Research in Transportation Business & Management xxx (xxxx) xxx

Contents lists available at ScienceDirect

Research in Transportation Business & Management

journal homepage: www.elsevier.com/locate/rtbm

Tourists' transport modal choices in Barcelona

Antoni Domènech [a,b,*], Daniel Miravet [c], Aaron Gutiérrez [a]

[a] Universitat Rovira i Virgili, Department of Geography, Research Group on Territorial Analysis and Tourism Studies (GRATET), 43480 Vila-seca, Spain
[b] Consortium of Environmental Policies of Terres de l'Ebre (COPATE), 43870 Amposta, Spain
[c] Universitat Rovira i Virgili, Department of Economics, Research Centre on Economics and Sustainability (ECO-SOS), 43204 Reus, Spain

ARTICLE INFO

Keywords:
Tourist mobility
Transport modal choices
Urban tourism
Barcelona

ABSTRACT

Transportation planning and mobility management are key for the transition towards sustainable cities. Research on tourists' transport modal choices at destination does not tend to analyse urban areas and instead sticks to one mode of transport. This study empirically testes a theoretical framework on tourists' transport modal choices for city destinations, and identifies the determinants that prompt tourists to choose among the full range of transport options. Based on a survey answered by tourists who visited Barcelona, multinomial logit regressions indicate that the transport mode used to reach the city, the characteristics of both the trip and the tourists, and the intensity of the visit within the destination are highly correlated with the mode selected. Compared to public transport users, those using tourist buses look for rapid access to attractions, those cycling are more interested in visiting the city in a flexible manner and those walking, using taxis and private vehicles have less interest in visiting attractions. This study suggests that the strategy to adopt to foster the use of sustainable modes of transport among visitors should also be considered in connection with targeting their profile.

1. Introduction

1.1. Impacts of mobility and transport in tourist cities

Tourism is an outstanding economic driving force for cities and countries (García, 2010). In recent years, the role of tourism has not only been a key factor in the economic development of cities and countries, but also in constructing places of interest. However, in some cities the massive influx of visitors and tourists showed the other side of the coin: the negative impacts. Tourist cities were (and will continue to be) modelled and shaped by different groups, with a large part of them being non-residents. Hence, conflicts arise when it comes to sharing the city spaces and its services between residents and an increasing number of non-residents.

According to Koens, Postma, and Papp (2018), the overcrowding of public spaces in cities, unruly tourist behaviour, physical touristification, residents feeling they are being pushed out of residential areas, and the pressure on the local environment, are the five side effects of city tourism. Mobility and transport are embroiled directly or indirectly in three of these five externalities attributed to tourism (see Table 1).

Impacts associated with city mobility lead to problematic circumstances that compromise the development of the tourism sector within the city context. The visitor experience and the reputation of the destination can be damaged due to both environmental issues (Becken, Jin, Zhang, & Gao, 2017) and mobility problems (Eusébio & Vieira, 2013) alike. Moreover, the local community may be prone to reject tourism activities (Martín-Martín, Guaita Martínez, & Salinas Fernández, 2018), or at least to move away from areas with tourist activity. Consequently, visitors' mobility becomes a central issue in terms of the planning and management of urban space and tourism activities, as well as in maintaining the quality of life of the various groups involved (Anton Clavé, 2019).

In order to mitigate the impact of these negative effects it is necessary to define policies at local level, relying not only on the specific positive and negative implications of each mode of transport, but also on the profile of tourists and the characteristics of their stay at destination.

The use of the private vehicle by visitors is associated with several negative externalities, such as the contribution to the poor air quality in cities (Saenz-de-Miera & Rosselló, 2012), noise (Becken, 2006), road congestion (Sundriyal, Shridhar, Madhwal, Pandey, & Sharma, 2018), road safety (Wilks, Watson, & Faulks, 1999), pressure on parking facilities (Israeli & Mansfeld, 2003), and heritage damage due to air pollution (Bonazza, Sabbioni, & Ghedini, 2005). However, the private

* Corresponding author at: Universitat Rovira i Virgili, Department of Geography, 43480 Vila-seca, Spain.
E-mail address: antoni.domenech@urv.cat (A. Domènech).

https://doi.org/10.1016/j.rtbm.2022.100902
Received 23 December 2021; Received in revised form 12 August 2022; Accepted 27 September 2022
Available online 7 October 2022

Table 1
Disturbances caused by city tourism in which mobility and transport are involved.

Mobility-related issues	Effects on the city and its services	Impact on residents and the quality of the city
Overcrowding of public spaces	Overcrowding on streets and pavements	Mobility issues between residents and visitors and resignification of public spaces
	Road congestion	
	Overcrowding of public transport	Potential worsening of service provisions
Visitor unruly behaviour	Noise and disturbances	Resignification of public spaces
		Rejection of tourism activities by residents
Local environment impact	Privatization of public spaces and "conquest" of urban space (store replacement, land use changes, building conversions, opening of hotels, hostels and (in)formal rental accommodation)	Loss of distinctive attractiveness, distortion of cultural identity, resignification of public spaces, rising prices, lack of affordable housing
	Increased litter and urban waste	Potential worsening of municipal services
	Increased water usage	Environmental and landscape damage and impact on health and quality of life of residents
	Increased air pollution due to mobility and energy consumption	

Source: Adapted from Koens et al. (2018).

vehicle provides full flexibility and independence to the visitor experience (Urry, 2004), and in the context of epidemic outbreaks, using private vehicles significantly reduces the perception of the risk of disease contagion (Gutiérrez, Miravet, & Domènech, 2020).

The negative implications inherent to the use of the private vehicle are counteracted by a more intensive use of public transport and the active / soft modes of transport (Scuttari, Orsi, & Bassani, 2018). Public transport can have a positive impact on visitors' satisfaction (Romão & Bi, 2021; Thompson & Schofield, 2007), as well as enhance the destinations' competitiveness due to a variety of reasons. First, a multimodal public transport system fosters sustainable mobility and helps to spread visitors around the city, thus avoiding the fact that they concentrate in the most demanded areas (Albalate & Bel, 2010). Second, public transport can become a tourist attraction in itself (Rhonden & Lumsdon, 2006). Third, it can also support the spread of tourism revenue across the city (Albalate & Bel, 2010).

Regarding active modes, destination walkability is seen as a key element in the tourist experience, enhancing destination sustainability, as well as contributing to improving individuals' health (Ram & Hall, 2018). In fact, walkable urban environments act as 'magnets' for visitors and augment the visitors' place attachment (Ujang & Muslim, 2014). Given that walkable city areas tend to agglomerate tourism supply and demand, city walkability becomes a strategic challenge for successful city destinations, especially in terms of the use of the space (Anton Clavé, 2019). Comparable to walking, tourists' experiences can also be enhanced by cycling (Larsen, 2016). The burgeoning of cycling in recent decades offers a good opportunity to develop initiatives in the tourism industry (Lamont, 2009).

In line with this view, cities must remain committed to developing communication infrastructures that guarantee multimodality and comodality, giving priority to active mobility (walking and cycling) and public transport use. City officials should favour the shift from less efficient to more efficient modes of transport as part of the Avoid – Shift – Improve scheme (ASI) (Banister, 2011), for both residents' and visitors' mobility. In this vein, reducing the use of motorised modes of transport and the distances must be prioritized (avoid), while secondly, the most pollutant transport options must be replaced by the most sustainable ones (shift). Although improving vehicle efficiency is important, according to this framework, it is the third step (improve). However, the solution is not straightforward. Increased use of public transport implies problems regarding the service capacity to absorb this additional demand (Albalate & Bel, 2010), the operational and service quality disruptions due to irregularities in revenue (caused, e.g., by seasonality), and the discrepancies regarding the fees that visitors must face. Depending on the city size, visitor demand can even overtake the locals' use of public transport (Domènech, Miravet, & Gutiérrez, 2020). Moreover, there are the management problems related to sightseeing buses causing congestion and disturbances (Cros, 2008). Similarly, active modes of transport are not exempt from drawbacks either, and their most pressing concern is probably the overcrowding of the most attractive areas (Neuts, Nijkamp, & Van Leeuwen, 2012). Redirecting pedestrians and cyclists is a challenge for city planning.

In such a context, mobility plans have become a useful tool for city officials to manage mobility issues within cities. In fact, these tools have proliferated in recent decades after being promoted by national and supranational institutions (see the ELTIS project, for instance). However, they tend to neglect the mobility issues associated with tourists and daily visitors, which in terms of research, is not a very different situation. Most works tend to stress the importance of the mode of transport chosen to reach a destination, especially because of its carbon footprint (Peeters & Dubois, 2010), while tourists' modal choices have received much lesser attention.

1.2. Tourists' modal choices

Works that have analysed the determinants of modal choices at a tourist destination have identified three main significant groups of factors. First of all, the mode of transport chosen to reach the tourist destination is key to determining subsequent modal choices once there (Bieland, Sommer, & Witte, 2017; Gutiérrez & Miravet, 2016). Secondly, there is a mutual relationship of causality between the attractions that the tourists decide to visit and their modal choices (Masiero & Zoltan, 2013; Le-Klähn, Roosen, Gerike, & Hall, 2015; Juschten & Hössinger, 2020). In this respect, tourists choose what to visit according to how accessible each attraction is, considering the benefits of each mode of transport available to them. Finally, there is also evidence associated with the tourist profile, mainly related to the characteristics of the trip and the tourists' socio-economic determinants: age (Masiero & Zoltan, 2013), education (Le-Klähn et al., 2015), income/social class (Gross & Grimm, 2018), car/driving licence ownership (Le-Klähn, Gerike, & Hall, 2014), transport choices at home (Bieland et al., 2017; Kaplan, 2015), party group (Le-Klähn et al., 2015), length of stay (Le-Klähn et al., 2014), repeating destination (Gutiérrez & Miravet, 2016), type of destination (Gross & Grimm, 2018), type of accommodation (Gutiérrez & Miravet, 2016), level of spending (Gutiérrez & Miravet, 2016), trip motivation (Romão & Bi, 2021) and sources of information (Bi & Romão, 2021). It has also been found that the mode of transport chosen to reach a destination can be used as a mechanism for selecting tourist profiles, and as a result, the socio-economic profile of the visitor might be determined by how the destination has been reached (Gutiérrez & Miravet, 2016).

As stated by Gross and Grimm (2018), tourists' modal choices vary depending on the type of destination visited. In fact, most of the previously commented works do not use the urban environment as their area of study, and instead analyse modal choices within larger areas. When they examine modal choices within the urban context, they stick to just one mode of transport, i.e. public transport is the most analysed mode (Gronau, 2017; Romão & Bi, 2021). Thus, their results, shown in Fig. 1, apply to country, regional, or multi-destination trips.

Within the context of urban tourist mobility, the research picture is

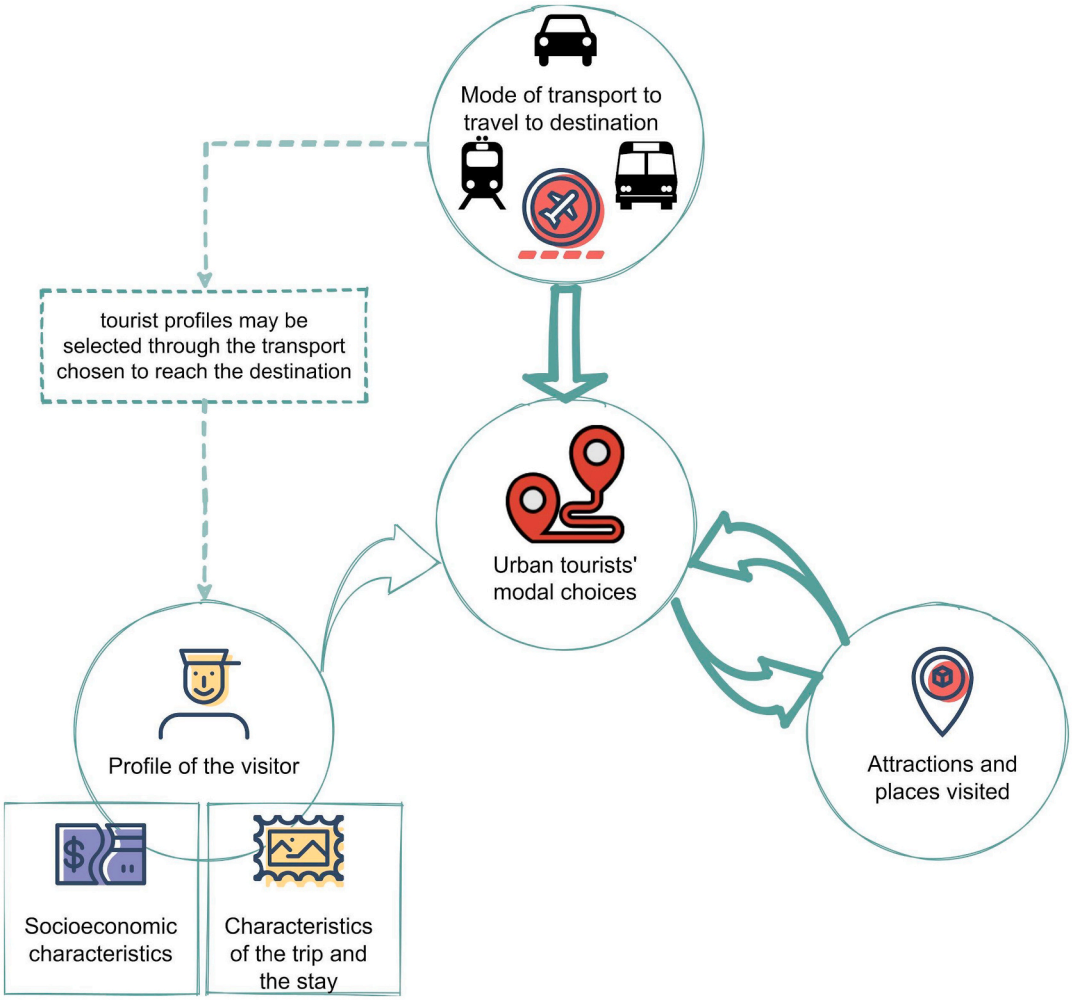

Fig. 1. Synthetic representation of tourists' modal choices according to Gross and Grimm (2018).
(Source: authors' own elaboration)

markedly different. In the first place, there is a wider range of transport alternatives, as walking, cycling, taxis and mobility on-demand emerge as suitable options for visiting the city. A second element to consider is that the mutual causality between what is visited and the transport choices diminishes, since all tourists are moving around the same city and, therefore, the same transport options are available to everyone. As a result, a new research theoretical framework must be developed. In this repect, Fig. 2 adapts the content of Fig. 1 to establish a theoretical framework for city destinations, and its validity will be assessed empirically subsequently.

First, it must be considered that the higher number of transport options for visiting urban spaces will lead to a higher level of competition between modes of transport. This scenario is closer to the one of the residents' modal choices, where individual characteristics (Keyes & Crawford-Brown, 2018; Tyrinopoulos & Antoniou, 2013), along with the characteristics of the urban space and the supply of each mode of transport are decisive determinants in modal decisions (Dieleman, Dijst, & Burghouwt, 2002; Ramezani, Pizzo, & Deakin, 2018). Consequently, the mode of transport chosen to reach the city should have less of an impact on tourists' modal decisions during the stay. In contrast, the wider range of options should result in the tourist profile becoming more significant, as it would be easier to find a mode of transport better suited to their interests and needs. In fact, a third element related to the tourist profile, besides the characteristics of the trip and tourists' socio-economic determinants, must be taken into consideration: the intensity of visits to attractions. In this vein, the different degrees of intensity in the demand for tourist products should be critical in terms of modal decisions. Secondly, given that the proximity between attractions reduces travel times and makes it possible to make a variety of visits in the same day, the effect of the modal decisions on what is visited is not included in the diagram. Thirdly, correctly integrating transport modes (i.e. multimodality), suitable infrastructure and accessibility (Deenihan & Caulfield, 2015), and tourists' perception related to each transport alternative (Nakamura and Abe (2016), can significantly predict visitors' modal choices. As a result, the model also considers the hypothesis that tourists' modal choices in the urban space can be shaped by mobility policies implemented at urban level in a similar way to residents' choices. Finally, weather conditions complete the scheme. Despite the abundant evidence of the weather's impact on commuting trips, this issue has received less attention in terms of tourist mobility. Previous evidence on everyday mobility choices signals that active / soft modes are much more sensitive to bad weather circumstances than public transport ridership and motorised private transport (Zhou et al., 2017). Therefore, dry, sunny, windless days with mild temperatures substantially enhance the choice of active modes (Böcker, Dijst, & Faber, 2016; Liu, Susilo, & Karlström, 2015). Whilst wind, rainfall, and cold temperatures hamper the use of active modes (Saneinejad, Roorda, & Kennedy, 2012) as well as public transport (Arana, Cabezudo, & Peñalba, 2014). The evidence related to tourists' mobility, indicates that, in summer, tourists in Mediterranean cities tend to be more willing

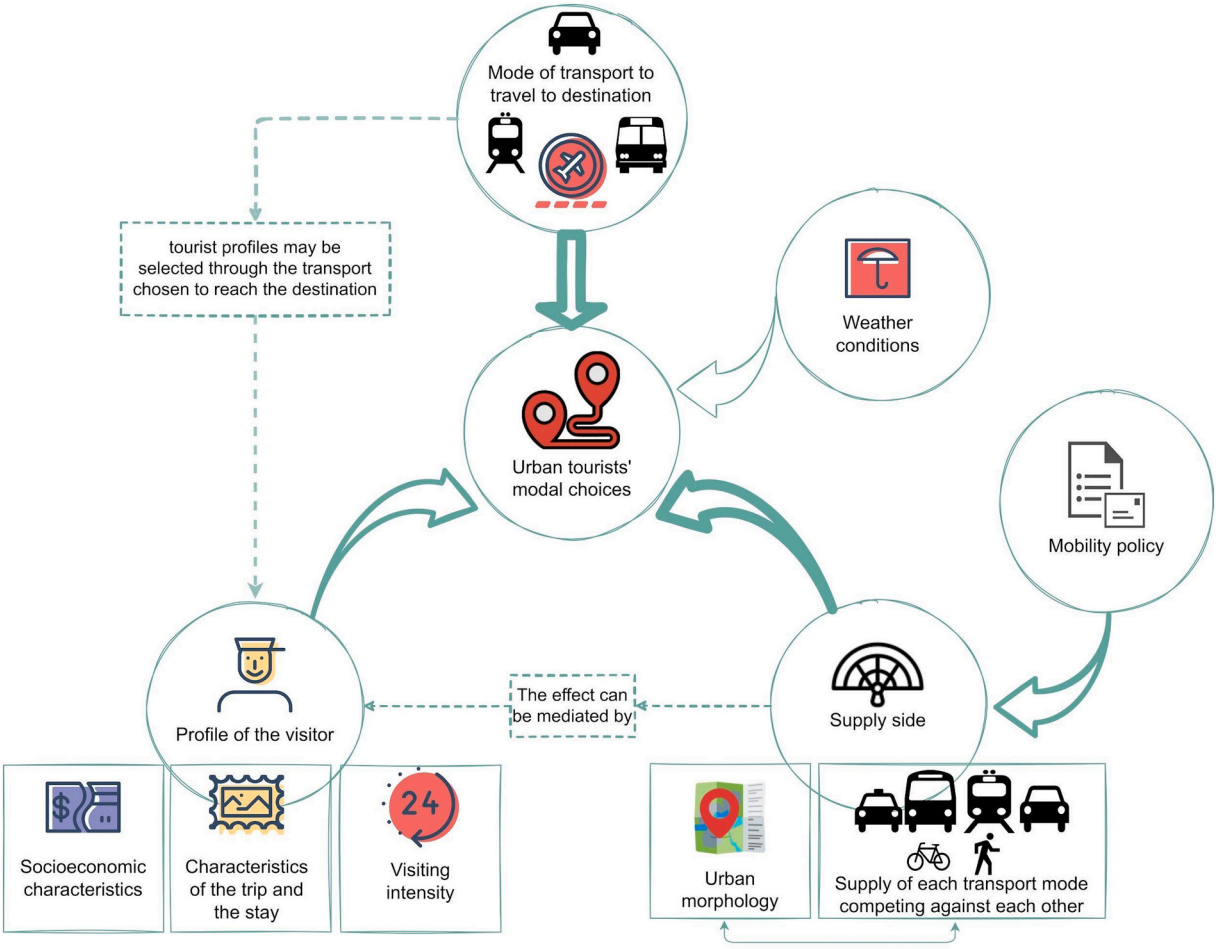

Fig. 2. Theoretical framework of urban tourists' modal choices.
(Source: authors' own elaboration)

to walk when the weather conditions are cloudy rather than sunny (Le Pira, Marcucci, & Gatta, 2021), considering the higher exposure to high temperatures during the peak season.

1.3. Research objective and interest of the study

The objective of this article is to unravel the determinants of tourists' transport modal choices within a major international city. While the analysis of urban residents' mobility has been a frequent topic of research, the number of contributions assessing tourists' mobility is much lower, even though this is far from being a minor issue. This study aims to disentangle the factors underlying tourists' modal choices in the urban space by considering the full range of modes of transport available for visiting a city: public transport, tourist buses, taxi, motorised private transport (MPT) and the active modes (walking and bicycle mainly).

The study is carried out using data drawn from a survey conducted in 2018 (N = 5743) in the city of Barcelona (Spain). Rich information related to multiple characteristics of tourists who stayed overnight in Barcelona (i.e. socioeconomic profile, the nature of the stays and travels -including transport mode choices-) is used to apply multinomial logit models that permit deciphering the determinants of tourists' transport modal choices.

The insights of this study contribute directly to the management and planning of both tourist mobility and urban spaces in tourist cities. Previous studies have provided interesting results on the factors pushing tourists to use public transport in Barcelona (Romão & Bi, 2021), or have explored the role of the information sources in the choice of collective, private or soft modes of transport (Bi & Romão, 2021). However, none of them has provided a complete x-ray of the different modal choices undertaken by tourists and the driving force behind their decisions, as we do in this study. Therefore, in the uncertain new post-COVID-19 era, this study sheds light on the different segments that are more prone to use certain modes of transport. This information is especially useful for designing awareness campaigns to promote sustainable mobility, as well as to configure a competitive multimodal transport system.

The paper is structured as follows. After this introduction, a description of the data used is provided in section 2. Then, the empirical approach implemented is presented in section 3. Afterwards, the results obtained are described in section 4. Finally, section 5 is devoted to a detailed discussion and conclusion, in which the implications of this research regarding the management and planning of tourist mobility are presented in section 5.1, the limitations of the study are indicated in section 5.2 and the future research directions are laid out in section 5.3.

2. Data

2.1. Study area

Barcelona is the capital of Catalonia, North East of Spain (1.6 M inhabitants in 2021). It is one of the most popular Mediterranean urban destinations in Europe. According to the official data from the agency, Tourism of Barcelona, 8.5 M of tourists visited the city in 2019, which translated into 33.8 M overnight stays. In 2018, the association, European Cities Marketing, ranked Barcelona the 7th European city in terms

of overall overnight stays, and the 4th if only international overnight stays are considered. Also in 2018, it became the 4th most popular world destination for congress and business tourism, according to the International Congress and Business Association. The city offers a wide range of attractions. In spite of its beaches, the main attractions are architecture, with some famous buildings and parks catalogued as World Heritage Sites (Sagrada Família, Park Güell, la Pedrera, among others), and museums (FC Barcelona, Picasso Museum). It is also a very attractive city thanks to its cultural attractions, gastronomy and mild climate, along with its nightlife.

The city is characterised by its compactness and high population and activity density (Muñiz & Galindo, 2005). The furthest distances between any two points within the city are shorter than 12 km. As a result, tourists can easily reach any point in the city with any of the modes or combinations thereof, with the multimodal public transport system being the most competitive because it integrates the bus, metro, tram, and train (Curtis & Scheurer, 2017). However, walking and MPT would be at a certain disadvantage since the former is not a suitable alternative beyond some distance thresholds, and the latter is conditioned by congestion in rush hours and parking availability and price.

The acute increase in the number of visitors in the city during the last decade has led to concerns about the adverse effects of the excessive pressure from tourism. Recent studies have reported some of these negatives externalities associated with the fast-growing tourism activity in the city, such as the carbon footprint (Rico et al., 2019), the pressure on the housing market and gentrification processes (López-Gay, Cocola-Gant, & Russo, 2020), the pressure on the use of public spaces (Brandajs & Russo, 2021), the substitution of retail activity (Cocola-Gant, 2015), among others. In this context, a negative perception of tourism activity and its associated impacts (Elorrieta, Cerdan Schwitzguébel, & Torres-Delgado, 2022) has emerged among the local population. Diverse strategic plans have been approved during the last decade in the city in response to the growing challenges associated with sustainable tourism planning. Most of them integrate tourism as a key factor (Donaire Benito, Zerva, & Palou i Rubio & Blasco, 2019). Mobility should be a key topic within this framework. For this reason, in 2017 the "Barcelona Tourism Mobility Strategy" (Ajuntament de Barcelona, 2107) was approved. This strategic plan defines the four main principles for more sustainable tourism mobility within the city: (1) achieve a more sustainable, safe, equitable, efficient and healthy distribution of visits within the city; (2) encourage a way of visiting that is responsible and compatible with the ordinary dynamics of mobility in the city; (3) create mechanisms for monitoring tourist mobility; (4) promote intermodal connectivity in the metropolitan area that contributes to dimensioning and favouring tourism mobility in the whole area.

2.2. Data sources

Data were obtained from a survey on tourist demand, designed and conducted in 2018 by the Tourism Observatory of Barcelona, a working platform made up of the Barcelona City Council, the Barcelona Provincial Council, the Barcelona Chamber of Commerce and the Barcelona Tourism Consortium. A total number of 6015 interviews were conducted with tourists who stayed overnight in the city. The field work involved on-street computer assisted personal interviews with visitors over 15 years old and who stayed overnight between 1 and 28 nights in Barcelona (excluding second homes and cruise ships). Interviews started in February and ended in December 2018. The locations where the interviews took place included hotels, highly frequented streets, the most popular city attractions, trade fair and congress centres, and the main transport infrastructures (bus and train stations and airport). The tourists interviewed were chosen randomly at any of these locations. The error margin within a confidence interval of 95% was ±1.0%.

The survey collected information on tourist characteristics and their demographic profiles (gender, age, level of education and country of origin). Tourists were also asked about the length of stay, accommodation, travel party, travel expenses, whether they had visited the city previously, how they booked accommodation and travel, reason for travelling, whether they were undertaking or planning to undertake excursions from Barcelona and the main transport used to reach Barcelona. There is also a valuation of the extent to which the city was too crowded to be visited. Information on how tourists moved around the city is gathered by means of the following two questions:

- Which of the following modes of transport have you used during your stay in Barcelona?
- If you have taken more than one mode of transport, which is the one that you have used most frequently?

Therefore, the modes of transport used are known, but not the extent to which each of them was used. To better portray how the tourists moved around the city, it is thus preferable to opt for the second question, instead of exploring the differences between users and non-users of each of the transport alternatives.

As stated previously, the transport modes included in the study are public transport, tourist buses, taxis, MPT, cycling and walking. They are the result of the aggregation of the more disaggregated range of options included in the survey:

- Public transport: train, underground, tramway, bus, funicular and cable car
- Tourist bus: hop-on hop-off tourist bus and coach
- Taxi
- MPT: private car, rented car, motorhome, car sharing, car pooling, private motorbike and rented motorbike.[1]
- Cycling: Private bicycle, rented bicycle, Bicing (public bike rental system) and electric scooters.
- Walking

Data drawn from the platform, Barcelona Open Data, regarding weather conditions during the dates tourists stayed in the city have also been included. Variables considered embrace temperature, days of rain, solar radiation and wind intensity.

2.3. Descriptive statistics

Table 2 presents descriptive statistics. There are dichotomous and continuous variables. The original data set comprised 6015 observations. After withdrawing the missing observations, the final sample results in a total of 5743 individuals.

Public transport was the most frequently chosen transport option with 66% of respondents, followed by taxis with 22%. The vast majority of tourists reached the city by airplane, i.e. up to 81%, while 14% arrived by means of public transport and the remaining 5% used a private vehicle. The average age was 36.7, and 71% had attained a higher education degree. With respect to the origin, 58% came from countries located further than 2000 km away, which contrasts with the only 14% that came from other parts of Spain. A total of 56% stayed at a hotel and another 18% in an apartment. The average travel party size was 3.2. Most of the tourists came with his/her partner (39%), or alone (28%). Average length of stay was 4.7, while average expenditure was close to €1400. Most of the tourists were enjoying leisure time in Barcelona (72%), whereas 22% were there for professional or educational reasons. Up to 52% had never been to Barcelona before. With respect to the weather conditions, the mean percentage of rainy days during the stay

[1] MPT includes car sharing, carpooling and rented motorbikes, even though they are not specifically MPT. The reason is that altogether, they only represent 0.35% (0.07% for car sharing, 0.05% for carpooling and 0.23% for rented motorbikes) of the total sample, and that is not enough to create a separate category.

Table 2
Descriptive statistics.

Variable	Description	Mean	St. Dev.
Bcn-PT	Public Transport most used mode within Barcelona	0.66	
Bcn-TB	Sightseeing bus most used mode within Barcelona	0.04	
Bcn-Taxi	Taxi most used mode within Barcelona	0.22	
Bcn-MPT	Motorised private transport most used mode within Barcelona	0.03	
Bcn-Bcl	Bicycle most used mode within Barcelona	0.01	
Bcn-Walk	Walking most used mode within Barcelona	0.05	
Gen-man	Gender: Man	0.60	
Age	Age	36.7	13.54
Edu-univ	Higher Education	0.71	
Or-Spain	Origin: Spain and Andorra	0.14	
Or-France	Origin: France and Monaco	0.07	
Or- < 2.000	Origin: countries located <2000 km from the destination	0.21	
Or- > 2.000	Origin: countries over 2000 km from the destination and overseas territories	0.58	
Ac-Hotel	Accommodation in a hotel or bed & breakfast	0.56	
Ac-Hostel	Accommodation in a hostel, couchsurfing or apartment exchange	0.13	
Ac-Apt	Accommodation in a rented apartment	0.18	
Ac-Friend	Accommodation at friends' and relatives' place	0.13	
Own_contr	Accommodation and travel directly contracted by the tourist	0.44	
N_Trparty	Number of people in the travel party	3.23	12.65
Who-Alone	Accompanied by nobody	0.28	
Who-Friends	Accompanied by friends	0.14	
Who-Family	Accompanied by family and/or children	0.11	
Who-Work	Accompanied by job or studies colleagues	0.08	
Who-Partner	Accompanied by partners	0.39	
Le_stay	Length of stay	4.72	3.67
Expenses	Travel expenses (thousands of €)	1.39	2.84
Mo-Holiday	Reason for travelling: Holiday	0.72	
Mo-Family	Reason for travelling: Stay with family	0.07	
Mo-Prof	Reason for travelling: Professional or educational	0.22	
Excurs	Excursions outside Barcelona	0.09	
1Time	First time in Barcelona	0.52	
People	Too many people in Barcelona	2.70	1.23
Tvl-Flight	Travelling to Barcelona: Flight	0.81	
Tvl-PT	Travelling to Barcelona: Public transport	0.14	
Tvl-PV	Travelling to Barcelona: Private vehicle	0.05	
We-Rain	Weather: % of days with rain (>1 mm) during the stay	0.20	0.29
We-Sun	Weather: Average sun irradiation (KJ/M^2) during the stay	17.39	7.41
We-Temp	Weather: Average temperature during the stay	19.08	5.93
We-Wind	Weather: Average wind speed during the stay (m/s)	1.99	0.47
Intensity_visit	Number of attractions visited / length of stay ($N = 1931$)	1.88	1.60

Source: Authors' own elaboration with data provided by the Tourism Observatory of Barcelona.

was 20%, while the average temperature was 19.1C°. The average daily number of attractions visited is 1.9. The value of this variable is only available for 1931 individuals, as the question was only posed to a randomly chosen $^1/_3$ of the sample.

3. Methods

The determinants of transport modal choices are usually appraised empirically via multinomial logit models when there are no alternative-specific independent variables, as they permit fitting models characterised by a discrete choice of unordered options (Gutiérrez, Miravet, Saladié, & Anton Clavé, 2019). Following this type of model, in this study a tourist who visits Barcelona selects their preferred intra-destination transport mode depending on the utilities provided by each of the available options:

$$U_{ij} = X_i\beta_j + u_{ij} \quad (1)$$

U_{ij} expresses the utility that tourist i obtains from the use of the mode of transport j. Nevertheless, these utilities cannot be observed directly. What is observed is the final choice that reveals the transport mode providing the highest expected level of utility to the tourist, and the set of covariates which encompass the characteristics regarding individual, travel and stay, along with average weather conditions during the stay (denoted by X_i). β refers to a vector of coefficients, while u_{ij} is the error term. Hence, the probability that tourist i opts for mode of transport j is expressed as:

$$P_{ij} = \frac{exp\ (x_i\beta_j)}{\sum_{k=1}^{J} exp(x_i\beta_k)} \quad (2)$$

Results of the multinomial logit regression provide the impact of each independent variable (X_i) on each transport mode (j), measured as a compared probability with respect to the most frequent option to move around Barcelona: public transport.

Probably, the main drawback with this sort of models is the fact that it imposes what is known as the independence of irrelevant alternatives assumption (IIA). In other words, the election between two alternatives must be made with no interference caused by the rest of the available options (McFadden, 1973). In our particular case, at least a priori, IIA could be a relevant issue, since there are transport modes that are quite similar. In this respect, several works have advocated for the use of the multinomial probit instead of multinomial logit, as the former relaxes the IIA assumption (Alvarez & Nagler, 1998). Nevertheless, the pros and cons of each model should be considered before taking a decision, as the multinomial probit is not exempt of estimation concerns. The most relevant issue is that it is often weakly identified, which is a problem that is very difficult to detect and would lead to misleading results (Dow & Endersby, 2004). Along the same lines, Kropko (2007) concludes that multinomial logit tends to provide more accurate results than the multinomial probit, even in the event that the IIA assumption is severely violated. Besides, several works have proved that the impact of its violation on the coefficients and significance levels is negligible in most cases (Dahlberg & Eklöf, 2003; Haan, 2006), since most of the times the

IIA property is neither relevant or particularly restrictive (Dow & Endersby, 2004). Another issue that must be taken into consideration is the concerns raised against the tests that are used to find out whether the IIA assumption is met. According to Cheng and Long (2007), the results provided by traditional tests tend to fail. The assumption is often rejected when the options look distinct, and often, they do not reject IIA when the alternatives are apparently close substitutes. In summary, both models have their own estimation issues, which are difficult to evaluate. The estimation concerns associated with the multinomial logit seem to be less in comparison with the multinomial probit, which in addition, is much more computationally demanding (Thrane, 2015). There are other models that also relax the IIA assumption; this is the case of the nested logit, the mixed logit, or the latent class multinomial logit. Neither of them is applicable to our data set, as they require the existence of alternative-specific variables (see Greene, 2012 and Bujosa, Riera, & Hicks, 2010 for further details). The use of latent class multinomial logit would be particularly interesting given the object of the present contribution. However, in addition to alternative-specific variables, it requires each individual facing different decision situations. The dataset identified the most frequently used mode of transport, but did not contain data related to point-to-point journeys within the city, which would have been necessary to estimate these models. In this vein, the availability of data related to tourists' itineraries would have allowed the inclusion of variables that vary across the different transport alternatives, besides having more than decisions by each individual.

Estimation concerns are not just limited to the IIA assumption, as there are other sorts of potential biases. Firstly, the decision to visit a place or an attraction is conditioned by the range of modes of transport available to the subject, and simultaneously, the modal choice also depends on the place or attraction to be visited. As a result, if the residuals of both equations (transport choice and visiting decision) were correlated, it would lead to an endogeneity bias (Le-Klähn et al., 2015; Masiero & Zoltan, 2013). It is very difficult to tackle this issue properly due to the absence of reliable methodologies that allow considering endogeneity when the dependent variable of the outcome equation is an unordered set of options. It is possible to do so when both dependent variables are dichotomous by means of the bivariate probit, or even, when the options are ordered using the bivariate ordered logit. It is even possible to consider an endogenous multinomial variable that is an endogenous variable of an outcome equation with functional forms such as logistic or binomial. However, the outcome variable cannot be multinomial (Deb & Trivedi, 2006). Given that all the tourists in our sample are staying in and visiting the same city, i.e. Barcelona, the effect of this mutual relationship should be mitigated, since the differences of accessibility between modes of transport should be minor in the context of an urban area with a limited extension and powerful transport networks. In fact, previous works that have proved the existence of a correlation between the residuals of both equations, have explored tourist visits across regions as opposed to a city.

Second, previous studies proved the existence of endogeneity in the decision of using public transport at the destination (Gutiérrez & Miravet, 2016). The unobserved characteristics of the tourists are connected to the willingness to have an active or a more passive holiday, and as a result, also to their transport decisions both to and within the destination. To cope with this issue, an alternative model has been estimated that includes an indicator which measures to what extent the tourist has visited attractions during the stay. Not all the tourists who were interviewed were asked about the attractions they visited, and instead, this question was only asked randomly to a third of them. Thus, the estimation that incorporates this variable reduces its sample size from $N = 5743$ to $N = 1931$. In order to ensure that the tourists had been chosen randomly, the Mann –Whitney two-sample statistic was carried out for all the variables shown in Table 2. Differences in medians are only statistically significant for four variables: intra-destination public transport use, having contracted the whole trip by oneself, hotel accommodation and flight transport to the destination. In each case, the degree of significance is weak. Respectively, 9.27%, 7.18%, 7.23% and 9.27%.

Third, previous evidence indicates that the modal choices at the place of origin effect the modal choices at the tourist destination (Bieland et al., 2017; Zamparini, Domènech, Miravet, & Gutiérrez, 2022; Zamparini & Vergori, 2021). Along these lines, if modal choices at home and at destination were both connected to individuals' environmental awareness, endogeneity would arise. However, very limited evidence of this connection has been found in previous research (Anciaux, 2019). Taking into account the latter, along with the fact that we lack proper instruments to tackle this issue, it is preferable to put it aside for future investigations with data sources that enable researchers to properly assess the incidence.

Finally, the quality of services and infrastructures should also affect tourists' decisions. On this occasion, the biasing effect should be mitigated by the fact that the sample is restricted to stays in Barcelona. As all tourists are using the modes of transport in the same city, no variability between transport alternatives can be considered. Variability could be reached if there were information on tourist perceptions regarding each mode of transport. As this is not the case, the impact of this sort of variables cannot be part of the model, and it will probably be captured through variables regarding the visitor's profile. If the sample encompassed other destinations, then the impact of the exclusion of this information on the results would be taken into consideration.

4. Results

For ease of reading, the results of the multinomial estimations of model 1 (N = 5743 without inclusion of the variable that measures the intensity of visits) and model 2 (N = 1931 with inclusion of the variable that measures the intensity of visits) are shown in Table A.1. Both models compare the likelihood that the tourist leans towards using each modal option compared to the probability of becoming a public transport user during their stay. A summary of the results is also provided in Fig. 3, where it is possible to differ between tourists' profiles using the different transport modes, compared to the reference group: those tourists using public transport. As stated in the methods section, differences between models are the consequence of the sample size effect. For this reason, the results in model 1 are more reliable than those obtained in model 2. Thus, o nly significant results both in model 1 and 2 will be taken into consideration.

According to the results, the users of tourist buses look for ease of travel when visiting an attraction, along with rapid access to maximise the number of visits. The former result is consistent with Luka (2012), and is signalled by the fact that those tourists using hop-on hop-off buses are older tourists, have travelled a further distance to reach the destination, stay in a hotel, travel with family members or a partner, do not visit friends or relatives, have not attained higher education and have not booked the accommodation and the travel by themselves.

The profile of the tourist who moves around by taxi is characterised by travelling to Barcelona for professional reasons, with less interest in visiting attractions, and a high propensity to spend money during the stay. The likelihood of moving within Barcelona by taxi also grows both in models (1) and (2) for men and hotel stays. On the contrary, the probability diminishes with tourists originating from places located within 2000 km, the length of their stay, and excursions they undertake outside Barcelona during their stay. This latter result is highly correlated to having travelled to the city by MPT. The significant negative impact yielded by the use of MPT to reach the city on the demand for taxis vanishes once the number of attractions visited is entered into model (2).

Results reveal that tourists who decide to move throughout the city by MPT have also travelled to Barcelona by MPT, are not very interested in visiting attractions, and has above average expenses during the trip. Few variables exhibit significant effects both in models (1) and (2). These are, on the one hand, the positive correlations associated with the use of MPT to reach Barcelona, undertaking excursions outside the city,

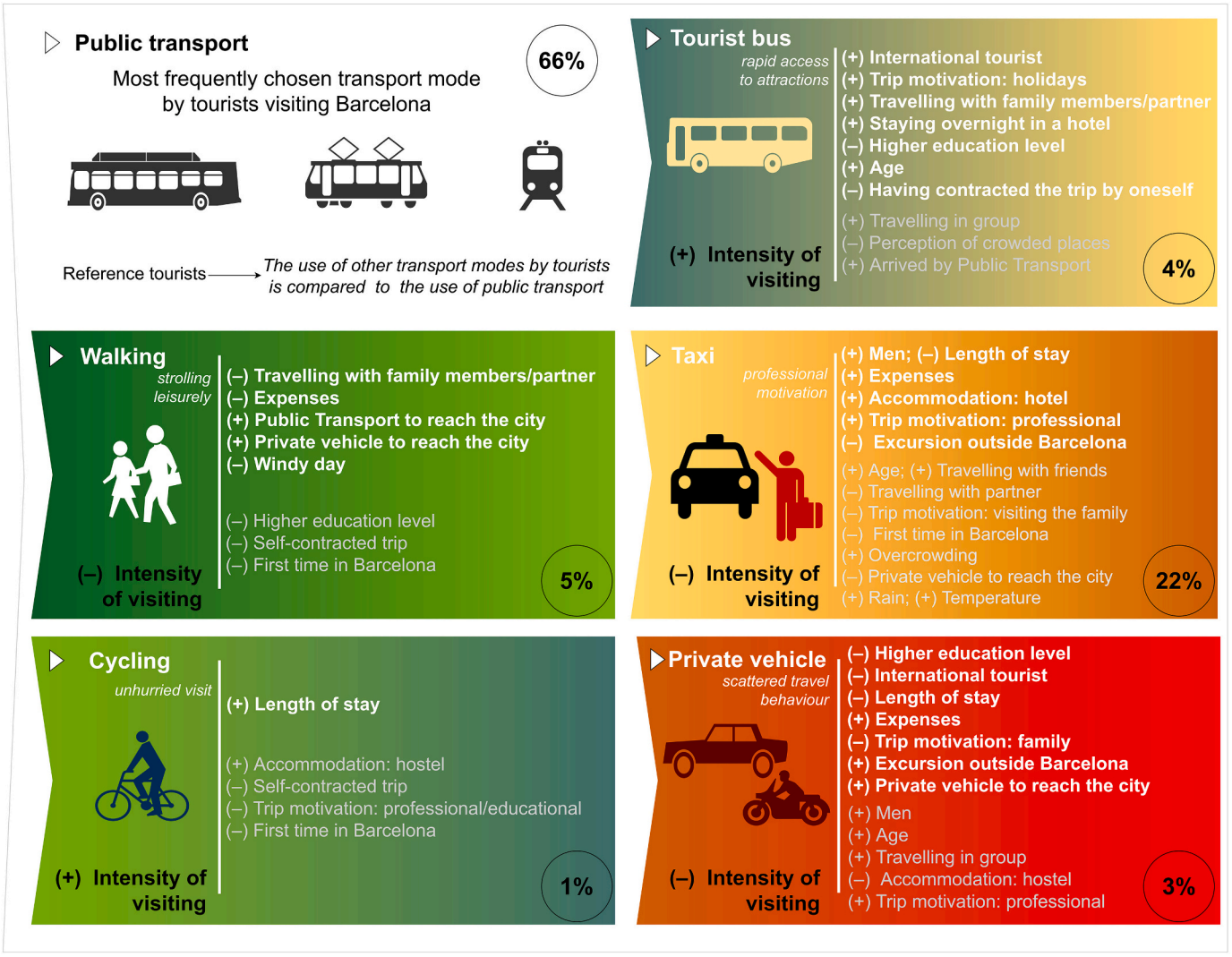

Fig. 3. Summary of the results obtained in the multinomial logit models ordered by impact of coefficients.
Note: Only variables statistically significant in model 1 are included (except the number of attractions visited in model 2): white = significant in both models; grey = significant only in the first model. (+) = positive association; (–) = negative association.
Source: Authors' own elaboration.

having greater expenditure, and travelling for family reasons, and, on the other hand, the negative relationships associated with higher education levels and coming from origins further away. The use of the bicycle is associated with an interest in an intense pace of visiting, as bicycles are convenient to move around the city in both a fast and flexible way. Besides, they are also preferred by those tourists staying for longer periods, even though the impact of this variable is softened as the number of days increases. For the rest of the significant variables, the evidence is mixed between models 1 and 2.

The profile of those who basically walk while staying in the city is characterised by less interest in visiting the city. This result is consistent with the negative relationship associated with visiting the city by those who travel for family reasons. The squared value of expenses shows a positive significant effect in both models. In fact, this result would counteract the opposite effect shown by the linear value of the variable, which is only significant in model 2.

Some variables deserve specific attention. First of all, the mode of transport used to reach the destination. In comparison with tourists whose preferred choice to visit Barcelona is public transport, significant differences in both models only arise for those who move around in private vehicles and those who walk. In this respect, those tourists who arrive in the city using MPT are much more likely to move around the city also by MPT, but also walking, rather than use the public transport. As expected, the use of MPT is conditioned to visitors who have also travelled to the city using MPT. Nonetheless, the higher probability of visitors walking leads us to think that there is a significant number of people who do not use MPT once in the city, even though they used it to travel there. This result is confirmed by the fact that 53% of tourists who travelled to the city by car, most frequently chose public transport to travel around, whereas in contrast, only 19% moved around by MPT. This percentage is close to the value of visitors who moved around the city walking (16%). Finally, those tourists who reach Barcelona by means of public transport are also more likely to walk around in comparison to those who fly.

Secondly, the feeling of overcrowding, which is a subjective individual perception, provides some weak evidence. A positive relationship is found with the use of the taxis (only model 1). On the contrary, the use of tourist buses (only model (1)) would be discouraged due to the stressful and unpleasant situations arising from the feeling of being surrounded by a crowd as moving around. The perception of overcrowding is connected to the available space for moving around.

Finally, the introduction of average weather conditions only yields a

significant effect regarding the use of the taxis (model 1: enhanced by the percentage of rainy days and higher temperatures), the likelihood of cycling (model 2: enhanced by higher temperatures), and visiting the city on foot (both models: its probability declines with the wind strength). To some extent these results reveal how weather conditions can effect tourists' transport modal decisions, as previously demonstrated (Böcker et al., 2016; Le Pira et al., 2021; Liu et al., 2015).

5. Discussion and conclusions

5.1. Implications of the results and contribution to the management and planning of tourist mobility

This study aimed to disentangle the determinants of modal transport choices made by tourists in Barcelona, one of Europe's most popular urban destinations. The work contributes to advancing the research in the field of transport mode choices and tourist mobility at destination. Indeed, compared to previous studies, it has provided a theoretical framework which portrays tourists' mobility within the city, introducing elements that noticeably differ from previous contributions which were focused on tourists' modal choices at other geographical levels beyond the limits of the city (Masiero & Zoltan, 2013; Zamparini et al., 2022; Zamparini & Vergori, 2021). Besides, this theoretical framework has been tested empirically.

Furthermore, unlike existing studies that focus on a single mode of transport (Gross & Grimm, 2018; Bi & Romão, 2021; Romão & Bi, 2021) or differentiate between sustainable and unsustainable modes of transport (Maltese, Zamparini & Amico, 2021; Zamparini & Vergori, 2021; Zamparini et al., 2022), this work attempted to appraise tourists' modal choices among the full range of alternatives available in a city: Public transport, tourist buses, taxis, MPT, cycling, and walking. Therefore, a complete analysis is provided of the different mobility options used by tourists and the driving forces behind their choices.

The results of the study provide empirical evidence that could be interesting both in the case of Barcelona city, and also other urban destinations interested in managing and planning sustainable tourism mobility. First of all, our analysis helps to show how collecting and exploiting trustable data, in this case, via tourist mobility surveys, could be crucial for better informed decision-making. The evidence obtained indicates that the visitor profile is a critical element determining mobility. There is one variable that requires specific attention: the pace of willingness to undertake visits, since all the modes of transport considered have significant impacts associated with this variable, in comparison with public transport. Thus, tourists who use tourist buses seek rapid access to attractions. Thereby, they maximise the number of attractions visited and eliminate any concern related to trip planning. In comparison with public transport, taxi users, who tend to be tourists with a professional purpose, and tourists moving by MPT, are much less interested in visiting attractions and tend to spend more money due to the increased cost of the transport mode used. Bicycles seem to be chosen by tourists who also intend to maximise the number of attractions visited per day, and those who stay in the city for longer periods, while people walking show less interest in attractions, along with the fact that they have not flown to the city. According to these results, it would be particularly interesting to introduce initiatives aimed at promoting sustainable mobility to specific visitor targets using marketing and communication tools. This should include developing specific products, targeting responsible visitors and building tourist experiences around a low-carbon, respectful and well-integrated mobility model.

Results also show that tourist mobility is sensitive to the characteristics of the urban space and the supply of each mode of transport. A clear example of this is that >80% of tourists who travelled to the city by MPT did not use it, once there, as their most preferred means of transport. In fact, the likelihood of moving around the city on foot substantially increased for these tourists. This is the consequence of the urban structure of a city such as Barcelona, which is characterised by high population and activity densities, which discourage the use of private cars, and also its above-average indicators of public transport accessibility (Curtis & Scheurer, 2017). This conclusion is consistent with Albalate and Bel (2010), who highlight that visitors are prompted to avoid the combination of cost, effort and hassle that arises from driving across unknown cities. Thus, this result, combined with the evidence of divergent mobility preferences contingent with tourist profiles, suggests that the implementation of ASI (avoid - shift - improve) schemes can be effective on both resident and tourist modal decisions. Our results suggest that actions aimed at promoting more sustainable and respectful mobility could become especially effective in a context such as the city of Barcelona. These actions should be geared towards developing active mobility facilities and services, and specifically walkable areas, but also to dimensioning public transport infrastructures and services taking into account the spatiality and temporality of visitor flows.

The clear distinction of tourist segments is nonetheless a key issue, as each segment will show different degrees of sensitivity to different sorts of actions. For instance, both the use of taxis and MPT are associated with higher levels of expenditure during the stay, which are closely related to higher tourists' incomes (Wang & Davidson, 2010). This implies that wealthier visitors are still willing to move around the city using these transport modes, despite the inconveniences of doing so within a densely populated city. Also, in terms of sustainability, shorter lengths of stay are also related to the use of the most pollutant modes of transport, while longer lengths of stay foster moving around by bicycle, consistent with Kovačić (2015). Having more time available allows tourists to enjoy a more relaxed visiting experience, without the need of hurrying from one attraction to another. This result is consistent with Leiper (1990) and Richards (2002), who point out that the tourists' available time is a key element that determines the pace of the visits and to what extent the destination is explored. Moreover, and in line with previous research (Bieland et al., 2017), modal choices to reach the destinations also play a role, with the configuration and competition between the different networks diminishing their importance. As stated by Peeters and Schouten (2006), there is an obvious correlation between the mode of transport selected to reach a city, and the subsequent intra-destination choices. Hence, it is central to discourage tourists from arriving in the city by means of MPT, and to reinforce the multimodality aspect of a competitive transport system such as the one in Barcelona. The potential creation of a congestion charge, currently under public debate, could help to discourage MPT access, especially in the case of one-day visitors.

Nevertheless, the solution does not simply entail selecting certain tourist profiles and pushing tourists towards the most apparently desirable modes of transport. The accelerated growth of urban tourism, which has driven the recovery after the economic crisis of 2008 (García, 2010), has introduced increasing pressure in urban spaces and transport, derived from the need to accommodate the arrival of an increasing numbers of visitors. In fact, current city designs and the distribution of urban spaces are not based on a layout or plan aimed at developing tourist activities (Ujang & Muslim, 2014). In this respect, it must be considered that cities are only able to respond satisfactorily to the arrival of additional visitors providing their infrastructures are strong enough to ensure that the level of externalities caused by the tourism sector is tolerable (Sheng, Li, & Wang, 2017), with the balance between liveability, environment, and population and visitor volume and growth being 'uneasy' (Romão, Kourtit, Neuts, & Nijkamp, 2018). This reasoning acquires special relevance given that intra-destination mobility and transport are an integral component of the visitors' experience (Larsen, 2001).

The results of this work have shown that there is considerable potential for the growth of active transport modes in Barcelona. Their future expansion depends on the availability of infrastructures (spacious and attractive sidewalks) to absorb more people strolling (Neuts et al., 2012) and cycling (Nilsson, 2019) through the city. The space devoted to active mobility must spread throughout the city to alleviate the traffic

congestion in the central areas. The current, and planned, actions in Barcelona aimed at promoting walkable and cyclable streets, and reducing the space for cars, clearly could help to develop more active and low-carbon mobility. The city could be successful in attracting visitors who prefer to wander throughout the city and diverting them from the most congested areas close to the main attractions, but only if tourist itineraries are appealing enough. Likewise, the pressure of additional users (visitors) can lead to undesirable reactions by locals (i.e. shift towards other less sustainable transport modes) and to a loss of attractiveness, in the opinion of visitors. Indeed, the particular circumstances brought on by COVID-19, especially in terms of imposing physical distance between individuals on the streets and requiring the enhancement of safety measures on public transport (Gutiérrez et al., 2020; Kissler, Tedijanto, Goldstein, & Grad, 2020), create additional pressure to properly planning tourists' mobility. In this respect, the considerations discussed in this study regarding the planning of tourists' mobility, become even more relevant.

Overall, results lead us to consider that, consequently, developing urban mobility plans that provide a close analysis and propositional perspective on forms of tourism mobility is becoming an essential issue. Among many attributions, urban mobility plans appraise how the available space in the streets must be distributed between MPT, public transport and the active modes. Their analyses have tended to focus mainly on residents' mobility and have neglected visitors' needs and preferences. As signalled by Orbaşli and Shaw (2004), appropriate mobility planning and management, including trips on foot, is contingent to ensuring that the city is attractive for visitors and locals alike. Proper planning also contributes to mitigating the rejection of tourists' activities by residents (Martín-Martín et al., 2018). Consequently, an action plan is needed that includes the multiple tourism flows, in terms of mobility plans, within the city of Barcelona. This action plan should give a logical continuity to the "Barcelona Tourism Mobility Strategy" (Ajuntament de Barcelona, 2107) and should address the impacts and take the opportunities to promote an integrated approach in order to enhance the sustainable urban mobility of both residents and visitors.

5.2. Limitations

This study presents limitations arising from the data source used. The data set was not designed originally to keep track of visitors' mobility. Although it allows us to identify the most used mode of transport to visit the city, it does not include some variables that are very likely to affect visitors' decisions, such as the everyday mobility patterns at the place of origin along with the effect associated with supply. The problem stems from the fact that tourist surveys at the destination are not designed specifically to gather information on tourists' mobility, and they tend not to include questions regarding their everyday mobility (Zamparini & Vergori, 2021). With respect to supply, since the survey is not a travel diary, neither does it include information on specific itineraries or the frequency of use of each mode of transport. Thus, it is not possible to apply indicators of this sort, which would imply analysing the effect of alternative-specific independent variables. Assessing the impact of the supply side variables would also be enabled if the sample comprised data from tourists of different urban destinations. Then, indicators for each of the cities and each of the modes could be built and entered into the equation. This aspect is particularly interesting as it would allow us to examine the different multimodality level of transport systems in cities, and to what extent a diversity of local mobility policies shape tourists' modal choices. Finally, although the results of this study showed a significant impact from some weather indicators, the use of average conditions should be replaced by more disaggregated data to obtain more accurate results. Hence, the exploration of how meteorological conditions shape modal decisions should be undertaken when the analysis is conducted at journey level (Zhou et al., 2017).

5.3. Future research directions

Besides the mitigation of the aforementioned limitations, this study sparks future lines of research. First of all, given that this work has assessed mobility decisions at a top urban destination such as Barcelona (a city which has some particular characteristics that, for sure, have decisively influenced tourists' choices), it would be very interesting to develop similar analyses using data from other urban destinations. It would clarify whether the factors that exerted a significant impact on the data from Barcelona would remain significant in different territorial contexts. Secondly, this work has used tourists' data. However, the impact on mobility associated with one-day visitors should not be neglected. Again, the availability of proper data is a central issue. Thirdly, this work has analysed the most used mode of transport during the whole stay at a tourist destination. The shifting of this analysis to the individual level of each journey undertaken would provide finer evidence not only on the modal decisions, but also on the decision including the place where the visitor departs from and goes to. This disaggregated perspective would make it easier to analyse the efficiency of the multimodal transport system, but it would require using alternative sources of data, such as passive mobile positioning data, smart travel cards, in the case of public transport, and/or exhaustive travel diaries with full details of all the journeys undertaken by the visitor. Finally, an increase is expected in the volume of research regarding the effects of the COVID-19 pandemic on mobility. This will be crucial to analysing the effect of the various policies implemented to identify which measures allow a progressive transition towards a sustainable model where active mobility and public transport are predominant, and which measures slowdown that transition. Measures such as providing a reliable and contagion-free image of public transport, as well as expanding bicycle networks and pedestrian spaces could guarantee the health of the city and its inhabitants (both residents and visitors).

CRediT roles

(AD, DM, AG) Conceptualization; (DM) Data curation; (AD, DM) Formal analysis; (AG) Funding acquisition; (AD, DM, AG) Investigation; (DM) Methodology; (AD, DM, AG) Project administration; (AD, DM, AG) Resources; (DM) Software; (AD, DM, AG) Supervision; (AD, DM, AG) Validation; (AD, DM) Visualization; (AD, DM) Roles/Writing - original draft; (AD, DM, AG) Writing - review & editing. (AD) Antoni Domènech, (DM) Daniel Miravet, (AG) Aaron Gutiérrez.

Acknowledgements

This publication is part of the R+D+i project ADAPTOUR (contract number PID2020-112525RB-I00) funded by MCIN/AEI/10.13039/501100011033 and the Department of Research and Universities of the Catalan Government under Grant 2017SGR22.

Table A.1
Multinomial logit models.

	Hop-on hop-off bus vs Public Transport				Taxi vs Public Transport				Motorised Private Transport vs Public Transport				Bicycle vs Public Transport				Walking vs Public Transport			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE
Intercept	0.01	(0.01)***	0.00	(0)***	0.08	(0.06)***	0.65	(0.77)	0.01	(0.01)***	4.83	(13.56)	0.00	(0)***	0.00	(0)***	0.32	(0.4)	0.69	(1.42)
Socio-economic characteristics																				
Gen-man	0.93	(0.14)	1.59	(0.44)*	1.25	(0.1)***	1.35	(0.18)**	1.48	(0.27)**	1.05	(0.3)	1.27	(0.33)	2.05	(1.07)	1.03	(0.14)	1.12	(0.25)
Age	1.07	(0.03)**	1.13	(0.07)**	1.00	(0.02)	1.01	(0.03)	1.14	(0.06)***	1.07	(0.07)	0.98	(0.06)	0.83	(0.09)*	1.02	(0.03)	1.01	(0.05)
Age2	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0)**	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0)
Edu-univ	0.71	(0.12)**	0.48	(0.14)**	0.92	(0.08)	0.99	(0.15)	0.71	(0.13)*	0.51	(0.16)**	1.72	(0.58)	1.28	(0.77)	0.76	(0.11)*	0.70	(0.18)
Or-Spain									Reference category											
Or-France	1.85	(0.92)	0.75	(0.58)	0.98	(0.18)	1.04	(0.33)	0.56	(0.19)*	0.39	(0.23)	0.48	(0.41)	0.00	(0)***	0.78	(0.22)	0.96	(0.44)
Or- < 2.000	2.17	(0.89)*	2.05	(1.24)	0.66	(0.1)***	0.61	(0.16)*	0.44	(0.14)**	0.38	(0.19)**	2.08	(1.15)	0.64	(0.65)	0.83	(0.2)	0.56	(0.24)
Or- > 2.000	4.99	(1.89)***	2.68	(1.55)*	1.30	(0.18)*	1.23	(0.29)	0.56	(0.16)**	0.40	(0.17)**	1.78	(1.04)	0.57	(0.58)	1.03	(0.21)	0.75	(0.27)
Characteristics of the trip and the stay																				
Ac-Hotel									Reference category											
Ac-Hostel	0.20	(0.07)***	0.32	(0.17)**	0.19	(0.03)***	0.22	(0.06)***	0.51	(0.19)*	0.64	(0.43)	1.87	(0.65)*	1.06	(0.76)	1.01	(0.21)	0.89	(0.33)
Ac-Apt	0.35	(0.08)***	0.43	(0.16)**	0.47	(0.05)***	0.48	(0.09)***	0.81	(0.2)	0.93	(0.35)	1.17	(0.43)	1.50	(0.92)	0.88	(0.17)	0.70	(0.24)
Ac-Friend	0.20	(0.1)***	0.17	(0.18)*	0.30	(0.05)***	0.33	(0.09)***	1.54	(0.44)	1.42	(0.67)	1.32	(0.51)	1.12	(0.86)	0.83	(0.19)	1.08	(0.44)
Own_contr	0.69	(0.11)**	0.58	(0.15)**	1.01	(0.08)	1.06	(0.15)	0.94	(0.2)	0.78	(0.27)	0.60	(0.18)*	0.82	(0.46)	0.75	(0.12)*	1.09	(0.29)
N_Trparty	1.03	(0.01)***	1.04	(0.05)	1.01	(0.01)	0.98	(0.04)	1.02	(0.01)*	1.04	(0.05)	1.02	(0.17)	63.86	(262.2)	0.99	(0.02)	1.10	(0.16)
N_Trparty2	1.00	(0)***	1.00	(0)	1.00	(0)*	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0.01)	0.49	(0.33)	1.00	(0)	0.99	(0.01)
Who-Alone									Reference category											
Who-Friends	1.46	(0.49)	2.49	(1.51)	1.34	(0.18)**	1.46	(0.35)	1.13	(0.37)	0.73	(0.49)	1.17	(0.47)	0.11	(0.24)	0.72	(0.19)	0.80	(0.38)
Who-Family	2.65	(0.82)***	5.42	(3.51)***	0.87	(0.13)	0.98	(0.26)	1.38	(0.45)	2.04	(1.01)	0.55	(0.34)	0.04	(0.11)	0.48	(0.14)**	0.34	(0.2)*
Who-Work	1.63	(0.67)	1.15	(1.03)	1.19	(0.18)	1.15	(0.34)	1.51	(0.56)	0.15	(0.13)**	1.57	(1.64)	0.00	(0)***	1.49	(0.44)	2.33	(1.22)
Who-Partner	1.60	(0.45)*	2.52	(1.39)*	0.77	(0.09)**	0.94	(0.18)	1.01	(0.27)	1.62	(0.66)	0.68	(0.26)	0.08	(0.17)	0.92	(0.17)	1.31	(0.48)
Le_stay	0.90	(0.06)	2.47	(0.99)**	0.76	(0.02)***	0.73	(0.04)***	0.81	(0.06)***	0.75	(0.09)**	1.28	(0.15)**	2.55	(0.83)***	0.93	(0.06)	0.86	(0.09)
Le_stay2	1.00	(0)	0.89	(0.04)***	1.01	(0)***	1.01	(0)***	1.01	(0)**	1.01	(0.01)	0.99	(0.01)**	0.95	(0.02)**	1.00	(0)	1.00	(0)
Expenses	0.75	(0.16)	1.79	(0.6)*	2.68	(0.27)***	2.40	(0.47)***	3.01	(0.64)***	2.59	(0.95)***	1.50	(0.46)	0.99	(0.51)	0.75	(0.15)	0.13	(0.11)**
Expenses2	1.03	(0.02)	0.95	(0.03)	0.91	(0.01)***	0.92	(0.02)***	0.90	(0.02)***	0.91	(0.03)***	0.95	(0.03)	1.00	(0.05)	1.03	(0.02)*	1.24	(0.11)**
Mo-Holiday									Reference category											
Mo-Family	0.08	(0.08)**	0.00	(0)***	0.63	(0.13)**	0.91	(0.28)	1.99	(0.61)**	2.59	(1.3)*	1.47	(0.63)	2.51	(1.72)	0.73	(0.21)	0.55	(0.29)
Mo-Prof	0.47	(0.16)**	0.60	(0.3)	2.24	(0.25)***	2.26	(0.45)***	1.75	(0.51)*	1.59	(0.7)	0.37	(0.21)*	0.61	(0.7)	0.72	(0.16)	0.57	(0.24)
Excurs	1.18	(0.3)	1.79	(0.78)	0.58	(0.09)***	0.52	(0.14)**	2.11	(0.51)***	2.19	(0.92)*	0.64	(0.29)	0.67	(0.52)	0.66	(0.18)	0.48	(0.26)
1Time	1.07	(0.17)	1.21	(0.36)	0.68	(0.05)***	0.83	(0.11)	0.81	(0.16)	0.89	(0.28)	0.57	(0.16)**	1.15	(0.66)	0.72	(0.11)**	0.95	(0.25)
Supply side																				
Overcrowding	0.89	(0.05)*	1.03	(0.1)	1.08	(0.03)***	1.05	(0.05)	0.92	(0.07)	0.83	(0.1)	1.09	(0.1)	1.26	(0.25)	1.03	(0.06)	1.14	(0.11)
Mode of travel chosen to reach the destination																				
Tvl-Flight									Reference category											
Tvl-PT	1.78	(0.41)**	1.02	(0.44)	1.10	(0.14)	1.17	(0.25)	0.72	(0.23)	0.31	(0.18)**	0.97	(0.44)	0.23	(0.24)	3.14	(0.56)***	2.15	(0.64)**
Tvl-PV	1.28	(0.52)	1.91	(1.06)	0.40	(0.1)***	0.65	(0.27)	6.69	(1.71)***	5.61	(2.24)***	1.50	(0.91)	0.00	(0)***	6.13	(1.39)***	3.91	(1.6)***
Weather conditions																				
We-Rain	1.63	(1.27)	1.29	(1.64)	1.90	(0.74)*	1.18	(0.8)	1.82	(1.77)	1.11	(1.95)	0.56	(0.7)	1.81	(3.89)	1.87	(1.29)	4.68	(5.84)
We-Rain2	0.44	(0.39)	0.33	(0.49)	0.48	(0.21)*	0.83	(0.64)	0.91	(0.95)	0.40	(0.78)	3.43	(4.82)	0.90	(2.13)	0.56	(0.43)	0.24	(0.35)
We-Sun	0.93	(0.05)	0.89	(0.09)	1.01	(0.03)	1.00	(0.05)	1.07	(0.07)	1.06	(0.13)	1.08	(0.13)	1.11	(0.32)	0.96	(0.05)	1.05	(0.09)
We-Sun2	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0)	1.00	(0.01)	1.00	(0)	1.00	(0)
We-Temp	1.09	(0.1)	1.25	(0.22)	1.09	(0.04)**	1.04	(0.07)	0.91	(0.08)	0.79	(0.12)	1.26	(0.26)	3.41	(1.66)**	1.06	(0.08)	1.16	(0.15)
We-Temp2	1.00	(0)	0.99	(0)	1.00	(0)	1.00	(0)	1.00	(0)	1.01	(0)	1.00	(0)	0.97	(0.01)**	1.00	(0)	1.00	(0)
We-Wind	0.43	(0.33)	0.51	(0.77)	1.69	(0.85)	0.56	(0.4)	0.73	(0.7)	0.13	(0.17)	2.44	(3.1)	5.41	(12.72)	0.27	(0.17)**	0.13	(0.12)**
We-Wind2	1.25	(0.19)	1.13	(0.36)	0.88	(0.1)	1.13	(0.17)	1.05	(0.2)	1.46	(0.39)	0.89	(0.23)	0.74	(0.33)	1.27	(0.16)*	1.45	(0.27)**
Visiting intensity																				
N_attrac			1.32	(0.12)***			0.82	(0.05)***			0.81	(0.1)*			1.60	(0.21)***			0.76	(0.08)***

OR = Odds Ratio; SE = Standard Error.

Model 1 does not include the number of attractions visited (N = 5743). Model 2 includes the number of attractions visited (N = 1931).

Robust standard errors within parenthesis. * Significant at 10%. ** significant at 5%. *** significant at 1%.

References

Ajuntament de Barcelona. (2017). Estratègia de mobilitat turística. Retrieved from:. https://ajuntament.barcelona.cat/economiatreball/sites/default/files/documents/mesura_de_govern_mobilitat_0.pdf.

Albalate, D., & Bel, G. (2010). Tourism and urban public transport: Holding demand pressure under supply constraints. *Tourism Management, 31*(3), 425–433.

Alvarez, R. M., & Nagler, J. (1998). When politics and models collide: Estimating models of multiparty elections. *American Journal of Political Science*, 55–96.

Anciaux, A. (2019). On holidays, I forget everything… even my ecological footprint: Sustainable tourism through daily practices or compartmentalisation as a keyword? *Sustainability, 11*(17), 4731.

Anton Clavé, S. (2019). Urban tourism and walkability. In E. Fayos-Solà, & C. Cooper (Eds.), *The future of tourism* (pp. 195–211). Springer.

Arana, P., Cabezudo, S., & Peñalba, M. (2014). Influence of weather conditions on transit ridership: A statistical study using data from smartcards. *Transportation Research Part A: Policy and Practice, 59*, 1–12.

Banister, D. (2011). Cities, mobility and climate change. *Journal of Transport Geography, 19*(6), 1538–1546.

Becken, S. (2006). Tourism and transport: The sustainability dilemma. *Journal of Sustainable Tourism, 14*(2), 113–116.

Becken, S., Jin, X., Zhang, C., & Gao, J. (2017). Urban air pollution in China: Destination image and risk perceptions. *Journal of Sustainable Tourism, 25*(1), 130–147.

Bi, Y., & Romão, J. (2021). Soft is better: Determinants of preferences for non-motorised forms of transportation in urban tourism destinations. *Sustainability, 13*, 11944.

Bieland, D., Sommer, C., & Witte, C. (2017). Uncommon leisure traffic–analyses of travel behaviour of visitors. *Transportation Research Procedia, 25*, 3971–3984.

Böcker, L., Dijst, M., & Faber, J. (2016). Weather, transport mode choices and emotional travel experiences. *Transportation Research Part A: Policy and Practice, 94*, 360–373.

Bonazza, A., Sabbioni, C., & Ghedini, N. (2005). Quantitative data on carbon fractions in interpretation of black crusts and soiling on European built heritage. *Atmospheric Environment, 39*(14), 2607–2618.

Brandajs, F., & Russo, A. P. (2021). Whose is that square? Cruise tourists' mobilities and negotiation for public space in Barcelona. *Applied Mobilities, 6*(3), 289–313.

Bujosa, A., Riera, A., & Hicks, R. L. (2010). Combining discrete and continuous representations of preference heterogeneity: A latent class approach. *Environmental and Resource Economics, 47*(4), 477–493.

Cheng, S., & Long, J. S. (2007). Testing for IIA in the multinomial logit model. *Sociological Methods & Research, 35*(4), 583–600.

Cocola-Gant, A. (2015). *Tourism and commercial gentrification. RC21 international conference on "the Ideal City: Between myth and reality. Representations, policies, contradictions and challenges for tomorrow's urban life"*. Urbino (Italy) 27–29 August 2015.

Cros, H. D. (2008). Too much of a good thing? Visitor congestion management issues for popular world heritage tourist attractions. *Journal of Heritage Tourism, 2*(3), 225–238.

Curtis, C., & Scheurer, J. (2017). Performance measures for public transport accessibility: Learning from international practice. *Journal of Transport and Land Use, 10*(1), 93–118.

Dahlberg, M., & Eklöf, M. (2003). Relaxing the IIA assumption in locational choice models: A comparison between conditional logit, mixed logit, and multinomial probit models. *Working Paper Series, Uppsala University, Department of Economics., 9*, 1–24.

Deb, P., & Trivedi, P. K. (2006). Specification and simulated likelihood estimation of a non-normal treatment-outcome model with selection: Application to health care utilization. *The Econometrics Journal, 9*(2), 307–331.

Deenihan, G., & Caulfield, B. (2015). Do tourists value different levels of cycling infrastructure? *Tourism Management, 46*, 92–101.

Dieleman, F. M., Dijst, M., & Burghouwt, G. (2002). Urban form and travel behaviour: micro-level household attributes and residential context. *Urban Studies, 39*(3), 507–527.

Domènech, A., Miravet, D., & Gutiérrez, A. (2020). Mining bus travel card data for analysing mobilities in tourist regions. *Journal of Maps, 16*(1), 40–49.

Donaire Benito, J. A., Zerva, K., Palou i Rubio, S., & Blasco, D. (2019). Do not cross the line: Planning the limits of tourism in Barcelona. *Boletín de la Asociación de Geógrafos Españoles, 83*.

Dow, J. K., & Endersby, J. W. (2004). Multinomial probit and multinomial logit: A comparison of choice models for voting research. *Electoral Studies, 23*(1), 107–122.

Elorrieta, B., Cerdan Schwitzguébel, A., & Torres-Delgado, A. (2022). From success to unrest: The social impacts of tourism in Barcelona. *International Journal of Tourism Cities*.

Eusébio, C., & Vieira, A. L. (2013). Destination attributes' evaluation, satisfaction and behavioural intentions: A structural modelling approach. *International Journal of Tourism Research, 15*(1), 66–80.

García, M. (2010). The breakdown of the Spanish urban growth model: Social and territorial effects of the global crisis. *International Journal of Urban and Regional Research, 34*(4), 967–980.

Greene, W. H. (2012). *Econometric analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Gronau, W. (2017). On the move: Emerging fields of transport research in urban tourism. In N. Bellini, & C. Pasquinelli (Eds.), *Tourism in the city: Towards an integrative agenda on urban tourism* (pp. 81–91). Springer.

Gross, S., & Grimm, B. (2018). Sustainable mode of transport choices at the destination–public transport at German destinations. *Tourism Review, 73*(3), 401–420.

Gutiérrez, A., & Miravet, D. (2016). The determinants of tourist use of public transport at the destination. *Sustainability, 8*(9), 908.

Gutiérrez, A., Miravet, D., & Domènech, A. (2020). COVID-19 and public transport services in cities: Emerging challenges and research agenda. *Cities & Health, 5*(1), S177–S180.

Gutiérrez, A., Miravet, D., Saladié, Ò., & Anton Clavé, S. (2019). Transport mode choice by tourists transferring from a peripheral high-speed rail station to their destinations: Empirical evidence from Costa Daurada. *Sustainability, 11*(11), 3200.

Haan, P. (2006). Much ado about nothing: Conditional logit vs. random coefficient models for estimating labour supply elasticities. *Applied Economics Letters, 13*(4), 251–256.

Israeli, Y., & Mansfeld, Y. (2003). Transportation accessibility to and within tourist attractions in the old city of Jerusalem. *Tourism Geographies, 5*(4), 461–481.

Juschten, M., & Hössinger, R. (2020). Out of the city–but how and where? A mode-destination choice model for urban–rural tourism trips in Austria. *Current Issues in Tourism*, 1–17.

Kaplan, D. H. (2015). Transportation sustainability on a university campus. *International Journal of Sustainability in Higher Education, 16*, 173–186.

Keyes, A. K., & Crawford-Brown, D. (2018). The changing influences on commuting mode choice in urban England under Peak Car: A discrete choice modelling approach. *Transportation Research Part F: Traffic Psychology and Behaviour, 58*, 167–176.

Kissler, S. M., Tedijanto, C., Goldstein, E., Grad, Y., & Lipsitch. (2020). Projecting the transmission dynamics of SARS-CoV-2 through the pandemic period. *Science, 368* (6493), 860–868.

Koens, K., Postma, A., & Papp, B. (2018). Is overtourism overused? Understanding the impact of tourism in a city context. *Sustainability, 10*(12), 4384.

Kovačić, N. (2015). Profiling bicycle tourists: A case of Croatia. *Tourism and Hospitality Management, 21*(2), 159–177.

Kropko, J. (2007). *Choosing between multinomial logit and multinomial probit models for analysis of unordered choice data* (Doctoral dissertation. The University of North Carolina at Chapel Hill.

Lamont, M. (2009). Reinventing the wheel: A definitional discussion of bicycle tourism. *Journal of Sport & Tourism, 14*(1), 5–23.

Larsen, J. (2001). Tourism mobilities and the travel glance: Experiences of being on the move. *Scandinavian Journal of Hospitality and Tourism, 1*(2), 80–98.

Larsen, J. (2016). Leisure, bicycle mobilities, and cities. In J. Rickly, K. Hannam, & M. Mostafanezhad (Eds.), *Tourism and leisure mobilities: Politics, work and play* (pp. 55–69). Routledge.

Le Pira, M., Marcucci, E., & Gatta, V. (2021). Roman holiday: Tourist heterogeneous preferences for walking path elements. *Research in Transportation Economics, 90*, Article 101106.

Leiper, N. (1990). Tourist attraction systems. *Annals of Tourism Research, 17*(3), 367–384.

Le-Kläh, D. T., Gerike, R., & Hall, C. M. (2014). Visitor users vs. non-users of public transport: The case of Munich, Germany. *Journal of Destination Marketing & Management, 3*(3), 152–161.

Le-Kläh, D. T., Roosen, J., Gerike, R., & Hall, C. M. (2015). Factors affecting tourists' public transport use and areas visited at destinations. *Tourism Geographies, 17*(5), 738–757.

Liu, C., Susilo, Y. O., & Karlström, A. (2015). The influence of weather characteristics variability on individual's travel mode choice in different seasons and regions in Sweden. *Transport Policy, 41*, 147–158.

López-Gay, A., Cocola-Gant, A., & Russo, A. P. (2020). Urban tourism and population change: Gentrification in the age of mobilities. *Population, Space and Place*. e2380.

Luka, M. (2012). Decision making in tourism: The choice of city tours in terms of socio-economic status and willingness to pay. *Acta Prosperitatis, 3*, 73–83.

Maltese, I., Zamparini, L., & Amico, C. (2021). Tourists, residents and sustainable mobility in islands: The case of Ischia (Italy). In L. Zamparini (Ed.), *Sustainable transport and tourism destinations* (pp. 97–115). Bingley (UK): Emerald publishing.

Martín-Martín, J. M., Guaita Martínez, J. M., & Salinas Fernández, J. A. (2018). An analysis of the factors behind the citizen's attitude of rejection towards tourism in a context of overtourism and economic dependence on this activity. *Sustainability, 10* (8), 2851.

Masiero, L., & Zoltan, J. (2013). Tourists intra-destination visits and transport mode: A bivariate probit model. *Annals of Tourism Research, 43*, 529–546.

McFadden, D. (1973). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in econometrics* (pp. 105–142). Academic Press.

Muñiz, I., & Galindo, A. (2005). Urban form and the ecological footprint of commuting. The case of Barcelona. *Ecological Economics, 55*(4), 499–514.

Nakamura, H., & Abe, N. (2016). Tourist decisions in renting various personal travel modes: A case study in Kitakyushu City, Japan. *Tourism Management, 55*, 85–93.

Neuts, B., Nijkamp, P., & Van Leeuwen, E. (2012). Crowding externalities from tourist use of urban space. *Tourism Economics, 18*(3), 649–670.

Nilsson, J. H. (2019). Urban bicycle tourism: Path dependencies and innovation in greater Copenhagen. *Journal of Sustainable Tourism, 27*(11), 1648–1662.

Orbaşli, A., & Shaw, S. (2004). Transport and visitors in historic cities. In L. Lumsdon, & S. Page (Eds.), *Progress in tourism and transport research: Issues and agendas for the new millennium*. Oxford: Pergamon.
Peeters, P., & Dubois, G. (2010). Tourism travel under climate change mitigation constraints. *Journal of Transport Geography, 18*, 447–457.
Peeters, P., & Schouten, F. (2006). Reducing the ecological footprint of inbound tourism and transport to Amsterdam. *Journal of Sustainable Tourism, 14*(2), 157–171.
Ram, Y., & Hall, C. M. (2018). Walking tourism in cities: Introducing the special issue. *International Journal of Tourism Cities, 4*(3), 281–284.
Ramezani, S., Pizzo, B., & Deakin, E. (2018). An integrated assessment of factors affecting modal choice: Towards a better understanding of the causal effects of built environment. *Transportation, 45*(5), 1351–1387.
Rhonden, S., & Lumsdon, L. (2006). A conceptual classification of the transport-tourist experience. In *European transport conference (ETC)*. Association for European Transport (AET).
Richards, G. (2002). Tourism attraction systems: Exploring cultural behavior. *Annals of Tourism Research, 29*(4), 1048–1064.
Rico, A., Martínez-Blanco, J., Montlleó, M., Rodríguez, G., Tavares, N., Arias, A., & Oliver-Solà, J. (2019). Carbon footprint of tourism in Barcelona. *Tourism Management, 70*, 491–504.
Romão, J., & Bi, Y. (2021). Determinants of collective transport mode choice and its impacts on trip satisfaction in urban tourism. *Journal of Transport Geography, 94*.
Romão, J., Kourtit, K., Neuts, B., & Nijkamp, P. (2018). The smart city as a common place for tourists and residents: A structural analysis of the determinants of urban attractiveness. *Cities, 78*, 67–75.
Saenz-de-Miera, O., & Rosselló, J. (2012). The responsibility of tourism in traffic congestion and hyper-congestion: A case study from Mallorca, Spain. *Tourism Management, 33*(2), 466–479.
Saneinejad, S., Roorda, M. J., & Kennedy, C. (2012). Modelling the impact of weather conditions on active transportation travel behaviour. *Transportation Research Part D: Transport and Environment, 17*(2), 129–137.
Scuttari, A., Orsi, F., & Bassani, R. (2018). Assessing the tourism-traffic paradox in mountain destinations. A stated preference survey on the Dolomites' passes (Italy). *Journal of Sustainable Tourism*, 1–17.
Sheng, L., Li, T., & Wang, J. (2017). Tourism and externalities in an urban context: Theoretical model and empirical evidence. *Cities, 70*, 40–45.
Sundriyal, S., Shridhar, V., Madhwal, S., Pandey, K., & Sharma, V. (2018). Impacts of tourism development on the physical environment of Mussoorie, a hill station in the lower Himalayan range of India. *Journal of Mountain Science, 15*(10), 2276–2291.
Thompson, K., & Schofield, P. (2007). An investigation of the relationship between public transport performance and destination satisfaction. *Journal of Transport Geography, 15*(2), 136–144.
Thrane, C. (2015). Examining tourists' long-distance transportation mode choices using a multinomial logit regression model. *Tourism Management Perspectives, 15*, 115–121.
Tyrinopoulos, Y., & Antoniou, C. (2013). Factors affecting modal choice in urban mobility. *European Transport Research Review, 5*(1), 27–39.
Ujang, N., & Muslim, Z. (2014). Walkability and attachment to tourism places in the city of Kuala Lumpur, Malaysia. *Athens journal of Tourism, 2*(1), 53–65.
Urry, J. (2004). The 'system of automobility. *Theory, Culture and Society, 21*(4–5), 25–39.
Wang, Y., & Davidson, M. C. (2010). A review of micro-analyses of tourist expenditure. *Current Issues in Tourism, 13*(6), 507–524.
Wilks, J., Watson, B., & Faulks, I. J. (1999). International tourists and road safety in Australia: Developing a national research and management programme. *Tourism Management, 20*(5), 645–654.
Zamparini, L., Domènech, A., Miravet, D., & Gutiérrez, A. (2022). Green mobility at home, green mobility at tourism destinations: A cross-country study of transport modal choices of educated young adults. *Journal of Transport Geography, 103*, Article 103412.
Zamparini, L., & Vergori, A. S. (2021). Sustainable mobility at tourist destinations: The relevance of habits and the role of policies. *Journal of Transport Geography, 93*, 1–6.
Zhou, M., Wang, D., Li, Q., Yue, Y., Tu, W., & Cao, R. (2017). Impacts of weather on public transport ridership: Results from mining data from different sources. *Transportation Research Part C: Emerging Technologies, 75*, 17–29.

Dr. Antoni Domènech works as responsible of the Terres de l'Ebre Biosphere Reserve for the Consortium of Environmental Policies of Terres de l'Ebre. He holds a PhD in Tourism from the Universitat Rovira i Virgili (Spain). He is Part-time Lecturer in Regional Planning and Cartography at the Universitat Rovira i Virgili (Spain) and at the Universitat de Lleida (Spain). https://orcid.org/0000-0002-1881-6679

Dr. Daniel Miravet holds a PhD in Economics from the Universitat Rovira i Virgili (Spain) and is Part-time Lecturer in Applied Economics at the Universitat Rovira i Virgili (Spain). Since 2009 he has worked as a mobility manager for the Consortium of Public Transport of Camp de Tarragona. https://orcid.org/0000-0001-7830-5515

Dr. Aaron Gutiérrez holds a PhD in Geography from the University of Lleida (Spain), 2009. Since 2011, he has been Lecturer in Regional Geographical Analysis at the Universitat Rovira i Virgili (Spain). He is member of the Research Group of Territorial Analysis and Tourism Studies (GRATET). https://orcid.org/0000-0003-0557-6319