

TRANSPORT FINDINGS

The Role of Intra-Household Interactions and Personal Social Network Dispersion in Air Travel Frequency in the UK

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Findings

This paper studies private air travel frequency among the UK population using a regression analysis. The analysis accounts for a large range of independent variables, including the respondents' partners' attributes, social network dispersion and migration background. We find that both having one's best friends and/or close family members abroad is associated with more frequent flights. Partners' friends living abroad also stimulate more frequent flights. Also, partners' education level and long-standing illness or disability are, respectively, positively and negatively associated with flight frequency. First generation migration background is associated with increased flying, while higher-order generation migration background (i.e. having parents or grandparents who were born abroad) is not.

1. Questions

There is growing concern over the climate and other environmental impact of long-distance travel and, specifically, air travel (Gössling and Upham 2009; van Goeverden, van Arem, and van Nes 2016; Aamaas and Peters 2017). The factors that affect air travel have been studied extensively in the past years especially with a focus on sociodemographics, attitudes and spatial context variables (Alcock et al. 2017; Bruderer Enzler 2017; Büchs and Mattioli 2021; Arnadottir, Czepkiewicz, and Heinonen 2021). Less is known about how personal social relationships affect air travel. This includes both (a) intra-household interactions between partners and (b) the geography of personal social networks beyond the household. These interactions seem intuitive, particularly for private air travel for holidays or visiting friends and relatives, but have been largely ignored (see, e.g., Ho and Mulley 2015).

This paper presents findings from a regression analysis of private (non-business) air travel frequency among a representative sample of UK respondents in a cohabiting relationship. The analysis accounts for the respondents' sociodemographic variables, spatial context at the place of residence, car ownership and use, migration background and ethnic group, and the spatial extension of personal social networks (referring to family

members and close friends¹). We include measures for migration generation to account for ‘transport assimilation’ processes to the ‘native’ population (i.e. a convergence towards the population’s average travel behaviour over time – see Delbosc and Shafi 2023) although, strictly speaking, our analysis does not allow us to look at processes over time. We include the same variables (except household car ownership and place of residence) for the respondents’ partners, to capture intra-household interaction. We are interested to shed light on the following questions that have rarely been addressed in the literature:

1. How do the respondents’ partners attributes affect private air travel frequency?
2. How does the geography of wider social networks (including the partner’s network) affect private air travel frequency?

2. Methods

We conduct a negative binomial regression analysis using survey data from *Understanding Society*, the UK Household Longitudinal Study (UKHLS), a nationally representative, general-purpose survey (University of Essex, Institute for Social and Economic Research 2018a). We use Wave 4 (2012-2013, n=47,066 individuals) for cross-sectional analysis but include social network information from Wave 3 (2011-2012) collected from the same individuals. We weighted our analysis as appropriate to adjust for differences in sample selection probability.

We match publicly available data from the 2011 UK Census on residential neighbourhood population density (Office for National Statistics 2021) at the level of Lower Layer Super Output Areas (LSOA) (University of Essex, Institute for Social and Economic Research 2018b). For more information on variables used, see Mattioli and Scheiner (2022).

Our dependent variable is the self-reported number of flights that a respondent had taken in the twelve months prior to the survey “for leisure, holidays or visiting friends or family” (air travel “for work or business purposes” was explicitly excluded). Arguably, the exclusion of business travel from the flight frequency variable is appropriate for this study, as we expect intra-household interaction and social network dispersion to have greater impact on private travel than on business travel. Note also that travel for “holiday” or “visiting friends and relatives” purposes accounted for 85% of international air travel by UK residents in 2013 (DfT 2020).

¹ The survey questions asked whether three self-reported “closest friends” and close family members (child, mother and father) were living abroad at the time of the interview. They made no difference between virtual and personal contact with them. As explicit reference is made to close friends and family members, we believe that this should not play a major role

We present two models whereby we only include partner variables in the second model to check whether their inclusion affects the coefficients in Model 1. The models are run on the full sample of respondents who are in a cohabiting relationship and whose partner was also interviewed, minus those with missing values on dependent or independent variables (listwise deletion), resulting in a sample of 9435 individuals. To avoid double counting of couples we have run the analysis on a subsample including randomly one partner per couple. The results are near-identical except for some coefficients that do not reach the level of significance (probably due to smaller sample size). The results are available on request. All Variance Inflation Factors are below 5.7, raising little concern about multicollinearity issues (Schendera 2008, 105).

3. Findings

In the analysis sample, 52.9% of respondents took no private flight in the 12 months prior to the interview, 23.1% took one, 11.7% took two, 11.3% took three or more². We briefly summarise significant sociodemographic and geographical effects on air travel frequency before turning our attention to partner and social network effects.

3.1. Sociodemographic and geographical effects

Air travel frequency is strongly and positively associated with income and level of education.

Those in employment fly more frequently than the ‘other’ group (including, e.g., students, the unemployed and those on parental leave). With respect to age, those aged 30-74 years fly more often than young adults, though only one in four effects is significant. Being responsible for children decreases air travel frequency and yields a considerably stronger effect than being female. Suffering from long-standing illness or disability also reduces private air travel.

In geographical terms, the most remote area of the UK (Northern Ireland) exhibits the highest frequencies of air travel, followed by Scotland and the most central area (London). Car ownership and use are significantly and positively associated with air travel, suggesting that those who own cars and those with a higher mileage fly more often.

3.2. Migration background and ethnic minority effects

Migration background is associated with a higher frequency of private air travel, confirming earlier findings documented in Mattioli and Scheiner (2022). The effects are significant only for first generation migrants (i.e., those

² The distribution of the dependent variable in the analysis sample is close to that in the full sample for Wave 4 (n=42,710; no flights: 58.2%; 1 flight: 20.9%; 2 flights: 10.9%; 3+ flights: 10.0%), although it shows a slightly higher frequency of air travel for individuals in a cohabiting relationship.

Table 1. Regression models of air travel frequency

	Model 1	Model 2
Equivalised income (after housing costs) (ref. cat.: 1st quintile / bottom)		
2 nd	0.94	0.93
3 rd	1.58***	1.54***
4 th	1.97***	1.89***
5 th	3.14***	2.96***
Tertiary education qualification (dummy)	1.28***	1.23***
Employment status (ref. cat.: In employment)		
Retired	0.93	0.92
Student	0.67	0.72
Other	0.82***	0.83**
Age (ref.cat. 16-29)		
30-59	1.12	1.17
60-74	1.19	1.24*
75+	0.78	0.83
Number of people in household	0.98	0.98
Female (dummy)	0.93*	0.96
Responsible for children < 16yo (dummy)	0.77***	0.75***
Long-standing illness or disability (dummy)	0.81***	0.83***
Type of area (Ref.cat: England: other urban)		
England: London Metropolitan Area	1.28*	1.25*
England: Rural	1.01	1.00
Wales: Urban	0.93	0.93
Wales: Rural	0.79	0.80
Scotland: Urban	1.36*	1.37*
Scotland: Rural	1.47*	1.47*
Northern Ireland: Urban	1.70**	1.67**
Northern Ireland: Rural	1.63*	1.60*
Population density in the LSOA (10s of persons per hectare)	1.00	1.00
Cars in household (dummy)	1.71***	1.67***
Distance driven by car in last 12 months (thousand miles)	1.01**	1.01**
Migration generation (ref. cat.: 4th)		
3 rd (grandparents born abroad)	1.03	1.02
2 nd (parents born abroad)	1.17	1.16
1 st (in the UK for 5+ years)	1.31*	1.25*
1 st (in the UK for 5 years or less)	1.95**	1.87**
Ethnic group (ref. cat.: White British)		
Other white	1.06	1.04
Asian or Asian British	0.80	0.76
Black or Black British	0.49**	0.49**
Other + Mixed	0.76	0.73
Friends outside of local area (ref.cat.: none)		
half or less	1.11	1.08
more than half	1.09	1.07
Best friends abroad (dummy)	1.37***	1.29***
Close family abroad (dummy)	1.37***	1.34***

	Model 1	Model 2
Partner: Tertiary education qualification (dummy)		1.13**
Partner: Employment status (ref. cat.: In employment)		
Retired		1.08
Student		1.32
Other		0.99
Partner: Long-standing illness or disability (dummy)		0.81***
Partner: Distance driven by car in last 12 months (thousand miles)		1.00
Partner: Migration generation (ref. cat.: 4 th)		
3 rd		0.97
2 nd		1.18
1st (>5+ years)		1.11
1st (5 years or less)		0.99
Partner: Friends outside of local area (ref.cat.: none)		
half or less		1.10
more than half		0.98
Partner: Best friends abroad (dummy)		1.22**
Partner: Close family abroad (dummy)		1.03
Constant	0.25***	0.25***
Alpha	1.19*	1.16*
Log-pseudolikelihood	-12622.85	-12577.34
Wald χ^2	950.97	993.00
McFadden's R^2 (adjusted)	0.07	0.07

Parameter estimates (incidence rate ratios) for negative binomial regressions (N=9435). Significance levels: * p<0.05; ** p<0.01; *** p<0.001.

who were born abroad), and particularly strong for those who had lived in the UK for a maximum of five years. This suggests a process of ‘transport assimilation’ over time and from one migration generation to the next, as documented in the literature for other transport modes (Delbosc and Shafi 2023). Furthermore, identifying as “Black (or black British)” is associated with considerably lower flight frequencies.

3.3. Effects of personal social networks and partner interactions

While the effects of migration background suggest associations with the geography of social networks, we are able to provide direct evidence as well. Having one’s best friends and/or close family members abroad is associated with more flights. Having a large proportion of friends outside of the local area of residence, however, does not exhibit significant effects.

Including the respondents’ partners’ effects in Model 2 does not improve the model fit substantially but brings to light statistically significant partner’s effects for several variables. All effects are in the expected direction. Specifically, the partner’s tertiary education increases the number of flights, and the same is true for the partner having their best friends abroad. Conversely, having a partner with a disability reduces the number of flights.

The magnitudes of the significant effects for the partner variables are somewhat smaller than those for the same variables for the respondent but still notable. For disability the magnitude is the same as for the respondent.

When controlling for partner variables in Model 2, several coefficients that refer to the respondent are slightly reduced in magnitude. This includes the coefficients for: high income, tertiary education, having cars in the household, first migration generation background, having friends and family abroad. For some of these variables this could be interpreted as a “homogamy effect” whereby, e.g., people with tertiary education are more likely to be in a cohabiting relationship with people with tertiary education (and will fly more as a result); people with migration background are more likely to be in a cohabiting relationship with people with migration background (and will fly more as a result). There might also be cross-relationships between different variables, e.g. if London residents are more likely to be in a cohabiting relationship with people with migration background, even if they themselves do not have migration background (and will fly more as a result). Such cross-relationships and homogamy effects call for more research.

3.4. Conclusions

Our findings provide evidence that private air travel frequency is affected by respondents’ wider social networks and partners’ sociodemographics. This suggests that more efforts should be devoted to these factors in research on long-distance, and particularly air, travel.

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