more conscious individuals seem to travel less for leisure, making them very different from clusters B and R.

Table 3. Cluster Analysis – Demographic Characteristics and Flying Behaviour

Variables	Total	Clusters (k3)			Mean t-tests		
		GREEN (G)	**BLUE** (B)	**RED** (R)	G-B	G-R	B-R
N	228	57	98	73			
Demographic characteristics							
Age	37.35	41.81	35.64	36.16	**	*	
Young	0.50	0.32	0.57	0.53	***	**	
Gender	0.63	0.65	0.65	0.59			
Education	3.90	4.89	3.78	3.30	***	***	
Income	2.73	3.04	2.58	2.70	*		
End of the month	3.70	3.68	3.69	3.73			
Flying behaviour							
Air travels	3.21	3.84	3.12	2.84			
Reason (leisure)	0.71	0.56	0.74	0.77	**	**	
Distance	0.55	0.42	0.59	0.60			
Airline preference (LCC)	0.62	0.70	0.56	0.63			
Trip Emissions	0.59	0.72	0.63	0.44		***	**
Industry Emissions	0.84	0.88	0.84	0.83			
Ever heard of flight shame	0.65	0.79	0.66	0.53		***	*

*, ** and *** denote significance at the 10%, 5% and 1% level, respectively, in the mean t-tests
Source: Own elaboration

The following two variables measured the extent to which respondents should estimate the impact of aviation industry emissions. The first variable, Trip Emission, asked the respondents to what extent the emissions of a car differ from a plane in terms of the distance between Amsterdam and Barcelona. Cluster G shows that emissions are overestimated the highest, by 70% on average. This is followed by cluster B, with 63%. Cluster R consists of the lowest number of respondents, overestimating 44%. The second variable, Industry Emission, was about estimating the total emissions of the aviation industry worldwide. Also, this variable is overestimated among the respondents in cluster G with 88%. This is followed by clusters B (84%) and R (84%) with almost equal estimations. The estimation variables served as control questions. The last variable in the table is the extent to which the respondents are familiar with the phenomenon of flight shame. Cluster G scored the highest, with almost 80% of the respondents. Cluster B is at 65%, and the lowest score is from cluster R (53%)

Since clusters B and R are similar, the significance is relevant between these clusters and cluster G. The results show significance within age, particularly in the difference between the age groups under and above 30. The strongest significance is presented in education (1% level). The variable Reason also has a relatively strong significance between the clusters (5% level).

4.4 Flying Perspectives

The clusters are now connected to the 12 statements questioned in the survey about flying perspectives (question 18 in the questionnaire – see *Annex* 3). The scores range from 1 to 5 (Likert) for all the items. It can be interpreted as the higher the value of the items the more they recognise themselves in a 'green' identity. This means that this group of individuals has strong concerns about the impacts that air transportation has. *Figure* 3 presents the average values of the statements for the clusters identified in the previous section. Items in this cluster include the ones used for the clusters again, and they are all sorted clockwise, according to the score obtained by cluster G (see Annex 5 for further details on the scores).

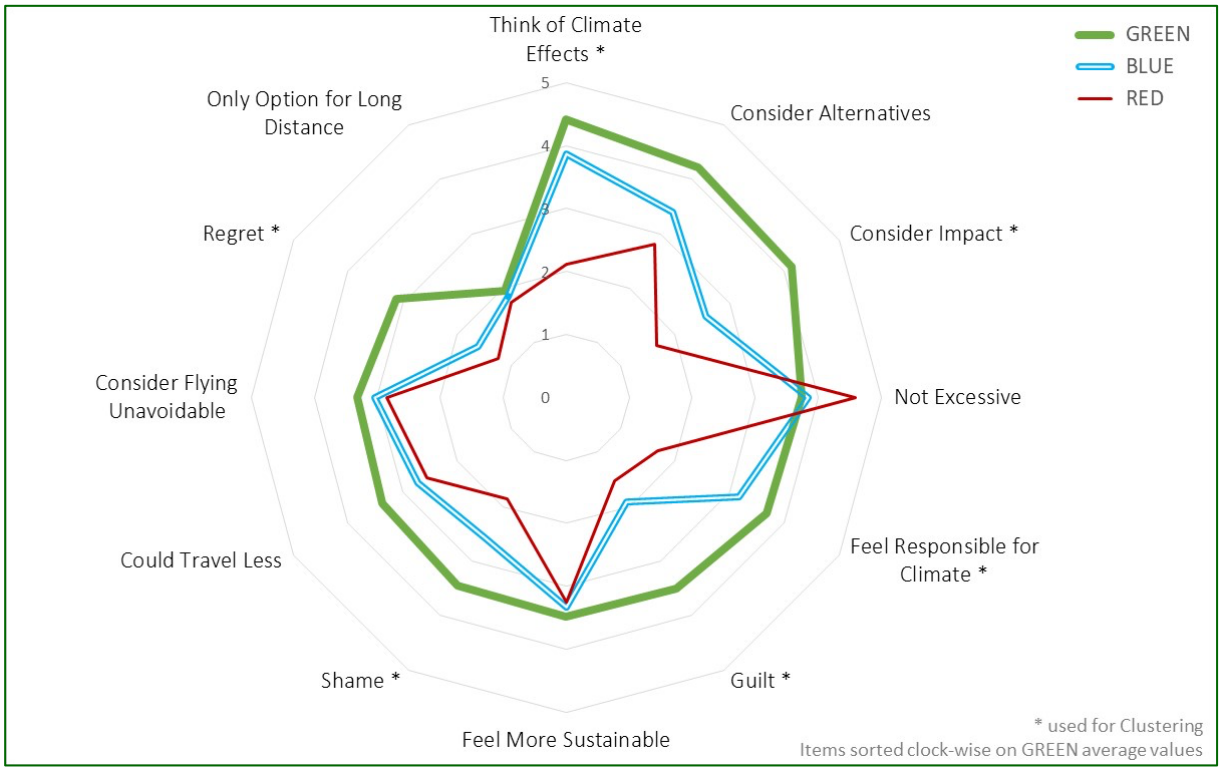

Figure 3. Cluster Analysis – Statements on Perspectives

Source: Own elaboration

Figure 3 shows that cluster G surpasses the other two for all the items except one. Cluster R scores the highest on the variable, considering their flying is 'not excessive.' This item presents a rather surprising result: individuals with the lowest levels of awareness towards climate effects exert their flying behaviour not being excessive, even though they travel as much as cluster B (*Table* 3). Moreover, they present the highest percentage of leisure trips, which can be considered the most voluntary reason to fly. Together, it can be interpreted as careless flying. Contrarily, the group being more aware (cluster G) seems to be the modest one defining their travel attitudes as 'not excessive'. At the same time, all clusters feel equally sustainable, which in this case may contradict their flying intensity measured by the number of trips in *Table 2*.

Figure 3 provides further insights. For example, the item about 'considering alternatives' to air travel gets the second highest score for cluster G. The difference is also significant, exceeding the other two clusters.

4.5 Sustainable Actions

Figure 4 shows the list of sustainable actions presented at the end of the survey as a multiple-choice question. All the items were recoded as a dummy variable. As a result, all the items were quantifiable and used to measure the number of actions per individual. As before, the groups in the figure are based on the cluster analysis stated in the previous section. For further details on the scores of the groups, see *Annex* 6. The items in the figure have been sorted by the percentage of individuals who took that action within the cluster.

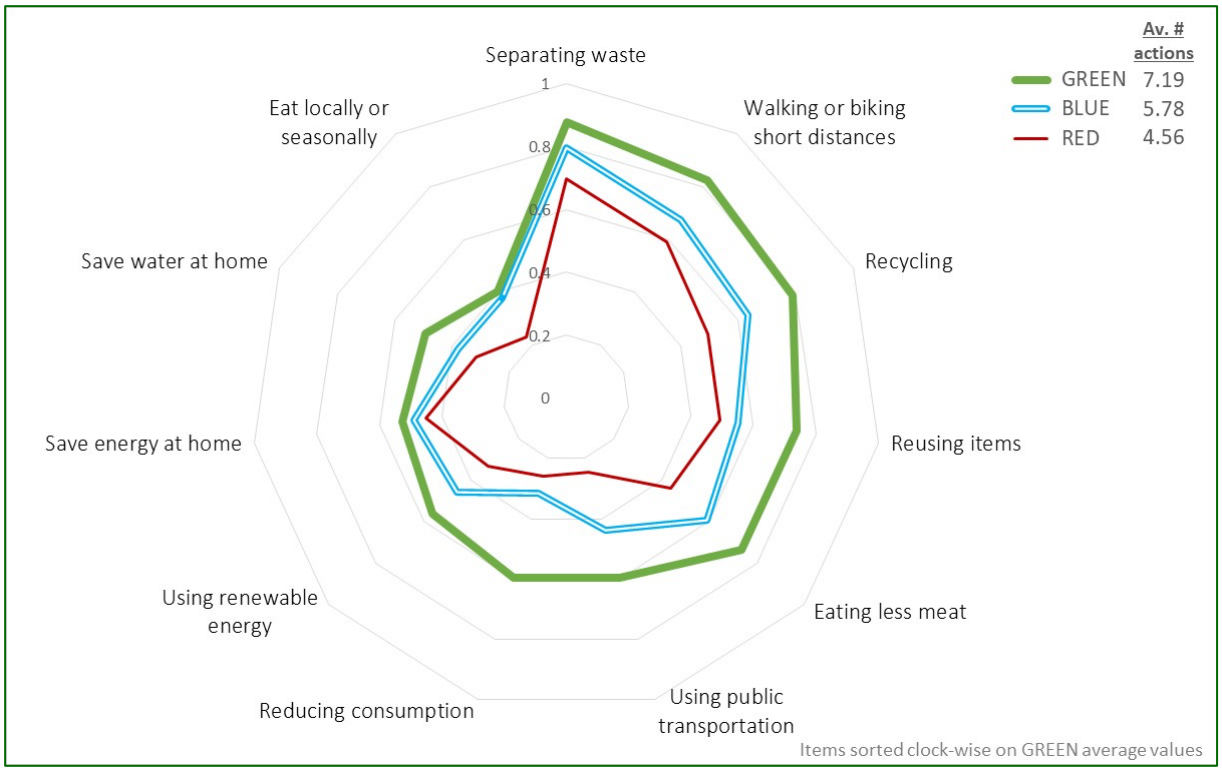

Figure 4. Cluster Analysis – Sustainable Actions

Source: Own elaboration

It is visible that cluster G scores the highest in all actions. This indicates that they are most committed to undertaking sustainable actions, which aligns with the findings in the previous section about this group being more concerned about their behaviour. Interestingly, the clusters do not overlap, indicating an intense correlation between individuals' awareness of their flying attitudes and sustainable actions.

Interesting results about attitudes can be observed. Separating waste is the most presented action, with 80-90% activeness among the respondents. However, more simple actions like saving energy and water at home could be easy to find among individuals. The figure shows

that these two items rank the lowest for all the clusters, with only 40-50% of respondents. Conversely, more costly actions like renewable energy are better represented within the sample.

The clusters' biggest differences are ‘using public transport’ and ‘reducing consumption’. Only 20-30% of the individuals in cluster R act in these actions, while almost 60% in the G cluster do. Finally, eating locally and/or seasonally reaches the lowest percentage of individuals among the three clusters. Some experts have declared this to be a big source of pollution. These poor results indicate substantial room for improvement at an individual level.

4.6 Further Insights on Flight Distance and Age

Starting from the idea that some governments plan to ban short-haul flights and, generally, seek alternatives to flights. This analysis will be based on the variable concerning flight distance in the questionnaire. The question asked the individuals about their most common type of flight, categorizing it as short- (0-3 hours), medium- (3-6 hours), or long-haul (> 6 hours). A dummy variable was created to set the most common flights: short, medium, or zero otherwise. In this way, it was possible to identify individuals whom the policy changes might restrict.

Two other variables are combined simultaneously in the analysis. The first question concerned the reason for flying. Most respondents indicated that leisure is the main reason for air travel. Therefore, a dummy variable splits the sample into leisure and other reasons. Secondly, the variable Young separated the respondents among two age groups: < 30 years old and > 30 years old. The distribution of the sample was almost equally divided.

Eventually, the aim is to compare two different groups of individuals. By merging the variables flight distance, reasons to fly, and age, it can be better understood how different age groups relate to their flying behaviour and preferred flight distance. Therefore, the two age groups are renamed as follows:

- ***Gen* Z**. Younger (< 30), flying short-medium distances, mainly for leisure (n = 67).
- ***Gen* Y**. Older (≥ 30), flying short-medium distances, mainly for leisure (n = 75).

The individuals are named according to a socially accepted classification of generational cohorts. The first generation is Gen Z, born in the late 90s (25-30 years old nowadays). The second generation is Gen Y, born in the 80s and early 90s (30-45 years old nowadays). This split is not exact, and the term is only used for the illustrative purpose of this analysis.

These two groups assess differences in the attitudinal variables used for the cluster analysis in the previous sections: regret, guilt, shame, feeling responsible for climate, thinking of the climate effects, and considering the impact on the environment of their flying behaviour. *Figure* 5 shows consistently that the younger generation (Gen Z) feels less aware of the impact their flying behaviour may have on the climate compared to the older cohort (Gen Y). Surprisingly, the highest difference is achieved for the variable of shame, even though they think about the effects of climate change almost as much as the older generation. These two results suggest that the younger generation understands the impact of their air travelling on climate. Still, feelings of shame or guilt are less common than in the average older individual.

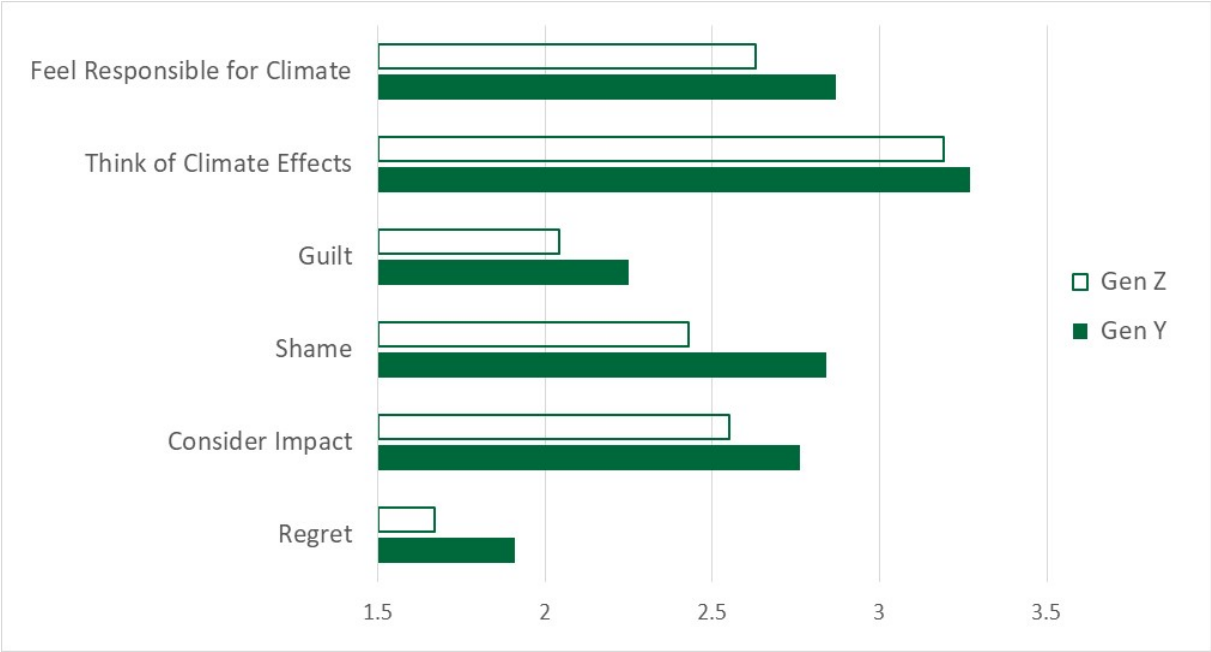

Figure 5. Flight Distance, Age, and Attitudes

Source: Own elaboration

The results of this analysis reveal the differences among the generations in terms of climate awareness and the emotional response to their flying behaviour. The younger generation feels lower levels of awareness. This indicates the need for further research targeting younger individuals. However, the fact that they also know about the impacts on climate signals the discrepancy between their attitudes and behaviours (cognitive dissonance). This opens the discussion about the balance between sustainability and responsibility.

4.7 Analysis of the Results

The data was analysed by cluster analysis (k-means). The results were dominated by cluster G. The age of this cluster was, on average, the highest (41.81 years old), and the majority of this cluster was above 30 years old. Clusters B and R are similar, with a mean age of 36. Despite being above 30 years old, most (55%) are below 30.

Cluster G is characterized by having the highest scores in terms of educational level and income. In addition, this cluster uses air travel the most on average but flies the shortest distances. Estimation ability was tested in the questions on emissions and was most overestimated by cluster G. Additionally, cluster G's airline preference is an LCC, which is striking since they have the highest income and mostly choose a budget airline. Cluster G was most familiar with the phenomenon of flight shame, with almost 80%.

Concerning the flying perspectives, it was visible that cluster G had the highest scores in 11 out of 12 statements. Therefore, this cluster experiences the most flight shame since the statement was based on a flying perspective. Especially the six statements presented in *Table* 2 are trustable indicators that highlight the level of flight shame due to their significance. Considering alternatives indicates the search for more sustainable options. Even on the long hauls where

flying is often the only option, cluster G is exploring options. This makes them consciously consider the choice of air travel.

It is striking that cluster R sees its flight frequency as excessive because, in terms of the number of flights, they fly the least on average. This result may be related to the purpose of air travel. This cluster indicates that the main reason for air travel is leisure. Leisure is not necessary, and hence, it can be explained that this cluster sees its air travel as excessive because they are only for leisure. Compared to cluster G, this group considers its air travel more reasonable. The main reasons for air travel are leisure, business, and other. In addition, this cluster scored highest on the unavoidability of air travel. They do consider themselves less able to fly. This is consistent with the results of the question on sustainable behaviour.

Cluster G is the most sustainable, corresponding to sustainable actions. Cluster G participates in the most sustainable actions compared to the other clusters. Despite cluster G respondents seeing themselves as the most sustainable, they are modest, as the difference with the other cluster is minimal. However, in terms of sustainable actions, cluster G scores numerous times higher than clusters B and R. Cluster G does not see itself as much more sustainable than others. However, they do participate in significantly more sustainable actions.

Finally, the insights into distance, age, and attitudes. Results split between the two generations showed that the younger generation is aware of the consequences but does not experience feelings of shame or guilt. In contrast, the older generation shows that they do experience these feelings. The findings from this analysis converge with the previous outcomes between the clusters and relate the characteristics to attitude.

4.8 Results of the Hypotheses

Based on the hypotheses set in section 2, the results are analysed.

H1a: *Individuals justifying their trip as necessary experience less flight shame.*

The results show that cluster G classifies air travel as unavoidable and necessary. Additionally, this cluster experiences the most flight shame. Therefore, this hypothesis is rejected.

H1b: *Individuals weighing alternatives when planning a trip experience more flight shame.*

Cluster G scored the highest on considering alternatives compared to the other clusters and experienced the most flight shame. Furthermore, this hypothesis is supported by the significance of the ‘green’ individuals and the level of search for alternatives. As a result, this hypothesis can be verified.

H1c: *Individuals with less knowledge about the impact of aviation emissions experience more flight shame.*

Cluster G had the lowest knowledge regarding the industry's environmental impact, having made the highest overestimates in emission questions. According to the statements, this cluster experienced the most flight shame. Therefore, this hypothesis can be confirmed.

H1d: *Individuals identifying as 'green' experience more flight shame.*

Again, cluster G identifies themselves most as ‘green’ and experiences the highest level of flight shame. This hypothesis can be verified.

H2a: *Individuals with higher incomes fly more and experience more flight shame.*

Cluster G measured the highest income. Moreover, this cluster travels the most by air. As previously stated, this cluster experienced the highest level of flight shame. Therefore, this hypothesis is verified.

H2b: *Individuals with higher education exhibit more environmentally conscious behaviour and flight shame.*

In cluster G, the respondents had the highest level of education and took the most sustainable actions. Additionally, there was strong significance in education, which verified this hypothesis.

H2c: *Older people experience more flight shame than younger people.*

Clusters B and C had the lowest average age and experienced the least flight shame. In contrast, cluster G was the oldest on average and experienced the most flight shame. The strong significance of age supports this hypothesis.

5. GENERAL DISCUSSION

After the analysis, the following section presents the general discussion. It further addresses the theoretical implications.

This study aimed to identify the factors involved in experiencing flight shame. This was accomplished by including several variables. The data was acquired through a quantitative online survey. After the data preparation phase, descriptive statistics and cluster analysis were constructed to assess the sample distribution based on individual characteristics and age.

After analysing the results, it was discovered that the outcome corresponded to the hypotheses. The results will be discussed along the lines of the theories. Starting with the demographic characteristics that influence flight shame. In the younger clusters (B and R), 60% of respondents had heard of flight shame. In comparison, almost 80% of the older cluster (G) had heard of the flight shame phenomenon. Among the two cohorts, the results showed that the older cluster (G) experienced more flight shame than the younger cluster (B and R). This is consistent with the findings that younger people have less awareness of flight shame than older people (Centraal Bureau voor de Statistiek, 2024). These findings are supported by Morrison and Beer (2016), who stated that older are more environmentally conscious than younger ones. Moreover, this study links knowledge and age. The results showed that the older cluster (G) overestimated the climate impacts by airlines more than the younger ones (B and R). This contradicts Morrison and Beer's (2016) research. In theory, older people should be better at estimating due to their knowledge since this grows simultaneously. According to Chiambaretto et al. (2021), knowledge determines the degree of flight shame. The study stated that a lack of knowledge about environmental impacts can lead to misperception and flight shame. The results can confirm the connection between overestimation and the degree of flight shame.

Moreover, education level is a factor that can influence flight shame. In the theory, Jagers (2009) and Hondroyiannis et al. (2024) establish a correlation between education level and environmental awareness. This is consistent with the results that cluster G, with the most flight shame, has the highest education level. Another demographic characteristic related to flight shame is income. The results showed that cluster G has a higher income and flies an average of 3.8 times annually. This number is similar to the results of the research of Pan and Truong (2020), which stated that older people fly more than three times a year. In contrast, clusters B and R fly an average of 3 times yearly. This is in line with the research by Randles and Mander (2009) and Gößling et al. (2020) that shows that people with higher incomes fly more frequently. These findings contradict the research indicating that younger people (18-35 years old) fly more often than older ones (36-55 years old) (Centraal Bureau voor de Statistiek, 2024).

One of the complementary factors impacting flight shame is the necessity of air travel. The study by Gößling et al. (2019) indicates that passengers often describe their air travel as meaningful and of high value. This valuation can be linked to the fact that air travel is hence classified as necessary or unavoidable. The results showed that clusters B and R use air travel for leisure purposes more often than cluster G. This is in line with the findings of Pan and Truong (2020), which state that the primary purpose of air travel for younger people is leisure.

As a result, older people (cluster G) also find their trips more often unavoidable, as air travel has a different purpose (e.g., business). Regarding the distance factor, older people fly shorter distances than younger ones and are considering more alternatives. According to Schmidt et al. (2023), flight distance contributes to flight shame.

As previously discussed, the results have shown that cluster G experiences the most flight shame. In addition, they do see themselves as more sustainable people. Research by Randles and Mander (2009) shows that even those who identify as green consumers use air travel. Nevertheless, this cluster is more willing to reduce their air travel compared to the younger clusters B and R. In addition, the results showed the extent to which respondents participate in environmentally conscious actions. It was found that cluster G performs significantly more actions than clusters B and R. As discussed earlier, cluster G identifies with green consumers. According to Randles and Mander (2009), this could mean they can fly because they compensate in other areas in their daily lives.

These findings are consistent with McDonald et al.'s (2015) research on the attitudes and behaviours of green consumers. The research presented four strategies for how these consumers behave. Although cluster G indicates that they will fly less, this does not confirm that they will adjust their flight frequency. This aligns with Schrems and Upham (2020), which link the personal conflict between environmental attitude and personal flying behaviour in the cognitive dissonance theory. This means that, according to the theory of McDonald et al. (2015), they fit between strategy 1 (no change) and 2 (reducing flying). The fact that cluster G flies the shortest distances but does experience the highest degree of sustainability contradicts the research of Cohen et al. (2011). It is explained that the passengers who fly short distances do not critically examine its effects. On the contrary, this research shows that respondents who fly the shortest distances are most aware of the impact.

In conclusion, the insights and interrelationship between distance, age, and attitudes to air travel have led to cognitive dissonances among the younger generation due to the younger generation being aware of the effect but not adjusting air travel behaviour accordingly (Schrems & Upham, 2020).

6. CONCLUSIONS

This section is dedicated to answering the research questions presented in section 1. The research questions of this study were as follows:

'What individual characterises determine higher levels of flight shame?'

'Is age important to determine flight shame?'

The literature review and the data obtained from the survey will form the foundation for answering the research question and formulating the conclusions of this research.

The phenomenon of flight shame was the focus of this research. This concept originated in Sweden in 2018 as flygskam. This survey showed that two-thirds of the respondents were familiar with the concept of flight shame. According to the established definition, flight shame arises from a feeling of shame and guilt towards air transportation that results in environmentally conscious and responsible behaviour based on social and personal norms, necessity, and perception (Gößling et al. (2020), Wolrath Söderberg & Wormbs (2019), Mkono (2020), Henley (2021), Chiambaretto et al. (2021), and Hesse & Rünz (2020).

After comparing the results alongside the theory, it can be concluded with significance that older people experience more flight shame than younger people. The results showed that the higher the age, the more flight shame experienced. Similarly, when the ages are placed in the generations, it has been found that the older generation (Gen Y) is more aware than the younger generation (Gen Z). This statement is supported by research (Centraal Bureau voor de Statistiek, 2024). Another demographic characteristic that can be correlated is education level. The average education level was higher among older people and was found to be significant in relation to age. The fact that education level is an essential factor in determining flight shame is supported by the studies of Jagers (2009) and Hondroyiannis et al. (2024). Another factor influencing flight shame is to which extent individuals identify as green. This is consistent with the findings that the same group considers more alternatives. The correlation between green people and looking for alternatives was significant. These factors indicate sustained attitudes toward the necessity of air travel.

The conclusion of this study is based on answering the research questions. The primary individual characteristics that influence flight shame are age and education level. In addition, the extent to which individuals identify themselves as green is important in correlation to the level of considering alternatives. These characteristics were found to be significant in the research.

6.1 Implications

The development of the definition, combined with an extensive literature review, has ensured that a powerful theoretical framework has been established in this area of research. The insights gained into the factors influencing flight shame among the individual characteristics will

reinforce the literature, especially the findings related to the significance between age and education level, which provide new insights.

6.2 Limitations and Implications for Future Research

The results from this study are not devoid of limitations. The respondents were acquired from the author's network. This ensured bias, as most respondents were from the Netherlands. The sample size (N = 228) may need to be increased to produce representative results (Saunders et al., 2012). In addition, descriptive statistics and cluster analysis were used for this study to summarise and analyse the data, which applied to the dataset size. Due to the time frame set for this thesis, a more extensive analysis was not feasible. The limitations discussed provide opportunities for future research. A method applicable to a larger sample size could lead to new insights because the data will have no biases. In addition, a change in sample size would lead to more sophisticated statistical data processing. As a result, advanced analyses could be done to determine the links between individual characteristics and fly shame.

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ANNEXES

Annex 1. Demographic Questionnaire

Question		Type of data	Measurement scale
1	**Age**	Numerical	Open field
2	**Gender**	Categorical	Female, Male, Other
3	**Occupation**	Categorical	List of occupations
4	**Nationality**	Qualitative, categorical	List of countries
5	**Country of residence**	Qualitative, categorical	List of countries
6	**Household size**	Qualitative, categorical	Household members
7	**Education**	Qualitative, categorical	Levels of educations
8	**Household income**	Ordinal	List of income intervals
9	**Reaching the end of the month**	Qualitative, Demi	5-point Likert scale

Annex 2. Operationalization of Questionnaire

Question		Explanation	Reference
10	**Number of trips**	The effect on the number of trips on air travel	Open field
11	**Trips registration**	Calculating the air travel distance	(IATA, n.d.)
12	**Reasons**	Necessity of air travel	Gößling et al. (2019)
13	**Distance**	Measure quantity of air travel	Fraport AG (UEW-MF), 2023
14	**Trip Emissions**	Measure knowledge and (mis)perception	Carbon Emissions Calculator, n.d., Chiambaretto et al. (2021) and (European Environment Agency, 2024), IATA CO2 Connect, n.d., (International Civil Aviation Organization, n.d.), (***see Annex 4***)
15	**Industry Emissions**	Measure knowledge and (mis)perception	Aviation, 2023 and Chiambaretto et al. (2021)

16	**Airline choice**	Measures the impact on the price related to flight shame	Gößling et al. (2019), Randles and Mander (2009b) and ("Global Air Transport Outlook to 2030," 2017)
17	**Air travel decision**	Understanding why people are choosing for air travel	Gößling et al. (2019)
18.1	**Statement 1**	Necessity of air travel	Gößling et al. (2019)
18.2	**Statement 2**	Regret towards flying	Andersen (2022)
18.3	**Statement 3**	Air travel behaviour related to climate change	Wolrath Söderberg and Wormbs (2019)
18.4	**Statement 4**	Shame while flying	Gößling et al. (2020), Wolrath Söderberg and Wormbs (2019), Mkono (2020), Henley (2021), Chiambaretto et al. (2021) and Hesse and Rünz (2020).
18.5	**Statement 5**	Necessity of air travel	Gößling et al. (2019)
18.6	**Statement 6**	Considering alternatives	Schmidt et al. (2023) and Gößling et al. (2019)
re18.7	**Statement 7**	Experiencing guilt on flying behaviour	Henley (2021) and Wolrath Söderberg and Wormbs (2019)
18.8	**Statement 8**	Air travel behaviour related to climate change	Wolrath Söderberg and Wormbs (2019)
18.9	**Statement 9**	Reflecting on travel behaviour	Cohen et al. (2011) and Randles and Mander (2009)
18.10	**Statement 10**	Reflecting on travel behaviour	Cohen et al. (2011) and Randles and Mander (2009)
18.11	**Statement 11**	Air travel behaviour related to climate change	Wolrath Söderberg and Wormbs (2019)
18.12	**Statement 12**	Reflecting on sustainable behaviour	Randles and Mander (2009) and McDonald et al. (2015)
19	**Environmentally conscious actions**	Reflecting on sustainable behaviour	Randles and Mander (2009) and McDonald et al. (2015)
20	**Comments**	Qualitative	n/a

Note: All statements were measured on a 5-point Likert scale of 1 (strongly disagree) to 5 (strongly agree). Additionally, questions 18.1, 18.4, 18.5, 18.8, and 18.11 are reverse-coded.

Annex 3. Questionnaire

Dear participant,

My name is Julia Dekker, I am an MSc International Business student at the Universitat de Barcelona. Currently, I am writing my master's thesis, and the results of this survey will add significant value to my research.

This research aims to understand the relationship between demographic factors and flying habits. The data retrieved from this survey will strictly be used for research purposes. Please be aware that your information will be completely anonymous and will be kept confidential.

For any questions/ concerns, please feel free to contact me at: jdekkede8@alumnes.ub.edu

Thanks for your participation!

(Estimated completion time: 5-7 minutes)

Part 1: Introductory questions

1. **Age**
   Open field

2. **Gender**
   a) Female
   b) Male
   c) Other, …

3. **Occupation**
   a) Student
   b) Employed – private company
   c) Employed – public company
   d) Self-employed (freelance)
   e) Unemployed
   f) Retired
   g) Other, …

4. **Nationality**
   List of countries

5. **Country of residence**
   List of countries

6. **How many people, including yourself, live in your household?**
   a) I live alone
   b) 2 persons
   c) 3 persons
   d) 4 persons
   e) 5+ persons

7. **Education**
    a) No education
    b) Primary education
    c) Secondary education (mbo)
    d) Associate's degree (f.e. AA or AS)
    e) Bachelor's degree (f.e. BSc or BA)
    f) Master's degree (f.e. MSc or MA)
    g) Professional degree (f.e. MBA)
    h) Doctorate (f.e. PhD)

8. **What is the total income in your household annually?**
    a) € 0 - € 30.000
    b) € 31.000 - € 60.000
    c) € 61.000 - € 90.000
    d) € 91.000 - € 120.000
    e) More than € 120.000

9. **Statement:** Financially, I can reach the end of the month.
    a) With great difficulty
    b) With some difficulty
    c) Fairly easily
    d) Easily
    e) Very easily

Part 2: Travel Behaviour

10. **How many trips by plane, approximately, do you take per year? Consider that a return flight is counted as 1. (indicate a quantity)**
    Open field

11. **My flights in the last 12 months (Only return flights, only fill them in once)**
    Example: My trips in the last 12 months, 1 return flight to Barcelona from Amsterdam and 1 return flight to Bangkok from Amsterdam via Berlin. Fill in: Amsterdam-Barcelona and Amsterdam-Bangkok (only start and final destination)
    Open field

12. **My main reason for taking flights usually is:**
    a) Visiting Family/friends
    b) Business
    c) Leisure
    d) Other, …

13. Most of my flying trips are:

a) Short haul, 0-3 hours (0-2,500 km)
b) Medium haul, 3-6 hours (2,500-6,000 km)
c) Long haul, more than 6 hours (6,000 km)

14. Imagine a person driving alone from Amsterdam to Barcelona, a distance of approximately 1,240 km. This trip by car would release about 130 kg/person of CO2. Now consider the same person flying the same distance. Compared to the car trip, how many times more CO2 emissions would be generated by the flight per passenger?

a) 0.5 times (half of that of the car)
b) 1 time (similar to the car)
c) 2 times (double that of the car)
d) 3 times
e) 5 times
f) More than 10 times

15. What percentage do you think the aviation industry contributes to worldwide carbon emissions? Fill in a number from a scale of 0-100%.

Open field

16. My most booked airline is…

a) Air France/ KLM
b) Transavia
c) EasyJet
d) Vueling
e) Lufthansa
f) Ryanair
g) Delta Air Lines
h) Emirates
i) Etihad Airways
j) Turkish Airlines
k) Qatar Airways
l) Other,

17. Why do you decide to travel by plane?

a) The price
b) Time savings
c) No other option to reach the destination.
d) Other, …

Part 3: About you

18. Indicate the level of agreement with the following sentences, where 1 = 'Strongly disagree' and 5 = 'Strongly agree'

		1	2	3	4	5
1	I often think that my air travel(s) are unavoidable					
2	I regret flying most of the time					
3	I regularly consider the impact of my flying habits on the climate					
4	I never experience shame while flying					
5	When travelling long distances flying is the only option					
6	I consider alternatives modes of transportation while planning a trip					
7	Often, I experience guilt about my impact on the environment regarding my flying behaviour					
8	I never really thought about the effects of my flying behaviour on the climate.					
9	I could travel less by plane					
10	I would not describe my travel behaviour as excessive.					
11	I rarely feel responsible for the impact on the climate while flying.					
12	When I compare myself with other people in my country, I am behaving in a more sustainable manner.					

19. Do you participate in any environmentally conscious actions?

- o No
- o Reducing consumption
- o Reusing items
- o Separating waste
- o Recycling
- o Eating less meat
- o Using renewable energy
- o Using public transportation
- o Walking or biking short distances
- o Save energy at home
- o Save water at home
- o Eat locally or seasonally
- o Other, …

20. You have completed the survey. Thank you for your time.
Would like to leave a comment or clarify any of your answers?
Open field

Annex 4. Calculation Trip Emission

This calculation corresponds to question 13 in the survey.

There are several calculators online to assess the environmental footprint (e.g., CO2) per passenger of a given flight. For instance:

ICAO - Carbon Emissions Calculator
https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx

IATA CO2 Connect
https://www.iata.org/en/services/data/environment-sustainability/co2-connect/ (Calculator)

We calculated the environmental impact of a 1-way flight from Amsterdam to Barcelona, considering an Aircraft A320 (generally the most widely used), with a high occupation level. Considering several calculators, as mentioned above, most converged to approximately 110 kg of CO2 emission per passenger. Of course, some factors can affect this number, such as the plane altitude, the number of passengers that influenced the weight, etc., but that is a robust estimate. Of course, we are neglecting other pollutants that could be relevant when considering a plane, as compared to a car.

The driving distance from Amsterdam to Barcelona is approximately 1240 km. The average emission of an average (traditional) car is 110 gr/km (CO2 Emissions Performance of New Passenger Cars in Europe, 2024). Therefore, driving alone that distance would pollute 136 kg of CO2 [1,240*110 = 136,400 gr]. Again, some factors can affect the number, like speed, number of passengers, age of the car, and weight, but that is an average estimate.

In conclusion, per passenger, the plane could even release less CO2 than an average car. Consequently, we build the variable of Trip overestimation as follows:

0. A Respondent selecting a value of 0.5, 1, or 2 would be somewhat correct in estimating how many times a flight pollutes more than a car trip.
1. Selecting a value of 3 or more, we consider that they are overestimating air travelling pollution.

Annex 5. Cluster Analysis – Statements

Variables	Total	Clusters (k3)			Mean t-tests		
		GREEN (G)	**BLUE** (B)	**RED** (R)	G-B	G-R	B-R
N	228	57	98	73			
Regret	1.87	3.12	1.61	1.25	***	***	***
Impact	2.67	4.14	2.57	1.66	***	***	***
Shame	2.57	3.46	2.58	1.86	***	***	***
Guilt	2.19	3.51	1.91	1.53	***	***	***
Effects Climate	3.44	4.42	3.87	2.11	***	***	***
Responsible Climate	2.82	3.67	3.17	1.68	***	***	***
Unavoidable	3.05	3.32	3.04	2.85		*	
Long Distance	1.85	1.96	1.85	1.75			
Alternatives	3.41	4.21	3.40	2.81	***	***	***
Travel Less	2.83	3.37	2.71	2.56	***	***	
Excessive	4.06	3.74	3.85	4.59		***	***
Sustainable	3.35	3.49	3.33	3.26			

*, ** and *** denote significance at the 10%, 5% and 1% level, respectively, in the mean t-tests
Source: Own elaboration

Annex 6. Clusters Analysis – Sustainable Actions

Variables	Total	Clusters (k3)			Mean t-tests		
		GREEN (G)	**BLUE** (B)	**RED** (R)	G-B	G-R	B-R
N	228	57	98	73			
Number of Actions (1-11)	5.74	7.19	5.78	4.56	***	***	**
Reduce consumption	0.37	0.60	0.32	0.26	***	***	
Reuse items	0.58	0.74	0.55	0.49	**	***	
Separate waste	0.79	0.88	0.80	0.70		**	
Recycling	0.63	0.79	0.63	0.49	*	***	
Eating less meat	0.58	0.74	0.59	0.44		***	*
Using renewable energy	0.44	0.56	0.46	0.33		**	
Using public transport	0.42	0.6	0.44	0.25	*	***	**
Walk or bike short distances	0.68	0.82	0.67	0.59	*	**	
Save energy at home	0.49	0.53	0.49	0.45			
Save water at home	0.39	0.49	0.38	0.32		*	
Eat locally or seasonally	0.34	0.4	0.38	0.23		*	*

*, ** and *** denote significance at the 10%, 5% and 1% level, respectively, in the mean t-tests
Source: Own elaboration