This is a repository copy of *Hyper-aeromobility: the drivers and dynamics of frequent flying*.

White Rose Research Online URL for this paper:
https://eprints.whiterose.ac.uk/191129/

Version: Accepted Version

Article:

Cass, N (2022) Hyper-aeromobility: the drivers and dynamics of frequent flying. Consumption and Society, 1 (2). pp. 313-335. ISSN 2752-8499

https://doi.org/10.1332/LCWC4408

eprints@whiterose.ac.uk
https://eprints.whiterose.ac.uk/

Hyper-aeromobility: the drivers and dynamics of frequent flying

Noel Cass, Institute for Transport Studies, University of Leeds, LS2 9JT, UK.

n.f.cass@leeds.ac.uk

Abstract

Flying is the most climate-impacting form of individual consumption. This paper interrogates the drivers and dynamics behind ever-increasing amounts of air travel ascribable to a minority, whose flying contributes an ever-larger proportion of travel-related energy consumption and carbon emissions. Moving beyond established work on (increases in) flying, it establishes the need to focus transport emissions reduction efforts on this relatively small number of elite, hyperaeromobile travellers. After outlining existing literature on different aspects of flying and frequent flying, which are combined in referring to hyperaeromobility, the paper reviews the many diverse explanations for its drivers and dynamics arising from different disciplinary traditions. Treating flying and frequent flying as 'consumption behaviour' has tended to focus on individualised behavioural explanations, but understanding and tackling rising hyperaeromobility involves grasping expanding systems of provision, and social and cultural positive feedback loops involving socialisation, habituation and internationalisation of social practices. Understanding these requires a multidisciplinary approach analogous to the 'needs satisfier escalator' model relating to increasing car use which has been proposed by Brand-Correa et al.(2020). The paper then provides data from qualitative research on high energy consuming households to provide backing for the particular relevance and importance of a subset of more sociological and structural drivers as contributing to the expansion of aeromobility and its concentration in a hyper-aeromobile elite. It concludes that the current reliance on voluntary behaviour change and different forms of financial disincentives is ineffective, whereas more radical structural change, restrictions, and impositions of quotas are increasingly necessary.

Key messages

1. Flying is a growing, climate-impacting form of consumption, increasingly concentrated in a hyper-aeromobile elite.

2. (Hyper)aeromobility has many drivers, but research and policy has treated it primarily as rational choice behaviour

3. Interview data from frequent fliers reinforces the importance of social dynamics of socialisation and habituation

4. Policies restricting aviation systems of provision are required, rather than pricing, to reduce hyperaeromobility

Introduction

In the context of climate change mitigation policy efforts, transport is the most important consumption sector to address, as travel mileages and associated energy consumption and carbon emissions are all still growing. Global transport emissions have increased 1.9% annually since 2000 and the sector is still responsible for 24% of direct CO_2 emissions from burning fuel (IEA 2020). The two most important sub-sectors still showing growth are private car usage in land transport (with road vehicles accounting for ¾ of transport emissions), and air travel. These two modes of transport have the highest energy intensity, i.e. carbon emitted per passenger mile, and their energy consumption is growing with little sign of abating. In both areas, a policy focus on energy efficiency (i.e. of engines) has been insufficient to slow the growth in related emissions. Air travel growth in consumption has been even more unrestrained than in land travel. Despite increases in engine efficiency (eightfold since 1960: Lee et al 2021: 4), aviation emissions have increased an average of 2.2% per year 1970 to 2012, increasing to 5%/yr 2013-2018, an absolute increase of 27% in those 5 years (Lee et al 2021). These accelerating trends mean a likely quadrupling of aviation 2005-2050 (Kantenbacher et al 2019: 46), a trend only recently and temporarily bucked by the covid pandemic. Focusing on absolute reductions, particularly to international tourist (i.e. personal leisure) (Jovanovic and Vracarevic 2016) and business flights (Jones et al 2018) will be necessary to reduce consumption and emissions, as required by climate change policy objectives. As Peeters et al. (2019: 176) point out *"in the absence of active interventions to achieve deep cut emission reductions, the tourism sector* [alone] *is likely to render the Paris (2015) climate targets unachievable."*

Another justification for focus on air travel consumption is based on its disproportionate impacts. Taking a (particularly long-haul) flight is acknowledged as the most climate damaging consumption act an individual can perform (Büchs and Schnepf 2013, Ivanova et al 2020). Methodological individualism in research has therefore treated taking flights as a consumption 'behaviour' that can be understood as more or less planned, rational, and deliberate. Policy approaches have treated most unsustainable consumption thus, leading to a focus on 'behaviour change' policy-making (Barr et al 2011, Ben-Elia and Shiftan 2013, Brand et al 2019, Brög et al 2009, Scott A. Cohen et al 2013, Schwanen et al 2012, Whitmarsh et al 2021), whereby individuals are to be dissuaded e.g. from taking flights, one by one. Known problems with such models include the existence of various 'gaps' including: the 'value-behaviour' gap and a 'home-away gap' (Barr et al 2010) in sustainable consumption (i.e. sustainability practiced at home may be abandoned when on holiday), resulting in a conclusion by Oswald and Ernst (2020: 81) that "*general environmental attitudes alone do not substantially shape behaviour choices in the travel domain. Therefore, a distinct research focus on air travel, in contrast to other environmental behaviours, appears justified and necessary*". As Whitmarsh and colleagues (2021: 76) summarise such approaches, in their recent review of *Behaviour change to address climate change*:

> "*their utility in establishing meaningful change is limited due to their being too reductive, individualistic, linear, deliberative and blind to environmental impact. This has led to a focus on suboptimal intervention strategies, particularly informational approaches*"

In the case of land transport, *systematic* assessments of the relative contribution of personal (psychological and habit), social (norms, practices), infrastructural (land use, transport system) and cost (time and money) influences on modal choice have been conducted (Javaid et al 2020), but the same is not true of long distance travel, and in particular, hyperaeromobility. This paper begins the process by providing a non-systematic summary of different disciplinary contributions to the task of understanding unrestrained growth in air travel consumption, and the particular contribution from the hypermobile (see below); identifying that forms of escalating unsustainable consumption such as (frequent) flying are better understood if more sociological and systemic drivers are added to over-researched socio-psychological behaviourist understandings. The paper then draws on rich qualitative data from a research project on 'excess' energy consumption, to show that these neglected social drivers and others are essential to understanding hyperaeromobility, before drawing conclusions for policy targeting this socially concentrated (although this concentration is lessening of late: Büchs and Mattioli 2021) form of climate-damaging consumption.

Contextualising hyperaeromobility research

Aeromobility, hypermobility, or hyperaeromobility?

Aeromobility generally applies straightforwardly to travel by air in the transport and tourism writing reviewed below, but in 'mobilities' writing (Cwerner et al 2009, Faulconbridge and Hui 2016) conceptually expands 'air travel' to study of the socio-cultural-technical *system* of flying in the same way as automobility reconfigured the understanding of driving as a society-shaping force (Urry 2004). *Hypermobility*, simply suggesting excessive travel, has been used to describe society and life becoming more distanciated (Adams 2017), and has been applied to frequent flying (Cohen et al 2018) as a negative for individuals and society. Cohen and Gössling (2015: 1661) see air-hypermobility sociologically as relating to identity formation/maintenance and network capital accrual, but the authors focus on the negatives of hypermobility for the individual and society.

Hyperaeromobility in this paper combines these terms and concepts. It refers to the increasing share of flights performed by small percentage of fliers, whereby *"at most 1% of the world population - likely accounts for more than half of the total emissions from passenger air travel"* (Gössling and Humpe 2020: 1). In this paper, 'the hyperaeromobile' therefore refers to those whose hypermobility intersects with aeromobility, i.e. frequent fliers. Gössling and Humpe'review (ibid: 8) draws on numerous international studies that demonstrate that: in the UK, the 20% most frequent non-business travellers are responsible for 60% of emissions; in a Swedish airport survey, the 3.7% most frequent fliers accounted for 28.3% of all flights taken; in commercial flights, surveys suggest that the most frequent 10% of fliers may account for 30–50% of all flights taken; and in Germany, 10.9% of a sample were responsible for 28.8% of all flights.

Hyperaeromobility therefore applies to Gössling et al.'s (2009: 11) observation that *"growth in mobility may not primarily be a result of new parts of society becoming air travellers, rather than affluent people travelling more"* – a claim specifically assessed by Büchs and Mattioli (2021). Along with general levels of aeromobility, hyperaeromobility has been explained by a bewildering array of drivers, which we now review in some detail.

Drivers of aeromobility and hyperaeromobility

A non-systematic review of literature on flying, snowballed from key recent texts, was undertaken in order to sample a broad number of hypothesised drivers of (including frequent) air travel, until theoretical saturation was achieved. The sample includes a large number of texts addressing tourist and other non-business flights, justified by their constituting 88% of UK flights, and 52% of domestic

flights (Büchs and Mattioli 2021), along with a smaller number addressing business or all flights. This summary is therefore intended as an *overview* of identified drivers for (hyper)aeromobility (flying and frequent flying), not intended to establish a theoretically-coherent framework or weighted assessment of their relative causal or influential power, but to illustrate that (hyper)aeromobility is already framed as a field of consumption which needs to be understood from multidisciplinary perspectives. In the section following, we then suggest the need for a focus on specific drivers identified as important for the dynamics of escalation and lock-in, but relatively neglected in the literature: systemic and sociological escalation or positive-feedback drivers.

This literature studies (frequent) flying as a behaviour, and therefore explicable to a large extent by **individual**, particularly **psychological drivers**. Although viewing flying as a literal addiction (Cohen et al 2011) is rejected by some (Young et al 2014), other individual/psychological components of planned behaviour models seen as influencing decisions to fly include: cosmopolitan attitudes (Árnadóttir 2021); preferences (i.e. for convenience and speed: Hares et al 2010); a lack of awareness of aviation's impact on the climate (Susanne Becken 2007) or of other options (Árnadóttir et al 2021); a cognitive failure to assess climate impacts/risks (Higham et al 2019); a strong value being placed on (perceived rights to) holidays (Morten et al 2018); a (perceived) necessity or strong importance/value placed on flying (Whitmarsh et al 2020); and a (perceived) inability to reduce travel, or travel being 'beyond the locus of control' (Cohen et al 2018). A small number of studies discovered an apparently counter-intuitive link between increased flying and pro-environmental attitudes (Czepkiewicz et al 2019), and awareness (Böhler et al 2006). Although the underlying drivers for this spurious association are more likely to be wealth and/or cosmopolitan attitudes, the association reveals how pro-environmental attitudes alone cannot be expected to shift behaviour in this key area. This literature also identifies that behaviourist models *fail* to predict observed flying behaviour with a classic attitude-behaviour gap (Cohen et al 2013), or as only predicting *intentions* to fly (Morten et al 2018). Flying may also result from another 'gap' between pro-environmental behaviour at 'home' and 'away' (Barr et al 2011). While this may be dealt with through denial and/or fatalism (Kroesen 2013), cognitive dissonance can also be rationalised through denying responsibility (Cohen et al 2013), explaining higher public support for polices directed at 'others' such as business, the state, or even NGOs, rather than fliers (Kantenbacher et al 2019). Finally, decisions to fly frequently may be based on the belief that benefits outweigh impacts (Árnadóttir et al 2021): a 'flyer's dilemma' (Young et al 2015), failure of collective action (Higham et al 2019), or a classic 'tragedy of the commons' (Young et al 2014).

Other factors that are more **sociological and cultural** in nature that have been identified as drivers for frequent flying include: cosmopolitan identities (Gössling et al 2019); social norms (Nielsen et al 2021), e.g. of international travel being necessary for well-being Árnadóttir 2021) or of 'conference culture' in specific occupations (Høyer 2009); obligations to travel for maintenance of social networks (Urry 2002, Whitmarsh et al 2020), or progress on a 'travel career ladder' (Pearce and Lee 2005); processes of socialisation and habituation (Hares et al 2010), including through specific life-course events (Mattioli 2020); the latter resulting in extended social networks (Oswald and Ernst 2020); and social 'glamorisation' of frequent and exotic travel e.g. by the media and the travel industry (Cohen and Gössling 2015). Whitmarsh et al. (2020) stress the combined influences of 'norms, status, professional pressures, and disposable incomes' shared by the hyperaeromobile. In more recent years, there has also been academic and media focus on the role of the elite in normalising unsustainable high carbon lifestyles that percolate down to the rest of society (Barros et al 2021, Monbiot 2021, Oswald et al 2021, Sovacool and Brisbois 2019).

Another set of factors relating to individuals' **sociodemographic** characteristics have been identified. By far the most influential and studied is wealth or income (Gössling et al 2007, Gössling and Humpe 2020, Nielsen et al 2021), although education and occupational seniority (Büchs and Mattioli 2021, Whitmarsh et al 2020) have also been noted. The hyperaeromobile have more available leisure time (Gössling and Peeters 2007), are strongly influenced by their social identity and network capital (Czepkiewicz et al 2019), and their combined financial, social and cultural capital are deployed in a Bourdiesian 'distinction' from other tourists (Casey 2010); a process also conceptualised as ascending a 'Travel Career Ladder' (Pearce and Lee 2005). They also have increased access to properties abroad (Gössling and Humpe 2020, Nielsen et al 2021).

Yet another set of influences on propensity to fly that have been postulated and tested are **material, spatial and infrastructural** in nature, including: urban form (i.e. urban rather than peri-urban and rural dwelling: Czepkiewicz et al 2018); geographical location, with Europeans being more highly aeromobile (Whitmarsh et al 2020); and airport capacity (Gössling et al 2007, Upham et al 2005). Other studies highlight the (perceived) lack of other options or the difficulty in assessing their relative impacts (Dubois and Ceron 2009).

Some specific **forms of travel** are more dependent on, and drive increasing air travel. These include visiting family, the international mobility of the young (Mattioli 2020) which acts as socialisation and habituation, tourism in general (Becken 2019, Higham et al 2016, Higham et al 2019, Peeters et al 2019, Vagena 2021), and business travel (Cohen et al 2018, Czepkiewicz et al 2019, Gössling et al 2009, Jones et al 2018, Kroesen 2013). Gössling et al. (2009: 143) also identify as hypermobile travellers *"health migrants and medical tourists … second home commuters … short-break long-distance travellers … frequent low-fare holidaymakers … long-haul business travellers"*, and middle-class 'gap year' youth. Volden's (2019) analysis of interviews with environmentalist fliers highlights different factors affecting decisions to fly for different purposes, summarised in table 1 below, which demonstrates flying being increasingly established and normalised through integration with multiple social practices of consumption (Warde 2005).

Private	Leisure	Holiday	Experience
			Get away
			Social expectations
		Air-travel experience	
	Friends/family		Save time/money
			Viable alternatives
			Social expectations
Workplace		Structural incentives	Time
			Money
			Family
			Viable alternatives
		Social incentives	Productivity/purpose
			Responsibility/obligation
Extraordinary events		Celebrations	
		Ceremonies	
		Special/unforeseen occasion	

Table 1: influences on flying for different trip purposes, from Volden 2019: 56

Finally, in this summary, increases in air travel result from a lack of **political** will to tackle both it (Cohen et al 2016) and the aviation industry's power; a 'taboo' (Cohen et al 2016, Peeters et al 2016) affecting transport policy. Formal **policies** and mechanisms such as the Kyoto-based International

Civil Aviation Organisation measures, the market-based Carbon Offset and Reduction Scheme for International Aviation, (Lyle 2018) and off-setting in general (Gössling et al 2007, Strasdas 2007) have failed to contain growth in flights, while airmiles/frequent flier programmes (Gössling and Nilsson 2010, Higham et al 2019, Young et al 2015) and cheap flights resulting from a lack of taxation on aviation fuel (Gössling et al 2009, Gössling and Peeters 2007) further drive demand. As the authors of one study on a very limited experiment with low carbon pricing of flights conclude, "Carbon pricing measures may have to be levied at a greater rate to affect behavioural change" (Markham et al 2019: 206). In general, the policies proposed (although not yet implemented) to reduce demand for flight are thus market-based, while technology-focused efficiency has been pursued. In contrast to e.g. land-based travel, information provision for behaviour change has been a minor element of government or industry policy, whilst being the focus of NGO campaigns, for example in the promotion of off-setting or travel carbon calculators.

Focusing on systems of provision and sociological drivers

The diversity of drivers summarised above arises from many different disciplines and methodological approaches, with some studies focusing particularly on the hypermobile (Büchs and Mattioli 2021, S.A. Cohen and Gössling 2015, Gössling et al 2009, Mattioli 2020). More recent work has indicated a need to focus on the less-used, non-behavioural frameworks of understanding. Cass (2021) introduces a conceptual framework for understanding the general escalation of energy consumption used for 'needs satisfaction', drawing on a series of multidisciplinary frameworks applied to Energy Consuming Behaviour (Burger et al 2015) and car-use specifically in a mobility/transport context (Brand-Correa et al 2020, Daramy-Williams et al 2019). These frameworks "include a dynamic or biographic aspect, in which choices […] and life events structurate other and subsequent decisions and routines, which collectively form the structuration context of energy consuming behaviour and practices in society" (5). At the most abstract level, Brand-Correa and colleagues (2020) summarise a system of different 'orders' or cogs of decreasing structurating power, encompassing '**Systems of provision**' of infrastructural capacity and services, **Activities and Services**, particularly interpreted in the theoretical terms of social practice theory; and **Specific products or technologies**. This suggests focus on the greater structurating power of systems of provision and social practices, rather than individual flight decisions as behaviour.

With regard to hyperaeromobility's urban concentration, Mattioli et al. (2021: 232) find that *"airport accessibility, migration background, and dispersion of social networks each explain part of this association"*, in addition to factors previously explored by Czepkiewicz and colleagues (2019, 2018), and Mattioli and Scheiner (2022) extend this focus on migrant families, ethnicity and social network dispersion as key determinants of long distance travel including flights. Büchs and Mattioli (2021) identify the UK *expansion* of flying (by more people) as driven by increases in: structural factors (low budget airlines and airport expansions); social norms (expectations of air travel and foreign holidays); and the global dispersion of social networks. Its *concentration* in hypermobile groups is associated with education, income, and retirement status, with migration background contributing again via dispersed social networks and airport proximity. They conclude that *"air travel in the UK is highly unequal and driven by richer, highly educated and urban households"* (92). Mattioli's (2020) chapter on 'mobility links' (Frändberg 2006), focuses on dynamic habituation and socialisation drivers of hyperaeromobility as a series of dynamic feedback loops, where early travel cements air travel and air-travel-dependent practices in individuals' lifestyles, extending cosmopolitan air travel through transnational education, careers, hobbies and holidays, with ever expanding social networks and expectations. This inter-generational positive feedback loop is confirmed by Mattioli et al.'s

(2022) study of students' families' migration backgrounds and travel. The analysis below primarily focuses on the drivers identified in these more recent studies reviewed in this paragraph.

Methods note

The data arises from 30 semi-structured interviews of 60-90 minutes, conducted with a sample of high energy-consuming households from a short list of 33 urban Lower Super Output Areas in England in the top 10% for gas or electricity use and/or driving, further filtered by high mean numbers of household flights by Super Output Area classifications. Other selection and recruitment criteria were demanded of professional recruiters to ensure high overall energy consumption (see Cass, 2021) for full details of methods and methodology), but in terms of flights, there was only a sampling requirement for two participants who took 4+ annual return flights, 'in a normal (i.e. pre-Covid) year'. The sample's characteristics are given below in table 2, and show that only 7% (2/30) did not fly, compared to roughly 50% of the UK population, while a third (10/30, in bold) took 5 or more return flights, clearly qualifying as a hyperaeromobile sub-sample.

[insert table 2: Sample characteristics achieved here]

The approach to interviewing was aimed at capturing participants' own understandings and explanations of their high-energy consuming lifestyles, and therefore was non-normative, i.e. there was no challenging of interviewees or even implied criticism, although interviewees knew from the recruitment process that this was our area of interest. Transcripts were coded using Nvivo software, beginning with a 'deductive' coding structure derived from the literature review and interview schedule. Inductive codes were added as coding progressed, and used to recode all transcripts using the software's text search function to identify relevant material. At the end of coding, inductive codes were reassigned to parent codes. The data presented below arises from identifying text coded for 'planes' as a travel mode, along with other sub-codes, to focus on specific influences in the analysis.

Findings

An initial analysis noted the relative frequency of discussion of a variety of influences in interviews. There was more discussion of flying that intersected with social influences such as norms and expectations, upbringing, family and relationships, than with classic behavioural influences such as speed, cost, and convenience. In terms of trip purposes, holidays far outstripped all other purposes being discussed, with visiting friends and family following, then (infrequent, non-routine) trips away with work and getaways and weekends.

Focusing on the flying data of the hypermobile subsample (i.e. those flying 5+ return flights in an average year) allows more nuanced analysis. The influence of more traditional socio-demographic drivers is reflected by the hyperaeromobile subsample being older, highly educated, and either employed in managerial, sales or engineering roles, at a high level (and thus high income) or else retired after similar careers. With such a small sample, the fact that 20% of the hyperaeromobile subsample is from BAME backgrounds cannot be taken as statistically significant, but the sample also included participants with Russian, South African, Norwegian and other inter/transnational backgrounds, whose data highlights that their already dispersed social networks and upbringing accounted for much international travel.

Following the more grounded thematic approach to analysis used in coding the data, the sections below highlight key 'influences' on frequent flying as highlighted by the literature review and found in data, organised into categories: the data reveals the importance of different factors in the existence and development of hyperaeromobile lifestyles.

(Infra)Structural

The availability of cheap flights was seen to have increased the attractiveness of flying over time: *"the cost of flights reduced, and it just became a normal … it was as cheap taking a week to Ibiza as … to … Ilfracombe … Cheaper, low cost airlines drove a lot of that."* (INT28) However other aspects of the **systems of provision** were mentioned, including free flights for infants (*"we didn't have to pay for my daughter's flight because she was one"* (INT20)), the institutionalisation of flight through work organising and paying for flights (INT24), and the incentivisation of frequent flying through airmiles: *"I've got air miles to use up, so we'd fly BA"* (INT14); *"I've gone from airmiles … on three international holidays a year"* (INT28). One interviewee had personal connections to multiple travel agents, facilitating impulsive flights: *"I also have a very good friend who is a travel agent, so … I just pick up the phone … and say, 'Right. I need a flight to so-and-so'."* (INT21)

Another factor identified in the literature is the **proximity of airports**: *"the majority of my flying throughout my career was from Heathrow because I was … northwest London"* (INT14). One mentioned it in the first seconds of an interview, as explaining their residential location: *"So it's in the south east, about 20 minutes north of Heathrow, quite an affluent town"* (INT24), while another specified an ideal distance: *"a lot of people choose to try and live here because … it's 15 miles away but not hearing the sound."* (INT16). Proximity also facilitated quicker access to a holiday property abroad than in England: *"I could be in the south of France quicker than I could get to my sister's in Dorset … three and a half hours I could be there on the balcony with a glass of vino"* (INT22).

Although more a material element of practice (Shove et al 2012) than an infrastructural factor, many of the hypermobile owned or could access **property abroad**, which routinises flights to holiday several times in the year: *"they come and use our place in France"* (INT22*); "my parents-in-law have a villa in the south of France, so we go there every year for two, three weeks"* (INT28); *"Between four and six times a year … usually my wife and I but … sometimes … all the family come out"* (INT16).

Processes and norms

Some participants described **upbringings** that involved foreign flights, indicating that they were second-generation hyperaeromobile: "*Very fortunate, we did go on quite a lot of* [skiing] *holidays. Generally … I'd take the family skiing … at Christmas time … maybe one or two other skiing holidays with my friends or with my work colleagues*" (INT20); *"when I grew up, I did sort of go … with my parents, generally once a year to a, you know, Spanish, Italian resort for two weeks, so, I sort of got the taste for it then"* (INT28). Others were influenced by international families: *"I'm half Norwegian so … used to go* [skiing] *with my grandfather and now I go with uncles and my cousins"* (INT17); *"My family, well my mother grew up in Vienna so we've been over to Vienna quite a few times"* (INT5).

One interviewee described being inspired by a spirit of **meritocracy** in childhood (*"I think my mum and dad … I watched them both do two jobs and … show that … if you put some effort in you will get rewarded"* (INT22)) which they compounded with experience of flying in youth, and passed on to their son: *"ballroom dancing … I travelled all over the world with it … I would go to Germany twice a year, Italy … Cuba … I went there twice … I'm sure that had a big difference in my view of life."* (INT22). This same participant thus explicitly described how they **socialised** meritocratic hyperaeromobility:

> *"we've said to him, 'The reasons we've been able to take you to Mexico … to take you for a week in Chicago to stay with friends … is because of the life we've made', and he sees* [us] *working really hard to achieve … the ability … to do those things, and we hope that rubs off."* (INT22)

In other cases, foreign travel was described as **habitual**, sometimes simply through repetition (which confers skills and familiarity): *"you can give me an airport probably anywhere in Europe and I'll tell you how to shortcut through it … So yes, travelled a lot"* (INT28). Others described **routines** of regular flights with their own rhythm: *"we tend to go away at ... half-term, in April, Easter, for a week or ten days … And then … late like half-term, winter trip … for a week"* (INT28).

In addition to travelling with friends or visiting them abroad, some stressed that the *processes* of establishing **social networks** through education or work prompted further flying: *"We're really fortunate we've got fantastic friendship networks all over the world.* [Wife] *has got a fantastic friend … who she used to be on the* [cruise] *ships with … he's a top New York wine sommelier … we get to go to some lovely restaurants"* (INT22).

In a few cases, interviews revealed explicitly that their exotic travel was influenced explicitly by the desire to enact **distinction** from 'normal' tourists: *"We tend to avoid the popular British destinations because the Brits on holiday are not my favourite tribe … in Spain we went to Andalucía … a Spanish resort, there were virtually no Brits"* (INT14); *"*[Nordic skiing] *you don't see people at all, hardly ever. I quite enjoy that. Alpine skiing is a bit more touristy"* (INT17).

Novelty and **experience** were clear drivers of more and more exotic travel by air: *"Last year we went over to Australia for a month … a combination of seeing the country and experiencing things like … the Barrier Reef and swimming there."* (INT5); *"And that bucket list … it's about that exposure to experiences and inspiring people … flying by helicopter to the Grand Canyon to have a champagne picnic … those memories, they are the most valuable things in the world. It's new experiences"* (INT22).

Similarly in some cases rising **disposable incomes** from career development were cited as enabling hyperaeromobility: *"International travel wasn't as big then. But … I suppose as you get through your career, you have more disposable income"* (INT28); *"as I developed my career I was travelling a lot out of Heathrow"* (INT 16). This was sometimes seen as a compensation for a lack of travel in one's upbringing: *"That's where we spend most of our money, yes … in my childhood we didn't even go away on holiday! … We just couldn't afford it … I started earning and I suppose that's why I do like travel, because I didn't do it a lot when I was younger"* (INT5).

Social

Friend and family networks facilitate the multiplication of hyperaeromobility, particularly for holidays: *"One family trip, one with my friends, and then another one often with work colleagues"* (INT20), while in other cases, friends occasioned extra flights while abroad: *"I have a very good friend in Toronto … and we have friends in New Jersey and I bunny hopped across"* (INT21). These connections again were often formed earlier in life: *"I had a little trip to Austria to visit… I did German at university … so I'm still in touch with people there … We lived in Prague for a time so I'd got another weekend there"* (INT3). Others fly regularly to maintain family networks: *"Once a year we'd go to Israel, because my sister-in-law … lives out there"* (INT20).

The internationalisation of **rituals and celebrations** was clear in much of the data:

> *"I've travelled on honeymoons, so to Africa on safari …. When [Wife] and I got married, we went to Australia for three weeks … And also even weddings and stag dos … as you move into the '90s and '00s … were international stag dos, and I … married second time around in France, so we had all the guests flying over for that as well … I was best man at a wedding in Perth … Australia"* (INT28).

"[A friend's] son was getting married in California. So … I took a flight out from Toronto … for her son's wedding, back to New Jersey and then back to London … then her second son got married in July (laughing) so me and my daughter did … the wedding in New York" (INT21).

Trip purposes

Predictably many foreign flights were for **holidays**: *"We've been to France many times; the Caribbean; and Turkey quite a few times actually."* (INT14); *"But summer holidays: usually warm places; the Mediterranean"* (INT14); *"The Caribbean, Cuba, Europe … in recent years … Portugal, some of the islands"* (INT16), in routinized cycles of travel in the case of this retired interviewee: *"to Tenerife in March, March/April time … to America in July, West Coast … to Spain for three weeks … then I was going to go to India in October to do a* [photographic] *tiger shoot"* (INT5).

There was also evidence that social practices of **sport and leisure** prompted international travel: *"We're rugby fans; we tend to combine it with rugby matches so we've been to … Brussels I think and odd cities around Europe for a long weekend"* (INT14); *"my son's rugby tour to South Africa … as a family … and I was doing an ultramarathon in Italy"* (INT3). The most impulsive long haul traveller flew for 'Pranic healing' and yoga:

> *"I went to Colombia for a weekend to do Arhatic yoga … I did the other one in Ireland … and the year before … I went to Thailand for four days … I did New Jersey to (laughing). I can't even remember what I did. I did New Jersey to Hong Kong."* (INT21)

Golf **clubs** were also responsible for regular flying: *"…we have played the same courses every year … sometimes we go to France and play, and once a year to Portugal or Spain to play"* (INT16).

Economic

International travel for **work** by managers was often regular and routine: *"I probably go on average … six to eight times a year to different destinations: … the US, sometimes to Europe. Rarely to Asia."* (INT24); *"So, I would … visit the Munich factory … on average about once every six weeks … eight or nine journeys a year … I had a lot of customers in Scandinavia as well so I just travelled there a lot"* (INT14);

> *"I have responsibility for the Benelux, so, … flying over once a fortnight to Schiphol or into Brussels, and … maybe two or three long hauls a year as well … So, last year, Shanghai, Buenos Aires. The year before, Dubai, New York … with holidays as well, maybe 60 flights a year."* (INT28)

Others involved in engineering, oil, or arms had regular if less frequent long haul trips:

> *"I was their technical expert … for export markets over in the Middle East and the Far East mainly … So that meant me flying out … Saudi, the UAE, Oman and South Korea, all of the NATO allies … it was every month, every other month … to win that business you probably do need a face to face."* (INT17)

In another positive feedback loop, several participants stressed that they holidayed in places that were **familiar from work** trips: *"I did a lot of work in South America … so I was always down in Buenos Aires, Rio for work, so we had a holiday to both of those as well"* (INT28). In only one case, foreign travel was suggested to be more attractive due to **relative cheapness**: *"the other thing as well is to holiday in the UK is so, so expensive"* (INT5). One interviewee travelled extensively for **professional training** abroad:

> *"I've travelled quite a lot from about 2017 to Canada, to … obtain dual qualifications as a Canadian barrister/solicitor … it was about three or four times a year … and I then in between decided … that I might as well do US at the same time"* (INT21).

Discussion and conclusions

The above data clearly illustrate many of the factors identified by the literature review, but more importantly, they lend support to the more recent focus on the sociological explanations behind, e.g. 'structural' explanations of higher international air travel in urban areas as being better explained by sociological factors – increased levels of transnational populations and others with dispersed social networks, along with access to over-provided cheap and convenient air travel infrastructure (Mattioli et al 2021). These stretched spatial networks are also likely the result of more, earlier international travel; a dynamic process increasing over time and generations. More importantly, in aggregate, the data illustrate the large amount of air flight by a small proportion of fliers, who were disproportionately rich and educated (Büchs and Mattioli 2021). The empirical subsample are more professional, and therefore in careers and occupations that not only demand more international flying, but provide increasing disposable income and 'time sovereignty' (Breedveld 1998) for regular foreign travel and holidaying beyond, and linked to, work.

These people had often been socialised into international air travel through early holidays, extended social networks, and thereby established appropriate 'norms' and expectations, skills/dispositions, and social practices (Cass 2021, Mattioli 2020). Such norms include the culturally-cemented idea that 'everyone flies', and that holidays, rituals such as birthdays, weddings and stag/hen celebrations, and even careers ought to be more exotic and involve foreign travel. Skills/dispositions include the ability to navigate booking systems and airports themselves, and associated social practices include business, rituals/celebrations, and specific leisure past-times (e.g. photography, skiing, 'bucket lists') as well as sports. Such socialisations are also dynamic, reinforcing feedback loops, including across generations. These findings also reinforce the validity of approaching (particularly frequent) flying as a social practice in itself, possibly as a 'distributed practice' in Schatzki's terms (Schatzki 1996), as an element of multiple other (elite) practices, or a social practice necessarily bundled (Shove et al 2012) with the other social practices highlighted in the data, as the only method of satisfying a perceived need for routinized internationalised practice performances.

These suggestions of 'mobility links' as explanatory factors specifically of hypeaeromobility are confirmed in the qualitative data, but other processes of habituation include 'Catch 22s' in which hyperaeromobile parents may have travelled either to make up for a *lack* of travel in their own childhoods, *or* through being socialised *into* it; but they pass on hyperaeromobility even from infancy, encouraged by free travel for babies, and then as part of a middle-class aspirationalism examined elsewhere (Cass 2021). Others in the non-hyperaeromobile sample (e.g. a South African emigrant) recounted their child's *rite du passage* into adulthood being to organise and carry out a long haul holiday at the age of 16, motivated by the freedom to *"ride on a motorbike without permission from us"* (INT29); equivalent to automobility's discursive links with 'freedom' (Manderscheid 2014). All of these factors are, of course, susceptible to a class-based analysis, being key factors of middle/upper class milieu, and associated with key structural element of class such as wealth, social status, capital, disposable income, and cultural pressures for 'distinction'. Such an analysis is strongly implied if not rigorously argued here. As mentioned above, the carbon impacts of the lifestyles of the hyper-rich elite are disproportionately higher, and must be tackled if the lifestyles of the developing world are to be able to sustainably borne within Net Zero targets (Millward-Hopkins 2022).

Therefore, the data supports the contentions that the hypermobile elite (the rich, which also largely overlaps/interacts with being e.g. retired, educated, and male (Büchs and Mattioli 2021, Buchs and Schnepf 2013) are more able to take advantage of the over-provision/capacity of aeromobility infrastructure, and are thereby more affected by the proposed feedback loops, as they tend to: live near big airports; experience more childhood flights/holidays; experience more business travel and expensive and internationalised holidays and rituals; based on increasing social networks, specific social practices (skiing, visiting 'a place in the sun') and their buying properties abroad. The question raised by this analysis is what the opportunities are for breaking these feedback loops that lead to runaway hyperaeromobility, and with what pubic acceptability or likelihood of success?

Much current research and the 'behaviour change' policy paradigm which it supports (Shove 2010) is failing to effectively grasp such key processes through which hyperaeromobility is increasing, because of both a focus on a few or single drivers, and the dominance of behaviourist assumptions. Approaching hyperaeromobility as simply an aggregate of individual choices, and therefore as theoretically explicable through attention to individual psychological constructs and a series of 'environmental/structural variables', fails to grasp that hyperaeromobility is both a social practice, and therefore deeply socially and culturally shaped and encouraged, and simultaneously an *autopoietic* system (Urry 2004), a socio-technical arrangement of infrastructures and institutions, linked to and reinforcing cultural ideals about 'freedom', 'social success' and the good life in much the same way that automobility does (Manderscheid 2014). Using a background theoretical faming of multi-disciplinary, hierarchical/nested/recursive frameworks, an analogous 'needs satisfaction escalator' model, and an understanding of social practice dynamics (Shove et al. 2012) along with a grounded analysis of the qualitative data, has highlighted key social, cultural, and infrastructural drivers and dynamics that are being occluded in much influential research.

In terms of methods, the use of semi-structured interviewing with no normative questioning of people's activities was important in securing access to details of their lifestyles, expressed in their own terms, and therefore revealing hyperaeromobility and high energy consumption directly without a defensive or protective gloss (Hitchings 2012). Deliberative approaches are therefore also likely to be useful to explore the potentials for reducing such consumption, as was explored later in our research. A particular approach which could be used by future studies to explore the relative strengths of the complex and diverse array of drivers that have been identified in the review is a system dynamics mapping methodology (Harrison et al 2021). This approach uses qualitative research to attempt to comprehensively identify all variables and their systemic interactions in a particular area of interest, particularly those which set up positive and negative feedback loops affecting the key variable of interest – here frequent flying. This approach could further qualitatively source, and map the multiple interactions between, all the drivers identified here, and thereby both model key reinforcing mechanisms and identify key potential intervention points.

With regard to policy recommendations, current policy approaches to reducing aeromobility, let alone hyperaeromobility, are failing. Efficiency gains of engine and fuselage design are wiped out by overall growth, and technological advances have so far turned out to be illusory (Peeters et al 2016). A generalised 'information for behaviour change' approach has been largely ignored in air travel, when compared to e.g. 'smarter choices' approaches to reducing car use (Barr and Prillwitz 2014). The attempts to raise awareness of flight's environmental impacts by campaigners has been demonstrably ineffective because of the far more powerful influences of sociological drivers, cultural norms and glamorisation (Cohen and Gössling 2015), and feedback dynamics; particularly intergenerational effects, and socialisation processes. Carbon taxes, or the correct taxing of aircraft fuel, could potentially curb flights, although potentially in unfair ways (Markham et al 2019). This is

because they will likely impact *expansion* of aeromobility (for example (bi)annual holiday flights by the general populace, and more regular but not more frequent travel by migrants, their children, and others with family abroad), without being likely to significantly affect the most important *concentration* of hyperaeromobility in business travellers and the wealthy, who can avoid or absorb such price increases. Frequent flier levies on the other hand, take these impacts into consideration, but would still have to rise exponentially to genuinely deter hyperaeromobility (Büchs and Mattioli 2021). Gössling and Humpe (2020: 10) similarly point out that in the case of flights paid for by businesses:

> *"a modest increase in the cost of air travel will not affect business travellers … who are causing* [globally speaking] *disproportionally high emissions. Yet […] halving the flight activity of the percentile of the most frequent fliers would reduce emissions from commercial passenger transport by more than 25%. These insights confirm the need to develop more complex transition policies for aviation".*

Framing hyperaeromobility in terms of a 'needs satisfaction escalator' leads to a theoretical conclusion that the drivers and dynamics identified result from the pursuit of satisfying universal human needs in ways that are intensely and increasingly unsustainable. This leads us to agree with Lavelle and Fahy's recent (2021: 62, 63) summary that "*a dearth of dialogue exists on the concept of maximum levels of consumption* […] *Excessive consumption appears neither to be a factor for attaining the "good life" nor a synonym for a state of happiness."* The escalator model also raises the conclusion that the most *effective* point of intervention is the systemic level. To reduce the extent of provision of aeromobility infrastructure, airports should be shrunk, not expanded, and flight routes and numbers reduced, because *"it is unlikely that aviation greenhouse gas emissions will be stabilized at levels consistent with risk-averse climate targets without measures that actively reduce aviation demand or restrict flying"* (Markham et al 2019: 207). Anti-flight campaign groups such as Stay Grounded have proposed potential policy responses (Smith et al 2019) which include such measures, including not only taxes and levies, but: setting limits on flights; moratoria on new infrastructure, and scaling down of airports; fostering night travel, high speed trains, ICT etc.; organisational changes in travel policies; and other measures including accounting properly for impacts, limiting advertising and lobbying, banning state support, banning frequent flier programmes, divestment, un-insuring and more. Virtually none of these are being pursued, not only because of the idea that pricing primarily can 'encourage' individual behaviour change, but because this approach itself is rejected by governments who reject the idea that demand should be managed or reduced, instead relying on technological solutions (Peeters et al 2016). As Markham et al. (2019: 213) further conclude, on the basis of a limited experiment:

> *"the failure of the carbon price to substantially reduce […] aviation emissions appears to necessitate more coercive policy interventions"* because *"Business as usual in the aviation sector is incompatible with a habitable planet […] Ultimately, the entrenched contradiction between the economic and social benefits of air travel and its environmental consequences may only be resolved by political action."*

In summary, there has been sufficient research on aeromobility, and the drivers for it, to identify a trend of slow general growth across the population, which is far surpassed by exponential growth in certain forms of hyperaeromobility; the business and holiday travel of the rich, and particularly the hyper-rich elite. Policy has tended to treat the task of reducing the emissions of air travel through an ineffective combination of primarily technological efficiency improvements and to a much lesser extent, offsetting information and behaviour change measures such as information provision and persuasion. Air travel demand itself appears not to be a target of government action, as highlighted

by the UK Prime Minister's foreword to the UK's (recently judged as illegally insufficient) Net Zero Strategy stating that *"we can build back greener, without so much as a hair shirt in sight. In 2050, we will still be … flying planes … but … our planes will be zero emission allowing us to fly guilt-free"* (HM Government 2021: 9) The review of previous and contemporary research provided here suggests that the key drivers of all forms of growth in (hyper)aeromobility are not individual and psychological, but structural, social and cultural, and are particularly associated with systems of provision, shifting social norms, the stretching of social networks, and particular social practices and their constituent meanings (novelty, cosmopolitanism) and skills/dispositions. These social practices tied to and including international flight are self-reinforcing inter-generationally, and engender more and normalised flight. Therefore the only strategy for flight demand reduction which is likely to be successful in the decade left to pursue a habitable planet through reducing elite forms of (energy) consumption is that of first reducing the systems of provision, and reducing the normalisation of and socialisation in aeromobile norms and practices, by targeting first the hyperaeromobility of the rich. Because norms descend from the desirability of elite lifestyles (Jaworski and Thurlow 2017), this task is likely to require stronger government actions than are being considered, including but not limited to frequent flier levies, taxing of air fuel, and/or more coercive measures such as the rationing of flights. The indications are that there is little appetite for such breaking of policy taboos and acting to curtail freedom of choice.

Details

Bibliography

Adams, J. (2017) 'Hypermobility: a challenge to governance', *New modes of governance*, Routledge. pp. 123-37.

Árnadóttir, A. (2021), Environmentally Significant Behaviour: Spatial Distribution, Drivers, and Barriers to Change. *Faculty of Civil and Environmental Engineering*, Reykjavík, University of Iceland. p. 200.

Árnadóttir, Á., Czepkiewicz, M. and Heinonen, J. (2021) 'Climate change concern and the desire to travel: How do I justify my flights?', *Travel Behaviour and Society,* 24: 282-90.

Barr, S., Gilg, A. and Shaw, G. (2011) 'Citizens, consumers and sustainability: (Re)Framing environmental practice in an age of climate change', *Global Environmental Change,* 21(4): 1224-33.

Barr, S., Gilg, A. and Shaw, G. (2011) ''Helping People Make Better Choices': Exploring the behaviour change agenda for environmental sustainability', *Applied Geography,* 31(2): 712-20.

Barr, S. and Prillwitz, J. (2014) 'A smarter choice? Exploring the behaviour change agenda for environmentally sustainable mobility', *Environment and Planning C: Government and Policy,* 32(1): 1-19.

Barr, S., Shaw, G., Coles, T. and Prillwitz, J. (2010) ''A holiday is a holiday': practicing sustainability, home and away', Journal of Transport Geography, 18(3): 474-81.

Barros, B. and Wilk (2021) 'The outsized carbon footprints of the super-rich', *Sustainability: Science, Practice and Policy*, 17(1): 316-22.

Becken, S. (2007) 'Tourists' perception of international air travel's impact on the global climate and potential climate change policies', *Journal of Sustainable Tourism,* 15(4): 351-68.

Becken, S. (2019) 'Decarbonising tourism: Mission impossible?', *Tourism Recreation Research,* 44(4): 419-33.

Ben-Elia, E. and Shiftan, Y. (2013) 'Understanding behavioural change: An international perspective on sustainable travel behaviours and their motivations', *Transport Policy,* 26: 1-3.

Böhler, S., Grischkat, S., Haustein, S. and Hunecke, M. (2006) 'Encouraging environmentally sustainable holiday travel', *Transportation Research Part A: Policy & Practice,* 40(8): 652-70.

Brand-Correa, L. I., Mattioli, G., Lamb, W. F. and Steinberger, J. K. (2020) 'Understanding (and tackling) need satisfier escalation', *Sustainability: Science, Practice and Policy,* 16(1): 309-25.

Brand, C., Anable, J. and Morton, C. (2019) 'Lifestyle, efficiency and limits: modelling transport energy and emissions using a socio-technical approach', *Energy Efficiency,* 12(1): 187-207.

Brand, C. and Boardman, B. (2008) 'Taming of the few—the unequal distribution of greenhouse gas emissions from personal travel in the UK', *Energy Policy,* 36(1): 224-38.

Breedveld, K. (1998) 'The double myth of flexibilization: Trends in scattered work hours, and differences in time-sovereignty', *Time, Society & Natural Resources: An International Journal of Social Research Methodology,* 7(1): 129-43.

Brög, W., Erl, E., Ker, I., Ryle, J. and Wall, R. (2009) ' Evaluation of voluntary travel behaviour change: Experiences from three continents', *Transport Policy,* 16(6): 281-92.

Büchs, M. and Mattioli, G. (2021) 'Trends in air travel inequality in the UK: From the few to the many?', *Travel Behaviour and Society,* 25: 92-101.

Buchs, M. and Schnepf, S. V. (2013) *Expenditure as proxy for UK household emissions? Comparing three estimation methods,* Southampton: University of Southampton Statistical Sciences Research Institute.

Büchs, M. and Schnepf, S. V. (2013) 'Who emits most? Associations between socio-economic factors and UK households' home energy, transport, indirect and total CO2 emissions', *Ecological Economics,* 90: 114-23.

Burger, P., Bezençon, V., Bornemann, B., Brosch, T., Carabias-Hütter, V., Farsi, M., Hille, S. L., Moser, C., Ramseier, C. and Samuel, R. (2015) 'Advances in understanding energy consumption behavior and the governance of its change–outline of an integrated framework', *Frontiers in Energy Research,* 3: 29.

Casey, M. E. (2010) 'Low Cost Air Travel: Welcome Aboard?', *Tourist Studies,* 10(2): 175-91.

Cass, N. (2021), Social and material cogs of the needs satisfier escalator, Proceedings of the 2021 eceee Summer Study, paper 1-080; https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2021/1-energy-consumption-and-wellbeing/social-and-material-cogs-of-the-needs-satisfier-escalator/2021/1-080-21_Cass.pdf/

CCC (2009) *Meeting the UK aviation target – options for reducing emissions to 2050*: Committee on Climate Change.

Cohen, S. A. and Gössling, S. (2015) 'A darker side of hypermobility', *Environment and Planning A* 47: 1661-79.

Cohen, S. A., Hanna, P. and Gössling, S. (2018) 'The dark side of business travel: A media comments analysis', *Transportation Research Part D: Transport and Environment,* 61: 406-19.

Cohen, S. A., Higham, J., Gössling, S., Peeters, P. and Eijgelaar, E. (2016) 'Finding effective pathways to sustainable mobility - Bridging the science-policy gap', *Journal of Sustainable Tourism,* 24(3): 317-34.

Cohen, S. A., Higham, J. E. S. and Cavaliere, C. T. (2011) 'Binge flying: Behavioural addiction and climate change', *Annals of Tourism Research,* 38(3): 1070-89.

Cohen, S. A., Higham, J. E. S. and Reis, A. C. (2013) 'Sociological barriers to developing sustainable discretionary air travel behaviour', *Journal of Sustainable Tourism,* 21(7): 982-98.

Cwerner, S., Kesselring, S. and Urry, J. (2009) *Aereomobilities,* Oxford: Routledge.

Czepkiewicz, M., Árnadóttir, Á. and Heinonen, J. (2019) 'Flights Dominate Travel Emissions of Young Urbanites', *Sustainability,* 11(22): 6340.

Czepkiewicz, M., Heinonen, J. and Ottelin, J. (2018) 'Why do urbanites travel more than do others? A review of associations between urban form and long-distance leisure travel', *Environmental Research Letters,* 13(7): 073001.

Daramy-Williams, E., Anable, J. and Grant-Muller, S. (2019) 'Car Use: Intentional, Habitual, or Both? Insights from Anscombe and the Mobility Biography Literature', *Sustainability,* 11(24): 7122.

Dubois, G. and Ceron, J. P. (2009) 'Carbon labelling and restructuring travel systems: Involving travel agencies in climate change mitigation', in S. Gössling, C. Michael Hall and David Weaver (eds), *Sustainable Tourism Futures*, Routledge. pp. 242-59.

Faulconbridge, J. and Hui, A. (2016) 'Traces of a mobile field: Ten years of mobilities research', *Mobilities,* 11(1): 1-14.

Frändberg, L. (2006) 'International mobility biographies: a means to capture the institutionalisation of long-distance travel?', *Current Issues in Tourism,* 9(4-5): 320-34.

Gössling, S., Broderick, J., Upham, P., Ceron, J.-P., Dubois, G., Peeters, P. and Strasdas, W. (2007) 'Voluntary Carbon Offsetting Schemes for Aviation: Efficiency, Credibility and Sustainable Tourism', *Journal of Sustainable Tourism,* 15(3): 223-48.

Gössling, S., Ceron, J.-P., Dubois, G. and Hall, C. M. (2009) 'Hypermobile travellers', in S. Gössling and P. Upham (eds), *Climate Change and Aviation*, London, UK, Earthscan.

Gössling, S., Hanna, P., Higham, J., Cohen, S. and Hopkins, D. (2019) 'Can we fly less? Evaluating the 'necessity'of air travel', *Journal of Air Transport Management,* 81: 101722.

Gössling, S. and Humpe, A. (2020) 'The global scale, distribution and growth of aviation: Implications for climate change', *Global Environmental Change,* 65: 102194.

Gössling, S. and Nilsson, J. H. (2010) 'Frequent flyer programmes and the reproduction of aeromobility', *Environment & Planning A,* 42(1): 241-52.

Gössling, S., Nilsson, J. H. J. E. and A, P. (2010) 'Frequent flyer programmes and the reproduction of aeromobility', 42(1): 241-52.

Gössling, S. and Peeters, P. (2007) ''It does not harm the environment!'An analysis of industry discourses on tourism, air travel and the environment', *Journal of Sustainable Tourism,* 15(4): 402-17.

Gössling, S. and Upham, P. (2009) *Climate Change and Aviation: Issues, Challenges and Solutions,* London: Earthscan.

Hares, A., Dickinson, J. and Wilkes, K. (2010) 'Climate change and the air travel decisions of UK tourists', *Journal of Transport Geography,* 18(3): 466-73.

Harrison, G., Grant-Muller, S. M. and Hodgson, F. C. (2021) 'A review of transport-health system dynamics models', *Journal of Transport & Health,* 22: 101138.

Higham, J., Cohen, S. A., Cavaliere, C., Reis, A. and Finkler, W. (2016) 'Climate change, tourist air travel and radical emissions reduction', *Journal of Cleaner Production,* III(Jan 2016): 336-47.

Higham, J., Ellis, E. and Maclaurin, J. (2019) 'Tourist aviation emissions: A problem of collective action', *Journal of Travel Research,* 58(4): 535-48.

Hitchings, R. (2012). 'People can talk about their practices'. *Area* 44(1): 61-67.

HM Government (2021) 'Net Zero Strategy: Build Back Greener'.

IEA (2020) *Tracking Transport 2020,* Paris: International Energy Agency.

Ivanova, D., Barrett, J., Wiedenhofer, D., Macura, B., Callaghan, M. and Creutzig, F. (2020) 'Quantifying the potential for climate change mitigation of consumption options', *Environmental Research Letters,* 15(9).

Javaid, A., Creutzig, F. and Bamberg, S. (2020) 'Determinants of low-carbon transport mode adoption: systematic review of reviews', *Environmental Research Letters,* 15(10): 103002.

Jaworski, A. and Thurlow, C. (2017) 'Mediatizing the "super-rich," normalizing privilege', *Social Semiotics,* 27(3): 276-87.

Jones, I., Faulconbridge, J., Marsden, G. and Anable, J. (2018) 'Demanding business travel - the evolution of the timespaces of business practice', in A. Hui, R. Day and G. Walker (eds), *Demanding energy. Space, time and change*, Cham, Switzerland, Palgrave Macmillan.

Jovanovic, M. M. and Vracarevic, B. R. (2016) 'Challenges Ahead: Mitigating Air Transport Carbon Emissions', *Polish Journal of Environmental Studies,* 25(5): 1975-84.

Kantenbacher, J., Hanna, P., Cohen, S., Miller, G. and Scarles, C. (2019) 'Public attitudes about climate policy options for aviation', *Environmental science policy,* 81: 46-53.

Kroesen, M. (2013) 'Exploring people's viewpoints on air travel and climate change: understanding inconsistencies', *Journal of Sustainable Tourism,* 21(2): 271-90.

Lavelle, M. J. and Fahy, F. (2021) 'Creating context for corridors of consumption: the case of Ireland', *Sustainability: Science, Practice and Policy,* 17(1): 62-76.

Lee, D. S., Fahey, D., Skowron, A., Allen, M., Burkhardt, U., Chen, Q., Doherty, S., Freeman, S., Forster, P. and Fuglestvedt, J. (2021) 'The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018', *Atmospheric Environment,* 244: 117834.

Lyle, C. (2018) 'Beyond the ICAO's CORSIA: Towards a More Climatically Effective Strategy for Mitigation of Civil-Aviation Emissions ', *Climate Law,* 8(1-2): 104-27.

Manderscheid, K. (2014) 'The movement problem, the car and future mobility regimes: automobility as dispositif and mode of regulation', *Mobilities,* 9(4): 604-26.

Markham, F., Young, M., Reis, A. and Higham, J. (2019) 'Does carbon pricing reduce air travel? Evidence from the Australian 'Clean Energy Future'policy, July 2012 to June 2014', *Journal of Transport Geography,* 70: 206-14.

Mattioli, G. (2020) 'Towards a mobility biography approach to long-distance travel and mobility links', *Mobility and Travel Behaviour Across the Life Course*, Edward Elgar Publishing.

Mattioli, G., Morton, C. and Scheiner, J. (2021) 'Air Travel and Urbanity: The Role of Migration, Social Networks, Airport Accessibility, and 'Rebound'', *Urban Planning,* 6(2): 232-45.

Mattioli, G. and Scheiner, J. (2022) 'The impact of migration background, ethnicity and social network dispersion on air and car travel in the UK', *Travel Behaviour & Society,* 27: 65-78.

Mattioli, G., Scheiner, J. and Holz-Rau, C. (2022) 'Generational differences, socialisation effects and 'mobility links' in international holiday travel', *Journal of Transport Geography,* 98: 103263.

Millward-Hopkins, J. (2022) 'Inequality can double the energy required to secure universal decent living', *Nature Communications*, 13(1): 5028.

Monbiot, G. (2021), Make extreme wealth extinct: it's the only way to avoid climate breakdown. *Guardian*, London, UK, Guardian Media Group.

Morten, A., Gatersleben, B. and Jessop, D. C. (2018) 'Staying grounded? Applying the theory of planned behaviour to explore motivations to reduce air travel', *Transportation Research Part F: Traffic Psychology and Behaviour,* 55: 297-305.

Nielsen, K. S., Nicholas, K. A., Creutzig, F., Dietz, T. and Stern, P. C. (2021) 'The role of high-socioeconomic-status people in locking in or rapidly reducing energy-driven greenhouse gas emissions', *Nature Energy,* 10.1038/s41560-021-00900-y.

Oswald, L. and Ernst, A. (2020) 'Flying in the face of climate change: quantitative psychological approach examining the social drivers of individual air travel', *Journal of Sustainable Tourism,* 29(1): 68-86.

Oswald, Y., Steinberger, J. K., Ivanova, D. and Millward-Hopkins, J. (2021) 'Global redistribution of income and household energy footprints: a computational thought experiment', *Global Sustainability*, 4: e4.

Pearce, P. L. and Lee, U.-I. (2005) 'Developing the Travel Career Approach to Tourist Motivation', 43(3): 226-37.

Peeters, P., Higham, J., Cohen, S., Eijgelaar, E. and Gössling, S. (2019) 'Desirable tourism transport futures', *Journal of Sustainable Tourism,* 27(2): 173-88.

Peeters, P., Higham, J., Kutzner, D., Cohen, S. and Gössling, S. (2016) 'Are technology myths stalling aviation climate policy?', *Transportation Research Part D: Transport & Environment,* 44: 30-42.

Randles, S. and Mander, S. (2009) 'Aviation, consumption and the climate change debate:'Are you going to tell me off for flying?'', *Technology analysis strategic management* 21(1): 93-113.

Schatzki, T. (1996) *Social practices : a Wittgensteinian approach to human activity and the social,* New York: Cambridge University Press

Schwanen, T., Banister, D. and Anable, J. (2012) 'Rethinking habits and their role in behaviour change: the case of low-carbon mobility', *Journal of Transport Geography,* 24: 522-32.

Shove, E. (2010) 'Beyond the ABC: climate change policy and theories of social change', *Environment and Planning A,* 42: 14.

Shove, E., Watson, M. and Pantzar, M. (2012). *The Dynamics of Social Practice*. London, Sage.

Smith, T., Haßler, A., Dwarkasing, C., Reckmann, E., Sekulova, F., Schneider, F., Iniesta-Arandia, I., Edwards, L., Machler, L., Schmelzer, M., Grebenjak, M., Heuwieser, M., Blázquez Sánchez, N., Bridger, R. and Mingorría, S. (2019) *Degrowth of Aviation: Reducing Air Travel in a Just Way*: Stay Grounded/Kollektiv Periskop.

Sovacool, B. K. and Brisbois, M.-C. (2019) 'Elite power in low-carbon transitions: A critical and interdisciplinary review', *Energy Research & Social Science*, 57: 101242.

Spurling, N., McMeekin, A., Shove, E., Southerton, D. and Welch, D. (2013) *Interventions in practice - re-framing policy approaches to consumer behaviour. Sustainable Practices Research Group Report, September 2013,* Manchester.

Strasdas, W. (2007), Voluntary Offsetting of Flight Emissions: An Effective Way to Mitigate the Environmental Impacts on Long-Haul Tourism. February.

Upham, P., Butlin, S., Davis, M., Nilsson, U. and Smith, T. (2005) 'Allocating aircraft carbon dioxide emissions to airports on the basis of passenger share: scenarios for Manchester Airport', *World Transport Policy & Practice,* 11(1): 5-12.

Urry, J. (2002) 'Mobility and Proximity', *Sociology,* 36(2): 255-74.

Urry, J. (2004) 'The 'System' of Automobility', *Theory, Culture & Society,* 21(4-5): 25-39.

Vagena, A. (2021) 'Digital nomads and tourism industry', *Academia Letters,* https://doi.org/10.20935/AL765.

Volden, J. R. (2019), Flying Through a Perfect Moral Storm: How do Norwegian environmentalists negotiate their aeromobility practices? , *Centre for Development and the Environment*, Oslo, Norway, Olso University. p. 159.

Warde, A. (2005) 'Consumption and Theories of Practice', *Journal of Consumer Culture,* 5(2): 131-53.

Whitmarsh, L., Capstick, S., Moore, I., Köhler, J. and Le Quéré, C. (2020) 'Use of aviation by climate change researchers - Structural influences, personal attitudes, and information provision', *Global Environmental Change,* 65: 102184.

Whitmarsh, L., Capstick, S., Moore, I., Köhler, J. and Le Quéré, C. (2020) 'Use of aviation by climate change researchers: Structural influences, personal attitudes, and information provision', *Global Environmental Change,* 65: 102184.

Whitmarsh, L., Poortinga, W. and Capstick, S. (2021) 'Behaviour change to address climate change', *Current Opinion in Psychology,* https://doi.org/10.1016/j.copsyc.2021.04.002.

Wormbs, N. and Wolrath Söderberg, M. (2021) 'Knowledge, Fear, and Conscience: Reasons to Stop Flying Because of Climate Change', *Urban Planning,* 6(2): 314-24.

Young, M., Higham, J. E. and Reis, A. C. (2014) ''Up in the air': A conceptual critique of flying addiction', *Annals of Tourism Research,* 49: 51-64.

Young, M., Markham, F., Reis, A. C. and Higham, J. E. (2015) 'Flights of fantasy: A reformulation of the flyers' dilemma', *Annals of Tourism Research,* 54: 1-15.