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Ageing passenger perceptions of ground access journeys to airports: A survey of UK residents

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A B S T R A C T

In common with other developed nations, the UK population is ageing. This has impacts on all areas of economic and social activity, including transport and air travel. This paper aims to provide an initial assessment of the ground access journeys to UK airports made by ageing (65+ years) air travellers, a topic hitherto unexplored by the academic research community. Using data from two online surveys (each with 600 respondents) undertaken in 2020 of 1200 different ageing UK residents, this exploratory research reveals that the ease of undertaking the journey and comfort are key factors in determining ground access choice whilst environmental issues play a minimal role. Whilst this paper offers new insights into the ground access journeys of ageing air passengers, it also makes recommendations for future research that needs to be undertaken to further academic understandings of the needs and attitudes of this important, and growing, passenger segment.

1. Introduction

Improved standards of living, nutrition and medical treatment are extending human life expectancy and enhancing quality of life with the result that global populations are ageing, and an increasing number of older people are travelling. This 'grey boom', however, places particular demands on providers of air transport and airport ground access as older travellers may exhibit distinct and different travel characteristics concerning their propensity to fly, their travel purpose, trip duration, destination, ground access travel preferences, dwell time, familiarity with airport automation and self-service technologies, their use of terminal facilities such as airport information desks, as well as their need for adaptive and assistive technologies.

When considering air journeys, a number of discrete stages can be identified. These can be summarised as: ground access to and from the airport (e.g. by car, taxi or public transport); in the departure terminal and gate area (which includes check-in, border control, security, boarding); onboard the aircraft (including identifying and accessing a seat and stowing hand luggage); and the arrivals process (e.g. disembarkation, border control, customs, baggage reclaim). All of these stages potentially represent challenges for older travellers who may disproportionately experience mobility and other physical and sensory impairments on account of their age. This exploratory investigation into the Air Transport (door-to-door) Journey of Ageing Passengers (ATJAP) seeks to examine passenger experiences and attitudes at the first of these stages, namely travelling to UK airports (i.e. the ground access stage). It does not consider ground access journeys at destination airports.

The focus on UK ageing passengers is both timely and relevant since the population is ageing and the proportion of the ageing population is predicted to increase; by 2050, one in four people in the UK will be aged 65 years and over, an increase from approximately one in five in 2019 (Office of National Statistics - ONS, 2021). In 2019, the average life expectancy was the highest ever, being 83.1 years for females and 79.4 years for males (ONS, 2021).

The overall aim of this paper is thus to provide an initial assessment of the ground access journeys to UK airports made by ageing (65+ years) air travellers in the UK. The structure is as follows. The next section provides an overview of the literature. This is followed by Section 3 which details the methodology. Section 4 discusses the findings of the empirical research while conclusions and recommendations are presented in Section 5.

2. Literature review

In developed nations worldwide, declining fertility rates and increased life expectancy are leading to a growing elderly population. In 2015, 12% of the global population was over 60 years. By 2030, this is estimated to increase to 16% and to 21% by 2050 (ONS, 2018). In

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Europe, 25% of the population is already 60 years of age or older and this figure is expected to increase to 35% by 2050 (OECD, 2018).

There are various ways of defining the ageing, elderly or older population as the public perception of what constitutes being old differs widely, as does the country and cultural context (Schwall, 2012). Statistics on ageing generally categorise older people as being above a certain age threshold. Common definitions are those aged 60 or 65 years or more (United Nations, 2019) or someone who has passed the median life expectancy at birth (World Health Organisation, 2015). Sometimes the ageing population is divided into different categories; for example, within the EU, Eurostat (2020a) defines older people as those aged 65 years or more, and very old people as those aged 85 years or more. Chang and Chen (2012a) identified the 65-74-year-olds as 'younger old' and those aged 75 and above as 'older old'. In reality the ageing process is multi-dimensional, and it has been argued that there are three subcategories of how individuals age beyond chronology: biological, social and psychological (Mathur and Moschis, 2005). However, in research about ageing it is often the constraints of official statistics and surveys used to gather the data that determine the actual definition that is used. Nevertheless, irrespective of the precise definition used, the growth in the ageing population has very considerable implications for all areas of society including health and social care (World Health Organisation, 2015), transport and mobility (Lin and Cui, 2021), employment and income (OECD, 2020), family structure (Blair and Claster, 2021) and housing (Housing Europe Observatory, 2021).

Travel is another important area to consider in relation to the ageing population, with the travel propensity of this age group increasing, not only because this market segment has the time to travel, but also because such travellers are wealthier, healthier and more experienced in undertaking journeys. Moreover, there is less of an expectation that their savings should be left to their offspring and a greater acceptance that such funds should be used for pursuing leisure activities in later life (DJS Research, 2016). Overall, in Europe (before COVID-19) residents over 65 accounted for one in five tourism nights (Eurostat, 2020b). As a result, there has been a growing interest in ageing (or senior) travel research (e.g. Sedgley et al., 2011; Chen and Shoemaker, 2014; Alén et al., 2016; Alén et al., 2017; Nielsen, 2014; Tung and Ritchie, 2011) with Pestana et al. (2020) presenting the most comprehensive overview by undertaking a bibliometric analysis of academic publications between 1998 and 2017. One clear finding from this research is that ageing travellers comprise a number of diverse and heterogeneous consumer groups. As regards to air travel, it is notable that the choice of airline type varies by age. For example, Cho and Min (2018) identified that passengers flying with low-cost operators in the US in 2015 were older than those flying on legacy full-service operators, whilst in Europe charter flights and package tours have traditionally been associated with older passengers (Castillo-Manzano and Lopez-Valpuesta, 2015; Major and McLeay, 2013).

Overall, however, research concerning ageing travellers and their air transport use is scarce compared with the general senior travel literature (exceptions being Graham et al., 2019; National Academies of Sciences, Engineering, and Medicine, 2014; Tretheway and Mak, 2006). Indeed, much of the extant literature on transport and ageing focuses on driving cessation, public transport use and the role of active travel in supporting healthy older age (see among others, Currie and Delbosc, 2010; Holley-More and Creighton, 2015; Mifsud et al., 2017, 2019; Musselwhite and Shergold, 2013), while the impacts of ageing on air travel have been hitherto comparatively unexplored. Fifteen years ago, Burghouwt et al. (2006) recognised that the growth in the number of older or ageing air travellers had resulted in important commercial and operational implications for airlines, airports and national regulators but these ideas have only been developed by a relatively few number of researchers. For example, Chang and Chen (2012a) considered the airport needs and mobility requirements of ageing passengers, and Kim et al. (2017) explored the relative merits of employing alternative level of service (LOS) standards that reflect the ageing profile.

Some ageing passengers can find their air transport journey particularly challenging in relation to wayfinding and mobility, especially if they have a disability or health condition (see Bosch and Gharaveis, 2017). Air travellers of any age who require additional assistance are often described as persons with reduced mobility (PRM). Owing to the increase in the ageing population combined with the growing propensity among disabled travellers to fly, PRMs represent one of the fastest growing demographics amongst air passengers. However, while many older travellers may develop physical or cognitive impairments due to age, there are also many disabled passengers that are of a younger age. A key issue therefore is the extent to which ageing PRMs need to be considered as a unique subset of PRMs requiring special attention, rather than in combination with other PRM groups. It also needs to be assessed whether disability influences the ageing passenger's ability and motivation to fly and travel with confidence and ease. Whilst there is increasing research about PRMs (e.g. Airports Council International – ACI, 2018; Ancell and Graham, 2016; Budd and Ison, 2020; Chang and Chen, 2012b; Davies and Christie, 2017; Poria et al., 2010), there is a dearth of literature addressing the needs of ageing air travellers, with a notable exception being Cochran (2020) who considered overall travel behaviour.

In general, travelling to and from the airport (i.e. the ground access stage of the air transport journey) has received increasing attention in the literature (e.g. Budd et al., 2011, 2014; Ison et al., 2014; National Academies of Sciences, Engineering, and Medicine, 2008; Nix and Mundy, 2017; Ryley et al., 2013). Much of the focus of this research has related to the impact of the ground access journey on overall airport noise levels, air pollution/emissions and congestion. As a result, many airports have set targets and produced policy measures in favour of reducing car use and increasing the use of more sustainable public transport modes. However, whilst reducing car use is a major way in which airports can yield environmental benefits, dissuading car use immediately reduces revenues from car parking and drop-off charges, and so difficult decisions about these trade-offs have to be made.

The academic literature with respect to ageing passengers and ground access is limited. Bauhaus Luftfahrt (2017) suggests that there is a strong preference of ageing passengers to use their own car or, as an alternative, to have friends or family pick-up/drop-off from the airport, which clearly has implications for policies aimed at encouraging greater public transport use. In a study of Taiwanese ageing passengers, Chang (2013) found that the favoured ground access modes were car lifts with families, followed by taking a taxi. Moreover, in assessing the factors affecting airport access mode choice it was found that 'safety' was the most important driving factor followed by 'user friendly' and 'convenience for storing luggage'. Meanwhile the National Academies of Sciences, Engineering, and Medicine (2014) found that the main issues of concern with the ground access stage of the ATJAP were 'trip anxiety', 'following roadway signage', 'using large parking garages' and 'handling heavy baggage'.

COVID-19 has had major implications for ageing passengers and their travel patterns and plans. This is particularly the case since these passengers are some of the most vulnerable with regards to complications arising from contracting COVID-19. There is a growing amount of research focusing on future passenger levels (Gudmundsson et al., 2021), confidence to fly (e.g. Lamb et al., 2020; Ipsos Mori, 2021), the implications for airlines (Sotomayor-Castillo et al. (2021) and airports (Serrano and Kazda, 2020) since the pandemic. However, there has been virtually no mention of ageing passengers and their behavioural influences within this research, apart from a short paper written by Graham et al. (2020). There appears to be a lack of published research on ground access issues, with the exception of Yilmaz et al. (2021), who considered passengers of all ages and concluded that policies trying to encourage public transport are currently difficult due to social distancing and the fear of close proximity, and Mundy (2021) who focused specifically on the challenges facing the US airport ground transportation industry. In summary, it is apparent that there are

significant research gaps in the literature as regards ageing passengers and ground access and their views towards the environment and COVID-19.

3. Methodology

This research focuses on the ATJAP for UK residents. In 2019, 7.9 million international air trips (10% of all international trips) were made by UK residents aged 65 and over (ONS, 2020a). This represented a growth rate since 2009 of 86%, significantly higher compared to the average growth of all trips (57%) over the same ten-year period (ONS, 2020b). However, propensity to fly data (the latest available is for 2014) demonstrates that ageing UK passengers took fewer flights than the overall UK average; only 40% of those aged between 65 and 74 took an air trip in the last year, compared to 48% for all ages. This decreased to only 18% for the 75+ age passenger segment (Department for Transport, 2014). Graham and Metz (2017) also found in a survey of UK residents that less than 50% of those aged 65–74 had taken one air trip in the last year, compared with under 30% for those aged 75+. The existing data though, whilst demonstrating that the UK ageing air passenger market appears to be an important and growing segment, does not provide adequate insight as to whether all actions have been undertaken to ensure inclusivity for the ageing population. Hence this research gathered new data based on two surveys of UK residents aged 65+ undertaken in June 2020 (Survey A) and September 2020 (Survey B). Survey A contained 21 and Survey B contained 22 questions.

The definition of 65 years and over for the 'ageing market' has been adopted as it is commonly used in UK and EU data (e.g. ONS, 2020a; Eurostat, 2020a), and is close to 'official' retirement ages for state pensions (which now vary between 61 and 68) in the UK. The purpose of the initial Survey A was to investigate ageing passenger views and experiences across all stages of the ATJAP. Subsequent research has delved deeper by looking at the individual stages with Survey B being focused solely on the ground access stage of the journey (i.e. the getting to and from the airport). The results presented in this paper are primarily obtained from Survey B, but some limited findings are also discussed from Survey A in order to provide the total journey context.

The surveys were undertaken during the COVID-19 pandemic and UK national lockdown. Consequently, it was not possible to undertake face to face surveys at airports or on journeys to the airports. This limited the approach to online surveys and Kantar, a global market research agency, was commissioned to administer them. Kantar has access to large databases of UK residents with different characteristics who are potential 'research-ready permission-based' participants that are recruited through a variety of sources to minimise bias. The company undertakes quality checks of their databases and have been used by the UK Government (Kantar, 2020). Specific participant conditions were met through age filters (to ensure participants were aged 65 or over) and travel history screening questions (to ensure participants had undertaken at least one trip by air in 2019) and a completely different sample of 600 participants was involved in each survey, with each one being closed once this target number had been reached.

The questionnaire was designed to take 5–10 min to complete and was conducted using the Qualtrics survey platform. The draft questionnaire was piloted with carefully selected aviation academic colleagues, and this resulted in some minor changes being implemented. It was also piloted by Kantar with five of their participants before the launch of the survey.

Table 1 provides the profile of the participants in both surveys. By far the greatest number of participants were aged between 65 and 74, the 'younger old' as defined by Chang and Chen (2012a). This is because the propensity to travel by air declines during the more elderly years (as discussed above) and there are far fewer travellers that are 'older old' or over 75. Our sample was typical of the ageing passenger profile at UK airports, and we are confident that it was representative of the population it sought to investigate. For example, CAA data shows that for the four largest London airports (Heathrow, Gatwick, Stansted, Luton) and the three largest regional English airports (Birmingham, Bristol and Manchester) by passenger numbers in 2019, 76–81% of ageing passengers were in the 65–74 age range, 18–23% in the 75–84 age range and only 1–2% in the 85+ age range (CAA, 2020). The gender of participants was evenly balanced and 70–80% made one or two air trips in 2019. A small number declared that they had a disability or health condition when they last flew.

Table 1
Profile of survey participants.

Age	% Share	Gender	% Share	Air trips (*) in 2019	% Share	Disability or health condition (+)	% Share
SURVEY A (n=600)							
65–69	44.7	Male	50.7	1	35.8	Yes	13.2
70–74	34.0	Female	49.3	2	32.0	No	86.8
75–79	16.3			3	18.3		
80–84	4.3			4	8.0		
85+	0.7			5+	5.8		
Total	100.0	Total	100.0	Total	100.0	Total	100.0
SURVEY B (n=600)							
65–69	49.8	Male	57.0	1	48.7	Yes	12.3
70–74	29.8	Female	43.0	2	31.3	No	86.3
75–79	14.3			3	7.5	Not stated	1.3
80–84	5.3			4	7.2		
85+	0.7			5+	5.3		
Total	100.0	Total	100.0	Total	100.0	Total	100.0

Notes: The numbers may not add to 100% due to rounding.
(*) Outbound and return flights and any transfers counted as one trip.
(+) The question asked was *'Do you have a disability or health condition that made flying, getting to/from and using the airport difficult in your last trip in 2019? This could be a physical disability or health condition (e.g. affecting your movement, balance, vision or hearing) or non-physical disability or health condition (e.g. affecting thinking, remembering, learning, communications, mental health)?.*

Various statistical tests were used to assess the associations between the variables depending on the nature of the variables. Specifically, one-way within-subjects ANOVA tests (also known as one-way repeated-measures ANOVA tests), one-way between-subjects ANOVA tests and chi-square tests for independence were undertaken to assess the statistical significance of the results and to eliminate findings that might just be attributed to chance using the software package SPSS Statistics 27 (IBM Corporation, 2020). The within-subjects ANOVA was used when looking at the participants responses to different questions on the questionnaire (which use the same scale) to assess whether there was a significant difference between the means of the responses to the different questions. The one-way between-groups ANOVA was used when looking at the participants response to one question (the dependent variable) in relation to another (the independent variable) to assess whether there were significant differences in the means of the dependent variable. Chi-square was used to assess whether there was a significant association between two variables in responses to two questions. The strength of the association between the variables in each case (i.e. the amount of variance of one variable explained by the other variable) was assessed using effect size statistics. More details are provided in Table 2.

4. Findings

97% of the last 2019 air trips made by participants in Survey A were for leisure purposes (holiday/short break 81.5% and visiting friends and relatives – VFR 15.2%), reflecting the small amount of business trips undertaken by this age group which has almost entirely reached the official retirement age (i.e. 66 in the UK in 2020) (Table 3). The data show that an aggregated 81% reached the airport by car with almost 40% parking the car at the airport and 20% using a taxi/minicab/Uber. Only 17% used public transport or any means of collective transport to get to the airport. This relatively high car use could possibly be

Table 2
Summary of statistical tests used.

Test used	Test statistics	First variable	Other variables (italics show statistically significant associations)
One-way within-subjects ANOVA (Survey A)	Wilks Lambda statistic converted to the F ratio to determine significance (p-value <0.05) and used to calculate partial eta squared value to assess effect size (0.01 – small, 0.06 - medium, 0.14 - large)	Satisfaction levels (dependent variable)	*Different stages of the air transport journey* (independent variable)
One-way between-groups ANOVA (Survey B)	F ratio to determine significance (p-value <0.05) and used to calculate partial eta squared value to assess effect size (0.01 – small, 0.06 - medium, 0.14 - large)	Satisfaction levels (dependent variable)	*Different transport modes, distance*, purpose, group size, trip frequency, age, gender, disability (independent variables)
One-way between-groups ANOVA (Survey B)	F ratio to determine significance (p-value <0.05) and used to calculate partial eta squared value to assess effect size (0.01 – small, 0.06 - medium, 0.14 - large)	Influence of environmental impacts (dependent variable)	*Different transport modes*, distance, purpose, group size, trip frequency, age, gender, disability (independent variables)
Chi-square for independence (Survey B)	Chi-square statistic to determine significance (p-value <0.05). Cramer's V used to assess the effect size (depends on variable category number but generally small =<0.1, medium =<0.3, and large =<0.5). At least 80% of cells must have expected frequencies of 5 or more.	Transport mode	*Distance, purpose, group size*, trip frequency, age, gender, disability
Chi-square for independence (Survey B)	Chi-square statistic to determine significance (p-value <0.05). Cramer's V used to assess the effect size (depends on variable category number but generally small =<0.1, medium =<0.3, and large =<0.5). At least 80% of cells must have expected frequencies of 5 or more.	Influence of COVID-19	*Trip frequency*, age, *gender, disability*

Table 2 (*continued*)

Test used	Test statistics	First variable	Other variables (italics show statistically significant associations)
	expected frequencies of 5 or more.		

Table 3
Characteristics of last air transport trip in 2019 (Survey A).

Purpose of travel	% Share	Mode of transport to access the airport	% Share
Holiday (5 days or more)	72.8	Bus/coach	5.7
Holiday (short break, 1–4 days)	8.7	Train	9.8
Visiting friends and relatives	15.2	Tube	1.8
Visiting second home	0.8	Taxi/minicab/Uber	26.7
Business	1.7	A lift from a family member or friend	14.8
Medical	0.3	Own car or one driven by a travelling companion parked at the airport	39.8
Other	0.5	Other	1.3
Total	100.0	Total	100.0

explained by the more limited mobility of some of the ageing passengers, who might prefer to be dropped off close to the terminal building and to avoid public transport (with potentially more complex journeys with their luggage and longer walking distances).

In comparison, general car ground access usage data for all ages in 2019 from the CAA shows considerably less use for the London airports, but similar car usage elsewhere to Survey A (Heathrow 60%, Gatwick 49%, Stansted 47%, Luton 56%, Birmingham 78%, Bristol 78% and Manchester 79% - CAA, 2020). Counted within these all-age car usage numbers was taxi/minicab/Uber which varied between 10% at Stansted and 32% at Heathrow, and so was broadly comparable with the 20% value from Survey A. Survey B investigated this issue further by considering different departure airports (see below). All this data relates to outbound trips from UK airports although it is reasonable to assume that this will be similar for inbound trips when residents return and travel back to their home. The CAA makes this assumption in their airport surveys for weighting purposes.

Using a private car (or taxi) rather than relying on shared services with others, as with the rest of the stages of the ATJAP, may help explain the participants' answers when asked about their experience of the different stages of their last air transport journey. Fig. 1 shows that the highest levels of satisfaction were achieved on both the journey to and from the airport with 70% and 62% respectively being extremely satisfied. The mean average satisfaction scores were also the highest for these two stages of the journey (Table 4). A within-subject ANOVA test, which can be used to assess the statistical significance of participants' responses (the dependent variable) to two or more different questions (the independent variable) using the same scale (in this case satisfaction levels for the different stages of the ATJAP) shows that there is a statistically significant difference at the $p < 0.05$ level in these satisfaction scores for the different stages (Wilks' Lambda = 0.80, $F(6, 594) = 25.09$, $p < 0.001$) with a multivariate partial eta squared value of 0.20 suggesting a large effect size.

As identified above, a small proportion of the participants (13%) stated that they had a disability or health condition that affected their last trip. Around half of these (38 out of the 79 participants) had asked for assistance at the airport before they travelled. All the disabled participants were asked to rank the journey stages in the order that they

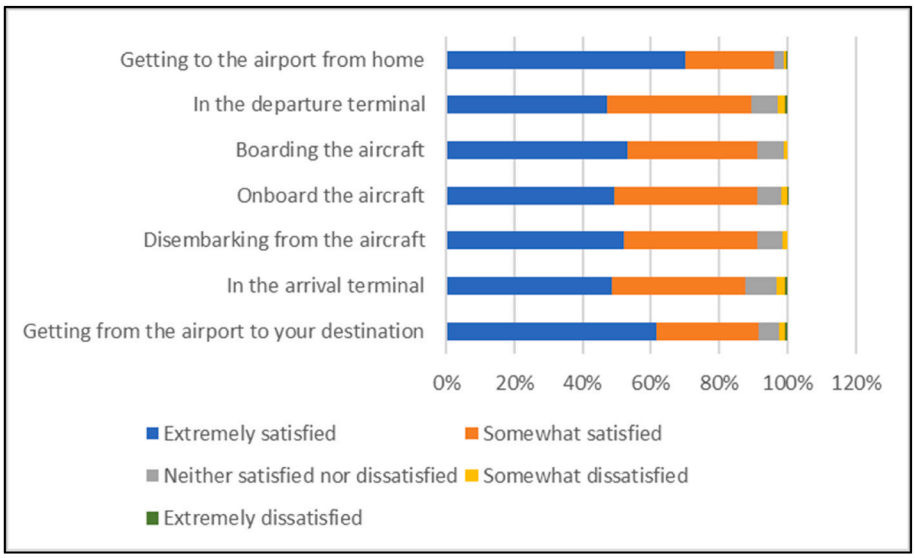

Fig. 1. Satisfaction with the different stages of the air transport journey (Survey A).

Table 4
Satisfaction mean and standard deviation (SD) scores with the different stages of the air transport journey (Survey A).

	n	Mean	SD
Getting to the airport from home	600	4.65	.62
In the departure terminal	600	4.33	.77
Boarding the aircraft	600	4.43	.69
Onboard the aircraft	600	4.39	.71
Disembarking from the aircraft	600	4.42	.69
In the arrival terminal	600	4.33	.80
Getting from the airport to your destination	600	4.50	.75

Note: The satisfaction scores are 1 = extremely dissatisfied, 2 = somewhat dissatisfied, 3 = neither satisfied nor dissatisfied, 4 = somewhat satisfied, 5 = extremely satisfied.

found the most difficult in relation to their disability or health condition. Fig. 2 shows that the fewest difficulties were encountered on the way to and from the airport as well as onboard the aircraft. This suggests that the ground access stage of the journey is the least challenging for disabled passengers. However, people who did not identify a disability or health conditions were not asked the same question and so it is not certain whether these responses were actually influenced by the participants having a disability. The results from Survey A which considered all stages of the ATJAP, suggested that the ground access stages of the journey from home were generally viewed in a more positive light than the other stages. However, the specific data collected concerning ground access were limited and so Survey B focused particularly on this stage.

As with Survey A, the last 2019 air trip for participants in Survey B was mostly for holiday and VFR reasons (Table 5). Likewise, around 80% used the car as the mode to travel to and from the airport. With this survey it was possible to identify which departure airport was used. Whilst the modal split was fairly similar for London vs regional airports, train use was higher for the London airports, and lifts from family and friends were higher for the regional airports. This may reflect the better provision of public transport (especially train) for the London airports,

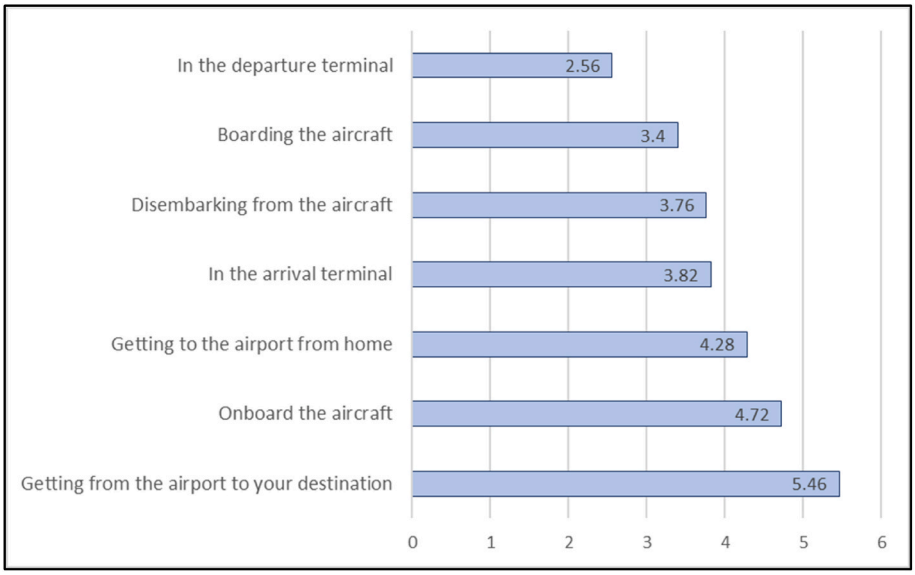

Fig. 2. Relative difficulties associated with the air transport journey stages and participants with a disability or health condition: mean score of rankings (Survey A). Note: Participants were asked to rank the stages 1–7 with 1 being the most difficult, so the lower the mean score of responses, the more difficult the stage.

Table 5
Characteristics of the last air transport trip in 2019 (Survey B).

Purpose of travel	% Share	Mode of transport to the airport	% Share - all departure airports	% Share – London departure airports	% Share – regional departure airports
Holiday (5 days or more)	74.5	Bus/coach	7.7	8.0	7.4
Holiday (short break, 1–4 days)	10.3	Train	10.8	14.0	7.4
Visiting friends and relatives	10.8	Tube	0.5	1.1	0.0
Visiting second home	1.2	Taxi/minicab/Uber	21.7	22.0	23.2
Business	1.0	A lift from a family member or friend	17.7	13.3	21.4
Medical	0.2	Own car or one driven by a travelling companion parked at the airport	38.3	37.1	39.3
Other	2.0	Other	3.3	4.5	1.2
Total	100.0	Total	100.0	100.0	100.0

and the difficulty encountered in using a car, most notably in terms of traffic congestion. Clearly congestion can impact the time a ground access journey takes, and this is all important for what is a time critical journey. However, car use for the London airports was still 72% in this survey, which was significantly higher than in the CAA survey for all ages (i.e. 47%–60%) (CAA, 2020). By contrast for the regional airports, the 65+ aged passenger and all passenger shares were more comparable. This suggests that although train use for ageing participants was higher for London airports compared to regional airports, the car was still the dominant mode.

When asked how satisfied the participants were with their transport journey experience from home to the airport, 73% were extremely satisfied and 21% were somewhat satisfied with less than 2% being somewhat/extremely dissatisfied (Fig. 3). This supports the findings of Survey A when most participants appeared satisfied with this stage of the ATJAP, maybe again reflecting the fact that they had the most control over this part of the journey. Participants were asked to add supplementary comments to explain their views and the majority of the negative ones related to congestion on the roads (e.g. *'Road works and traffic delays'; 'Roadworks!'; 'Don't expect much from a journey and the M25* [M25 = main London motorway]*!'; 'Usual M-way traffic congestion'; 'Roads busy, lots of traffic congestion'; 'It is a busy road with many hold ups and the journey time can be unpredictable'; 'Just so busy on motorway'; Traffic was bad and we were delayed')*. For airport operators this is a difficult issue to address.

There were far fewer comments in general about public transport, perhaps because of its lower use. Negative points included: *'Expensive rail fares'; 'Trains from Manchester airport are not always reliable … often long wait if you want a direct train, sometimes train very crowded and little luggage space'; 'Journeys of that length aren't very enjoyable but the hassle of attempting to get to Gatwick by public transport (there is no railway station where we started from) and particularly having to travel back by night made a car the only sensible option for us'*.

Parking and drop-off at the airport also raised some negative comments; *'Easy but expensive parking at the airport'; 'We had difficulty finding our allocated parking space'; 'Drop off restrictions apply at the airport so had to walk the last few minutes'; 'Had to pay a drop off* fee'.

In a few cases there was evidence of travel plans to the airport being significantly influenced by the need to reduce the stress levels involved (e.g. *'Easier to get accommodation at airport complex and walk across road to airport takes the stress of worrying if the motorway is closed. So take taxi day before and stay overnight'; 'Travel up the night before so I would not be late for the journey in the morning'; 'The large roundabout at the entrance to the airport is EXTREMELY difficult to navigate from certain directions ….to the point that I will no longer travel there by car')*.

Satisfaction declined somewhat with distance from the participant's home to the airport (Table 6) (the highest mean scores were obtained for distances up to 80 miles) with a statistically significant difference using a one-way between-groups ANOVA. This test assessed the statistical significance of the responses of different groups of participants (the independent variable – in this case different groups by distance) to the satisfaction question (dependent variable) at the $p < 0.05$ level for the

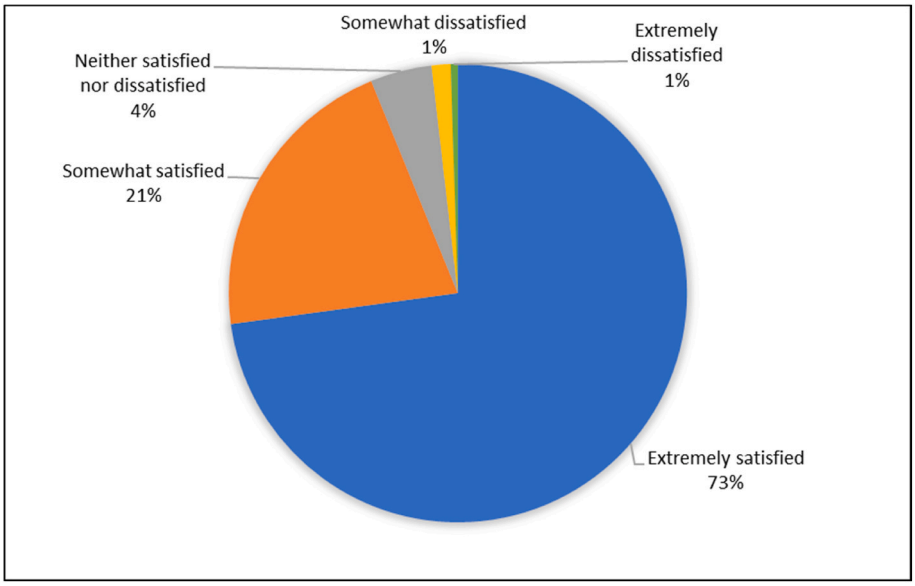

Fig. 3. Satisfaction with their transport journey experience from home to the airport (Survey B).

Table 6
Satisfaction scores with transport from home to the airport by distance and mode (Survey B).

Distance between home and the airport	n	Mean	SD	Transport mode	n	Mean	SD
1-20 miles	166	4.81	.45	Bus/coach	46	4.42	.72
21-40 miles	152	4.70	.59	Train	66	4.12	1.05
41-60 miles	87	4.61	.67	Tube	3	4.67	.58
61-80 miles	60	4.63	.66	Taxi/mini-cab/ Uber	131	4.80	.47
81-100 miles	52	4.29	1.04	A lift from a family member or friend	108	4.90	.30
101-200 miles	64	4.45	.82	Own car or one driven by a travelling companion	232	4.62	.68
>200 miles	19	4.53	.84	Other	14	4.79	.43
Total	600	4.64	.68	Total	600	4.64	.68

different distances (F (6,593) = 5.5 $p < 0.001$), although the partial eta squared value of 0.05 indicated a small effect just below the 0.06 threshold guidelines for a medium effect. Moreover, satisfaction was the lowest for those who travelled by bus/coach and train. There was a statistically significant difference using the one-way between-groups ANOVA test at the $p < 0.05$ level in satisfaction scores (the dependent variable) for the different modes (the independent variable) (F (6,593) = 12.5 $p < 0.001$), with the partial eta squared value of 0.11 indicating a medium effect. By contrast, no statistically significant differences were found to exist with the participants' purpose of travel, group size and profile independent variables (i.e. trips frequency in 2019, age, gender, disability).

Table 7 shows the transport mode used by purpose of travel, distance travelled and travel group size. Public transport usage for long holidays was lower than for other purposes, perhaps due to the inconvenience on carrying more luggage for such trips. As expected, taxi use and lifts from family and friends were more popular options for shorter journeys whilst cars were used for around half of all journeys longer than 40 miles (except >200 miles), maybe because public transport options became more complicated for longer distances. Public transport use was most popular when participants were travelling on their own, perhaps suggesting that it is less convenient (and maybe more expensive) when participants are travelling in a group. Chi-square tests for independence which can be used to assess the statistical significance of the association between one variable (in this case transport mode) and others (in this case the trip characteristics and profiles of the participants) found that these were statistically significant associations (using the assumption that at least 80% of cells must have expected frequencies of 5 or more): Purpose (χ^2(9, n = 600) = 47.49, $p = 0.000$, Cramer's V = 0.16); distance (χ^2(18, n = 600) = 77.47, $p = 0.000$, Cramer's V = 0.21); group size (χ^2(15, n = 600) = 68.83, $p = 0.000$, Cramer's V = 0.20). The Cramer's V values indicate medium effect size. However, there were no statistically significant associations with the participants' profiles (i.e. trips frequency, gender, age and disability).

The participants were asked about the factors that influenced their choice of transport when travelling to the airport, each being able to list as many factors as were relevant (Fig. 4). By far the most important factor was ease of undertaking the journey (i.e. how many changes were required) followed by the comfort of the transport option. The timing of the flight was the third most important factor, presumably because this affects the availability of public transport, congestion of roads and other issues such as personal safety. The price of the transport option was ranked fourth. While it might have been expected that pricing would be more influential given that price sensitive leisure (as opposed to business) travel was being considered and that most 65+ aged passengers are not working but retired, many have reasonable or generous pensions and may also have access to free or discounted rail and bus travel. The price of airport parking was also identified by some but was only ranked seventh in order of importance. Some issues that might be assumed to be very relevant to 65+ aged passengers, such as walking distances, amount of luggage and ease of accessing information were mentioned but less often.

When asked to provide supplementary comments about ground access choice, only one participant mentioned the environment (*'The environment … so choose public transport as much as possible'*). However, as discussed above, many airports have developed ground access policies aimed at reducing the harmful impacts of car travel on the environment, and so a further specific question was included to cover this area, namely to what extent environment impacts had influenced the types of surface transport chosen (Fig. 5). Two thirds of the participants stated that the environment had not influenced their choice at all, with a further 12% stating that it had only influenced their choice 'a little'. Only 5% stated that the environment had influenced their choice 'a great deal' or 'a lot'. However, lack of data for all UK passengers means that it is not possible to determine whether this comparatively low concern for the environmental impact of ground access travel is typical of all

Table 7
Mode of transport from home to the airport by travel purpose, distance and travel group size (Survey B).

Purpose (a)				Holiday (5 days+)	Holiday (short break)	VFR	Other (+)	Total
Public transport (*)				77	20	22	10	129
Taxi				118	3	8	2	131
Lift				69	12	20	7	108
Car				182	28	15	7	232
Total				446	63	65	26	600
Distance (miles) (b)	**1–20**	**21–40**	**41–60**	**61–80**	**81–100**	**101–200**	**> 200**	**Total**
Public transport (*)	32	23	22	14	13	15	10	129
Taxi	56	36	15	9	8	5	2	131
Lift	44	34	11	6	6	6	1	108
Car	34	59	39	31	25	38	6	232
Total	166	152	87	60	52	64	19	600
Travel group size (c)		**1**	**2**	**3**	**4**	**5**	**6+**	**Total**
Public transport (*)		44	48	26	2	4	5	129
Taxi		13	60	36	9	9	4	131
Lift		13	46	24	13	5	7	108
Car		18	129	53	19	9	4	232
Total		88	283	139	43	27	20	600

Notes: (a) 1 cell (6.3%) has an expected count less than 5. The minimum expected count is 4.68. (b) 3 cells (10.7%) have an expected count less than 5. The minimum expected count is 3.42. (c) 4 cells (16.7%) have an expected count less than 5. The minimum expected count is 3.60.
(+) 'Other' purpose = visiting second home, business, medical and 'other'.
(*) Public transport = bus/coach, train, tube and 'other'.

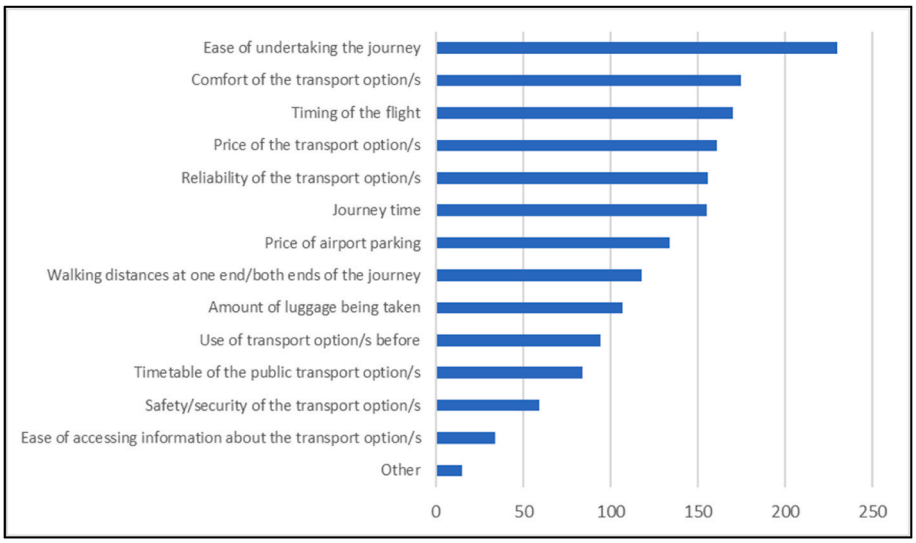

Fig. 4. Factors influencing choice of transport to the airport (more than one choice allowed) (Survey B).
Note: The most common factor under 'other' was when surface transport was included as part of the holiday package or provided by the airline.

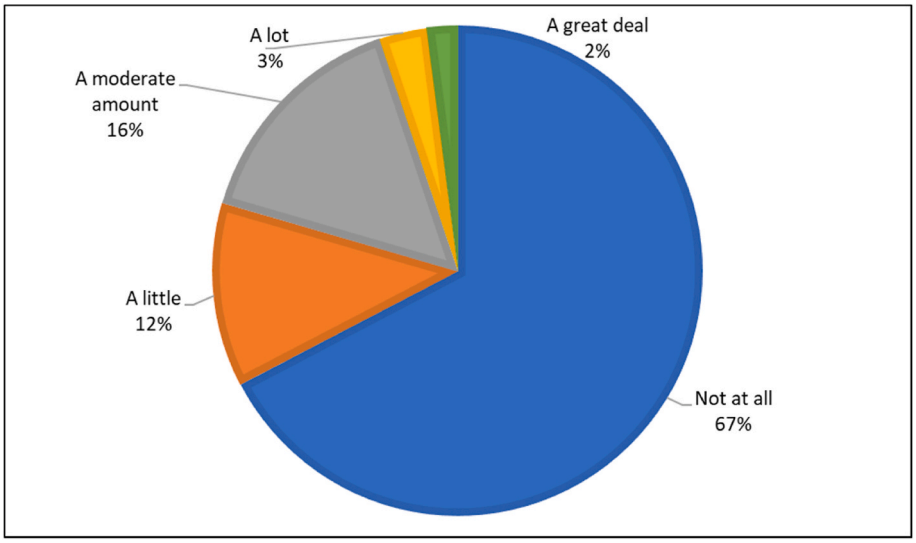

Fig. 5. Influence of environmental impacts on the surface transport choices (Survey B).

passengers or whether the 65+ aged passengers have distinct views. It may also be that those most worried about the environment have avoided travelling by air completely.

Some of the supplementary comments again provide insight into the participants' perceptions and attitudes with respect to the environmental impact. For example: *'I used electric trams for journey and believe this to be more environmentally friendly'; I always use this combination of taxi/Metro to travel to/from Newcastle Airport; the fact that of the available options it has the least negative effect on the environment is a 'bonus'; 'My car has a diesel engine with very little emissions so I was happy to take my own car'; 'less pollution in private cars, local taxis belch out black smoke'; 'a bus does not affect the environment'*.

Others gave reasons for not considering the environment *'Could not have easily chosen a 'greener' means of transport'; 'Using my own car was sensible as I have a mobility impairment. Luggage only needed stowing once. No need to get to coach stations at strange times. The environmental impact of 200 miles was negligible'; 'I only want a reliable service and one vehicle is not going to make that much difference. If it wasn't a taxi it would be my own vehicle'*.

Others explained why the environment was of no concern. *'We were picked up the door and dropped off right outside the departure lounge. When it comes to the environment, our comfort comes first'; 'In my list of needs ease and convenience comes before environmental issues'; 'Just wanted to get away on holiday and was not worrying about anything else at that time'*.

The most detailed comment was*: 'Ideally I would NOT use my own car (any car) as it does NOT help the environment BUT, 1. Alternatives would also hurt environment (bus/train/taxi) 2. Need to carry luggage on alternatives more difficult 3. Most "planet helpful" variation would require a "4 mode mix of walk/bus/train/bus" and would take around 3 h in total instead of our usual 1 h 4. We are BOTH over 70 - convenience takes precedence - we salve our conscience by ONLY doing this once a year instead of previous years when it was 3/5 times'*.

Table 8 shows that those using bus/coach or train were most influenced by the environmental impacts, perhaps suggesting that they made the conscious decision to use public transport rather than car. Using a one-way between-subjects ANOVA test to assess the statistical significance of the environmental responses for groups of participants divided up in different ways, there is a statistically significant difference at the $p < 0.05$ level in environmental influence scores (the dependent variable) for the different transport modes (the independent variable) (F (6,593)

Table 8
Influence of environmental impacts on the surface transport choice by transport mode used (Survey B).

Transport mode	n	Mean	SD
Bus/coach	46	2.02	1.09
Train	66	2.00	1.27
Tube	3	1.33	.58
Taxi/mini-cab/Uber	131	1.38	.77
A lift from a family member or friend	108	1.57	.90
Your car or one driven by a travelling companion	232	1.55	.98
Other	14	1.71	1.20
Total	600	1.61	.99

Note: The environmental scores are 1 = not at all, 2 = a little, 3 = a moderate amount, 4 = a lot, 5 = a great deal.

= 4.6 $p < 0.001$) although the partial eta squared value of 0.04 indicated just a small effect, below the 0.06 threshold guidelines for a medium effect. No other significant differences with any other independent variables were identified.

Finally, the coronavirus pandemic was considered, given that it has had a major impact on air travel, not only in terms of the ability to fly in terms of travel restrictions and availability of flights, but also because it had a major impact on passengers' confidence to fly and their perception of a COVID-19 secure environment. Passengers may perceive the various stages of the ATJAP as posing different risks with regards to COVID-19 and so the remaining questions of Survey B focused on this. A relatively small share (19%) of participants were not concerned about contracting COVID-19 during the ATJAP, whereas a larger share (31%) was equally concerned with contracting this during all the stages of the ATJAP (Fig. 6). Moreover, nearly half of the participants were more concerned with contracting COVID-19 with the other stages of the ATJAP and not the ground access stage.

Typical accompanying comments supported this by stating *'planes are cramped and can have many passengers, the car contained three family members'; 'I have more control during the journey to the airport. I have no control when in the airport'; 'The chance of contracting some sort of infection in a sealed tube containing 150 passengers is much higher than in most other forms of transport (especially one's own car)'*. However, a few argued that it was the level of crowding rather than the journey stage which was the most important factor (e.g. *'Anywhere you are surrounded by people in close proximity is a major risk. The shuttle bus from the train station to the airport terminal is more likely to be crowded than the train. This would also apply to a shuttle bus from the parking area'; 'the risk depends on how crowded the various stages are'*).

Given the apparent lesser concern for the ground access part of the journey, a question was asked as to whether the pandemic was actually affecting surface transport decisions, for example as passengers might feel more COVID-19 secure in their private car than travelling on public transport. Just under a third said that it would not influence their decision whilst a larger number said that they were more likely to use private transport (38%) and taxi/minicab/Uber (8%) (Fig. 7).

Explanations included *'Travelling in my car is the easiest option and I have zero chance of getting the virus using this'; 'If we use a taxi and the driver wears a mask and we wear masks the chances of contracting Covid 19 is negligible and we are only coming into contact with one person. If we used public transport there would be several changes and contact with many more people'*. A small percentage (3%) said that they would use public transport more, but it is difficult to infer the rationale for this. There were also some positive comments about travelling by public transport: *'I consider it reasonably safe to travel by rail at off-peak times'; 'I will try travelling at much less busy time on public transport'; 'I can select my seat on the Metro train to include a social distancing measure, but I would not be able to do that on board an aircraft'*.

The impact of participant profiles (trip frequency, gender and disability) on future decision making is shown in Table 9. The share of participants who stated that 'the pandemic will not influence their decision' was a less popular response for those who took only one trip in 2019, as compared to more frequent travellers. This perhaps indicates that regular travellers have more established travel patterns and are more certain of their future travel plans. It was also a less popular response for female participants as opposed to males whilst 'more likely to use private transport' was a more popular response for females as compared with males. Moreover, for disabled participants 'not influencing decision' was a less popular response and 'using private transport' was a more popular response compared to non-disabled participants, suggesting that disabled participants may be more affected in the post COVID-19 era. Chi-square tests for independence (using the assumption that at least 80% of cells must have expected frequencies of 5 or more) indicate that these are statistically significant associations, although the Cramer's V values indicate relatively small size effects: Trip

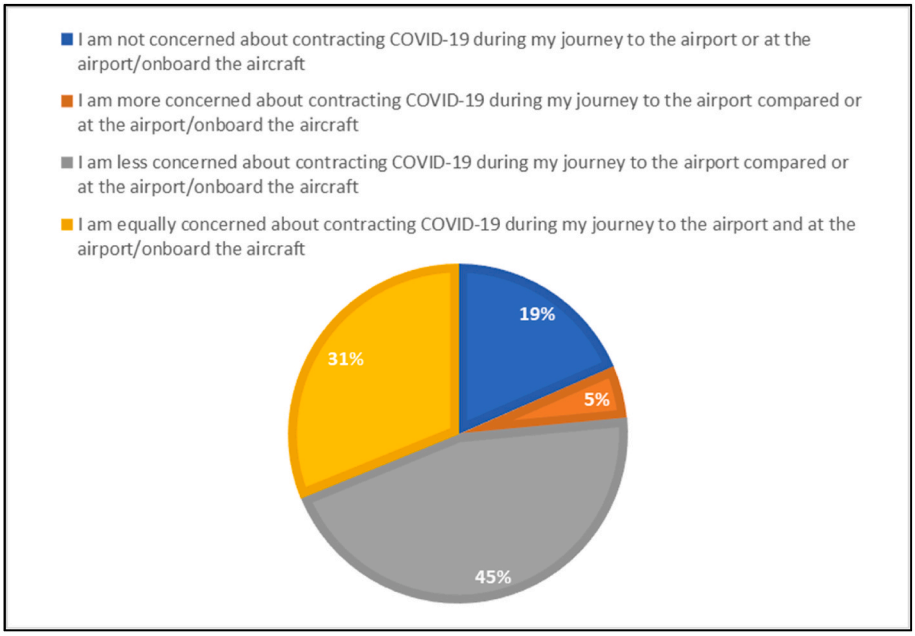

Fig. 6. Concern about contracting COVID-19 and the different stages of the ATJAP (Survey B).

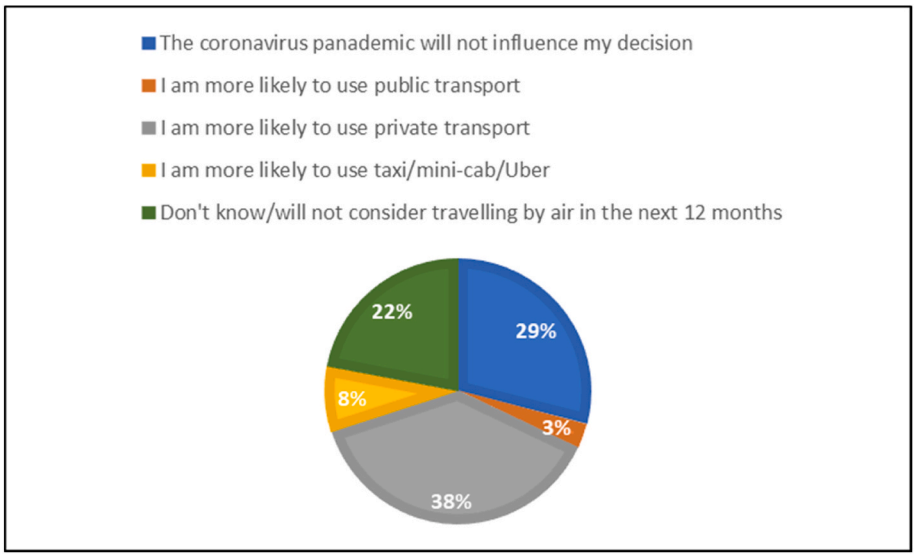

Fig. 7. Influence of the coronavirus pandemic on transport choice to the airport (Survey B).

Table 9
Influence of the coronavirus pandemic on the transport to the airport decision making by trip frequency, gender and disability (Survey B).

Return air trips in 2019 (a)	1	2	3	4+	Total
More likely to use taxi/mini-cab/ Uber	24	18	1	6	49
More likely to use private transport	117	62	21	27	227
More likely to use public transport	8	6	3	1	18
The pandemic will not influence decision	59	69	17	28	173
Don't know/not considering air travel in next 12 months	84	33	3	13	133
Total	292	188	45	75	600
Gender (b)			**Female**	**Male**	**Total**
More likely to use taxi/mini-cab/ Uber			23	26	49
More likely to use private transport			110	117	227
More likely to use public transport			7	11	18
The pandemic will not influence decision			58	115	173
Don't know/not considering air travel in next 12 months			59	74	133
Total			257	343	600
Disability (c)			**No/not stated**	**Yes**	**Total**
More likely to use taxi/mini-cab/ Uber			42	7	49
More likely to use private transport			195	32	227
More likely to use public transport			13	5	18
The pandemic will not influence decision			162	11	173
Don't know/not considering air travel in next 12 months			114	19	133
Total			526	74	600

Notes: (a) 3 cells (15.0%) have an expected count less than 5. The minimum expected count is 1.35. (b) 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 7.71. (c) 1 cell (10.0%) has an expected count less than 5. The minimum expected count is 2.22.

frequency (χ^2 (12, n = 600) = 35.67, p = 0.000, Cramer's V = 0.14); gender (χ^2(4, n = 600) = 9.63, p = 0.047, Cramer's V = 0.13); disability (χ^2 (4, n = 600) = 10.98, p = 0.027, Cramer's V = 0.14). Age (i.e. 65-69, 70–74, 75–79, 80–84, 85+) was not found to be a significant independent variable.

5. Discussion and conclusions

Four key conclusions can be drawn from this research. First, concerning how UK ageing passengers view their ground access experience from home in relation to the other stages of the ATJAP, it is apparent that they consider this stage in a more favourable light and are generally satisfied with this part of the journey. This could well be because they have more control over this aspect of their journey compared with the other stages. Nevertheless, it suggests a need to investigate the other stages in greater detail to identify the key weaknesses within the overall air travel experiences of ageing passengers. At the same time, there is also an opportunity to enhance the ground access experience, particularly for those travelling long distances to the airport or using public transport where satisfaction levels are lower. This presents an opening for further research which focuses on the distance that is travelled (and/or the duration of the ground access journey) and mode choice in relation to passenger needs and attitudes.

Second, in relation to the factors driving the choice of ground access mode from home, as expected this is influenced by travel purpose, distance travelled and travel group size. It has also been found that the ease of undertaking the journey and comfort of the transport option appear to be more important in determining ground access choice than other factors such as price. Hence public transport operators, together with other interested parties (such as the airport operator and airlines) could make sure that as much as possible is done to minimise the ground access changes involved by co-ordinating services, optimising schedules and by ensuring that any changes involved are made as seamlessly as possible by providing detailed and readily available information before the journey, and clear guidance, wayfinding and assistance (if necessary for those carrying luggage or for those with disabilities) during the journey. In other words, an integrated, seamless journey.

Third, the influence of environmental issues on ground access transport choices appears to be limited. In an era when it has become more important than ever to reduce carbon emissions by reducing private car use and increasing the mode share of public transport, more needs to be done to ensure that this message is resonating with ageing passengers and that there are sufficient incentives associated with the availability, quality and pricing of public transport to encourage a mode shift from the private car.

Fourth, as regards the impact of COVID-19, it is apparent that this may well encourage more ageing passengers to use car and taxi as their preferred ground access mode from home. This is likely to be primarily because there may be a fear that public transport is less COVID-19 safe

due to crowded spaces, people being in close proximity with each other, difficulties in maintaining social distancing and generally passengers having less control over the journey environment. These attitudes, whilst understandable, could mean that progress towards the use of more sustainable modes of ground access transport is halted or even reversed, at least in the short term. If and when more 'normal' conditions and passenger volumes return, it will be essential to once again ensure that all is done to encourage ageing passengers to consider the environmental implications when making transport mode decisions and future work can usefully examine these changes. Exploring whether this was a short-term phenomenon or has longer term implications will be a useful avenue for further research.

Although the initial findings afford interesting insights, the main contribution of this exploratory paper, however, has been in providing a new strand of research in relation to ageing travellers (some of whom are disabled) and airport ground access. Both topics have been given considerable and growing attention in their own right but have rarely been integrated in the academic literature. The ageing travel market is seen as a key growth area (Pestana et al., 2020), there is greater attention being given to airport ground access strategies (Yilmaz et al., 2021) and the needs of disabled passengers is becoming an increasingly important area to address for airport management and policy makers (ACI, 2018; Budd and Ison, 2020). The impact of COVID-19 on ground access choice, which has not been covered by emerging research about air transport and the pandemic (e.g. see RizziTettamanti and Rizzi, 2022), is another contribution of this paper. The research also provides insight into how the ageing market views environmental concerns in relation to ground access choice. This adds a new dimension to research concerning the ageing population and environmental issues, which is an expanding and increasingly important research area with contradictory evidence as to whether this age group is more environmentally conscious (e.g. as argued by Wang et al., 2021) or less (e.g. as Geys et al., 2021) than other age groups.

With some of the statistically significant associations, the effect size (i.e. the amount of variance of one variable explained by the other variable) is quite small. This indicates that the association is quite weak, suggesting that in further research additional variables should be considered. Moreover, the lack of significant differences related to gender, trip frequency and age in terms of modal choice, satisfaction levels and attitudes to the environment (albeit that gender and frequency do appear to influence future decisions) suggests that the ageing passenger segment is a homogeneous group, even though previous research indicates that this is unlikely to be the case. However, it may well be that the profile variables used in this research are unable to explain the diversity of the market, and that more complex variables, particularly related to lifestyle and socio-economic and demographic factors, are needed involving further research to be able to more effectively target more diverse groups of ageing passengers with different needs and attitudes. Place of residence may also be an important issue to consider, and this represents a useful area for future research. Disability is not generally found to be a key influencing factor (except with future decisions) which is surprising given that experiences and attitudes might be expected to differ between disabled and non-disabled passengers. However, the small sample size of disabled participants must be noted, and this is an area for future research. Moreover, while many older passengers may be disabled due to the consequences of ageing, other ageing passengers may have lifelong disabilities. These two groups may have different views and experiences of the ground access journey, and future travel plans post-pandemic. This is an area which can be explored further.

Any work of this nature is exploratory and so there are limitations in the approach. For example, an online survey for older passengers raises specific issues with respect to digital literacy, accessibility and suitability and we appreciate the sample here is self-selecting and thus potentially biased. Similarly, while every effort was made to make the sample representative of the UK travelling ageing population, the fit was not absolute. In addition, it reports on a sample of the population from one country, and only provides a snapshot in time of attitudes. The impacts of COVID-19 are changing very rapidly, and so further research might show whether attitudes are remaining consistent or changing. Additionally, it does not cover other age groups for comparisons, and so it is not possible to conclude whether some of the key findings here are limited to just ageing passengers or whether they are typical of more or all age groups. Some similarities seem to exist with research investigating passengers of all ages: for example, since COVID-19 the National Travel Attitudes Survey (Department for Transport, 2022) identified that passengers felt least concerned when travelling to the airport compared to other stages of the ATJAP (as reflected in Fig. 6), and there had also been an increase in private car use (as reflected in Fig. 7), although both aspects require further investigation.

Moreover, the surveys did not include ageing people who have not travelled by air recently, their reasons for not travelling, nor their views about the ground access stage of the journey. A detailed study of disabled UK residents who have not flown recently would also be beneficial. Neither was there scope within this research to fully investigate views towards self-service technology (particularly since COVID-19) and whether common perceptions that the ageing market is generally less comfortable with this technology are valid. The surveys could not be conducted through means other than online, thus limiting the ability to capture ageing passengers who are not confident with using online technology. Hence, more work is planned to develop these research areas further. Nevertheless, this study has made a significant first step in addressing the research gap with respect to ageing air passengers and the ground access journey, with the ultimate aim in seeking to ensure that inclusive policies and practices are considered so as to enable ageing travellers to have an equal opportunity to fly and that the industry benefits from this growing travel market. It is hoped that future research will be able to use this study as a foundation to refine the methods of data collection and analysis.

Credit author statement

Anne Graham: Conceptualization; Methodology; Formal analysis; Writing – Original Draft; Writing – Review and Editing, Willy Kruse: Methodology; Data curation; Writing – Original Draft; Writing – Review and Editing, Lucy Budd: Conceptualization; Methodology; Writing – Original Draft; Writing – Review and Editing, Frances Kremarik: Conceptualization; Methodology; Writing – Original Draft; Writing – Review and Editing, Stephen Ison: Conceptualization; Methodology; Writing – Original Draft; Writing – Review and Editing.

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