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Xavier Saumell Badell

Age friendly cyclo-tourism: older travelers' perceptions of their cycling experiences in Barcelona

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Academic tutor prof. Antonio Paolo Russo

UNIVERSITAT ROVIRA I VIRGILI

Vila-seca

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Age friendly cyclo-tourism: older travelers' perceptions of their cycling experiences in Barcelona

Abstract

In a context riddled with numerous challenges rooted in the ageing of the population, the necessity of conducting a green transition, the systemic shocks derived from the Covid19 pandemic, and the effects of tourism over the city, Barcelona is conducting several transformation processes to adapt itself to present and future scenarios. Taking into account the city council focus on accessibility, inclusion, and promotion of sustainable means of transport such as the bicycle, as well as the importance of the tourism sector for Barcelona's economy, the study has centered its attention in the segment composed by tourists of 60 years old or plus that have visited Barcelona and has used the bicycle during their stay. Their perceptions of the use of the bicycle during their vacation has been evaluated through a surveying process with the goal to identify, among others, what factors inform their decision to use or not use a bike, and what aspects have influenced their cycling experience in a positive or negative way. The results obtained show that cycling has a good rate of adoption among the studied group and that their experiences are generally positive. Nevertheless, some key issues have been identified as aspects that should be improved in order to assure the satisfaction of the visitors, impulse the use of the bicycle, and reduce possible frictions with the local population.

Introduction and objectives

During the last decades, Barcelona has become a popular tourism destination among international and domestic travelers. The conjunction of several factors, like climatic conditions, proximity to the Mediterranean coast, closeness to important source markets, the availability of travel infrastructures (international port and airport, main road connections, high velocity trains), an abundance of cultural and heritage attractions, and an emitted image as an open, modern, and dynamic city, has prompted the arrival of a growing number of tourists interested in spending some days in the Catalan capital (Romagnoli, 2020).

The rise of Barcelona as a global tourism destination has generated multiple benefits for the city and its inhabitants, like economic prosperity, modernization, creation of workplaces, and generation of an overall attractive image (which, consequently, has helped the city attract international companies and talent). Nevertheless, tourism growth has also boosted, directly and indirectly, some negative impacts over the city. In this sense, visitors flows have been identified as one of the main causes of the overcrowding affecting the city center (as well as other areas with high presence of tourists), giving place to problems such as hindrances to everyday mobility and social routines, the rise of prices (both consumer

prices and housing prices), the displacement of local inhabitants to non-tourist neighborhoods or even neighboring cities, the damage on the social fabric of the city, and the loss of its authenticity and identity. In fact, these adverse effects have given way to a direct confrontation with Barcelona's tourism model, both from popular associations as well as from the city council of the city, which has developed policies oriented to control tourism activities and reassess the growth strategies dominant until the recent years (Elorrieta et al., 2022).

At this point it is also necessary to mention the effects of the Covid19 pandemic over Barcelona and its tourism sector. As in other parts of the world affected by overtourism, that is, a phenomenon defined by a growth of the tourism supply and demand that causes an over-consumption of a destination's irreproducible natural, cultural and social assets (Mihalic, 2020), the forced stop derived from the sanitary crisis and the travel restrictions has been identified as a stepping stone to rethink and improve the tourism strategies of the city. However, the reduction of travel-related activities has also put the spot on another problematic: the economic weight of Barcelona's tourism industry. According to Observatori del Turisme a Barcelona (2020), in 2019, the companies dedicated to tourism represented a 15.2% of al the city's companies. The same report indicates that a 13.6% of the city's employment is provided by the tourism sector. Along the same lines, Ajuntament de Barcelona (n.d.a) states that the tourism sector represents approximately the 14% of the city's GDP and generates around 150.000 places of work. This economic reality, in conjunction with the sanitary crisis, has derived in a paradoxical situation, as described in Milano & Koens (2022), in which urban destinations like Barcelona have moved from a situation of tourism saturation to a situation of tourism scarcity that can generate important economic concerns and vulnerabilities. Hence, as stated by the same authors, to recover from the Covid19 pandemic without suffering from undertourism or returning to the previous overtourism scenario, it is necessary to develop clear strategies and policies that favor a more just and balanced tourism model.

In connection to the aforementioned problematics, Barcelona, as other major cities around the world, is facing additional challenges affecting its ability to give its inhabitants good living conditions. In this sense, the lack of affordable housing, the existence of inequalities, the growing of advanced-aged population, the levels of pollution, and the high concentration of motor vehicles in the city's streets have been identified, not only as present challenges, but also as some of the main issues for Barcelona's near future, especially if the fact that these can become worse in the coming years it is taken into account. In order to tackle this complex situation, Barcelona's city council has developed multiple plans, like the creation of social rentals, the development of programs oriented to people in risk of exclusion and elderly persons, the establishment of circulation limitations for high-pollutant cars, the pacification of some of the city's streets, and the expansion of the cycling lane's network.

It is in this context in which the present research take place. Specifically, the work developed has taken into consideration three of the main problematics that Barcelona is trying to

address: the reduction of motorized traffic and, conjunctly, the bolstering of the use of the bicycle as a mean of transport; the creation of a more inclusive city and adapted to the needs of elderly people; and the development of a new tourist model that is more sustainable and that fits respectfully with the other uses and activities that take place in the city. In spite of the fact that these three topics might seem unrelated at first sight, the reality is that the actions taken in relation to one of them can have important consequences on the others. Taking the case of improving sustainable mobility, the pacification of big urban areas not only aims to reduce the motorized traffic riding through the middle of the city, but it also wants to create spaces where cycling is fostered and where older people can move more freely and safely. At the same time, these spaces can generate social activities and enlarge the greenery of the city, which can attract the visit of tourists and improve Barcelona's global image.

Hence, the rationale behind the research carried out is that the strategic changes that are taking place in Barcelona cannot be considered independently, but in a holistic manner. In this sense, as the city council builds more cycling infrastructure and facilitates the use of the bicycle, this will start shifting the mobility habits inside the city and boost the number of people using this kind of vehicle, including people of different ages and different provenances. Fruit of this situation, it is possible to expect some net positive impacts, but also the appearance of certain frictions. For example, the rise of cycling activities can become a sustainable way to move around the city (also contributing to the reduction of traffic, noise, and pollution); it can have positive effects on human health (promoting an active lifestyle and reducing affections related to pollution); it can facilitate the active ageing of the older population (additionally giving them a new tool to move around the city, gain autonomy and independence, and socialize), and it configures a new, more sustainable tourism experience, better integrated with the city and its desired tourism model (which, at the same time, can also help enhance the city's image and differentiate it from competing destinations). Notwithstanding, it also can cause some tension between user collectives, as it can already be seen in Barcelona's streets, with complaints about tourist bike tours collapsing the old city's narrow spaces, the upcoming prohibition of bike taxis, and the periodical cyclists demonstrations organized by popular associations like "Massa Crítica", dedicated to promote and defend cycling as mean of transport inside the city.

The present research inserts to a larger project, ENTOURAGE, which has been awarded to Rovira i Virgili University under the EU-funded call Marie Skłodowska-Curie – H2020-MSCA-IF-2020, and it has been conducted by Dr. Wilbert den Hoed and Dr. Antonio Paolo Russo. ENTOURAGE stands for "European tourist cities in transformation: constructing age-friendly tourism mobilities" and, as its names indicates, it is dedicated to investigate the transformations and weaknesses of urban mobility in tourist cities, and their effects on the inclusion of older residents and tourists. The election of older people as the target of the study has been motivated not only because it is a growing segment of an ageing world's population, but also because they can suffer a more accentuated risk of exclusion in front of the transformation processes that are affecting or will affect our society in the near future.

Taking all of this into consideration, the conducted investigation has centered its focus in the study of tourists older than 60 years old that have spent some time visiting Barcelona and their perceptions in relation to the use of the bicycle during their stay in the city. Through the study of their perceptions, it is hoped to obtain a snapshot of the relation between sustainable tourism, active mobility and inclusive ageing in Barcelona and identify which factors are enhancing this relation and which ones can hinder it. Hence, the main objectives of the research have been:

1. Establish if cyclo-tourism can be an attractive tourism modality for a market segment conformed by people older than 60 years old.

2. Identify which factors prompt tourists older than 60 years old to use – or not – a bicycle during their stay in Barcelona.

3. Detect which sub-segments of older tourists are more likely to use a bicycle during the course of their trip.

4. Assess the perceptions of the tourists older than 60 years old that have used a bicycle in the city and identify those factors that have contributed positively to their satisfaction or quality of the experience, as well as those that have affected them in a negative manner.

5. Extract information (areas frequented by cyclo-tourists, condition of the bike lanes, signalization, use of pacified spaces, among others) that can be used to improve cyclo-tourism experiences in Barcelona as well as overall tourism management and general city's infrastructures.

Literature review

Cycling and its relationship with urban management

During the last decades, the growth of urban areas and major cities has highlighted the negatives externalities that can arise from excessive concentration. As stated by Roman & Roman (2014), traffic congestion has become an important source of pressure on almost all cities, deriving not only in transport problems, but also propelling the appearance of social conflicts and environmental impacts. In this context, cycling has been identified by many urban planners as a feasible alternative to motorized transport, which can have positive effects not only on urban mobility policies, but also on other areas like ecology, human health, accessibility, and use of space.

Not surprisingly, many efforts have been made to promote the use of bicycle in many urban areas, specially focusing on the provision of physical infrastructure such as bike lanes, commuting trails inter-modal solutions at traffic nodes, bike-share schemes, and internet

based smart mobility (Nilsson, 2019). In parallel, and despite existing notable differences between regions and socio-cultural backgrounds, cycling has been increasingly adopted by cities inhabitants, with a sharp increase in the number of bikes sold, public bikes and bike-sharing programs all over the world (Le-Klaehn & Hall, 2015). Public bike-sharing systems in particular have become widely adopted in major cities, where its inhabitants perceive them as a sustainable and environmental transport option that diversifies their existent commuting options, allows them to have a more active lifestyle, and don't create the traditional problems associated with owning a private bicycle (Roman & Roman, 2014; Chen & Huang, 2021). Aside from this, as mentioned in Chen & Huang (2021), the bolstering of cycling has also become a tool to improve the image of a city, portraying it as advanced, civilized and environmentally friendly. At its turn, this image has also prompted the attraction of external visitors, with cycling tourists becoming an increasingly common sight in many urban destinations (Nilsson, 2019).

Cycling and its relationship with public health

Cycling has been recognized as an important potential tool to promote public health. In this sense, as shown in Oja et al. (2011), there is strong evidence relating physical activities, such as bike riding, to improved cardiorespiratory endurance, muscular fitness, favorable body composition, improved bone health, improved cardiovascular and metabolic health biomarkers, lower risk of developing certain diseases and conditions (heart diseases, strokes, diabetes, high blood pressure, cancer), reduction of risk of early death, prevention of weight gain, improved cardiorespiratory and muscular fitness, prevention of falls, reduced depression, and better cognitive function in older adults. In a similar sense, Vujko & Plavša (2011) highlights positive impacts of sports and recreational activities like cycling on mental health, such as the increase of self-esteem and confidence, the improvement of the self-image, and the stimulation good mood.

Hence, the practice of cycling could contribute to the tackling of health problematics in our society which, according to Rezende et al. (2014), is experimenting a notorious growth of sedentary habits, especially in older age groups, that can lead to an increase of the risk of mortality, reduction of mobility, and appearance of health deficiencies. Despite this situation and the positive effects both physical and cognitive of physical exercise, Ortet er al. (2021) observed that only a small portion of seniors citizens realize physical activities at the recommended levels.

Cycling and its relationship with urban tourism

In spite of the fact that the bicycle has been traditionally identified as a means of transport, as soon as in the 19th century cycling started to trespass the barriers of the concepts of mobility to become a playful sport, an activity more related to leisure than to a simple way of commuting from point A to point B. Hence, the bicycle quickly became identified as a tool that could extend the tourist gaze, giving place to what nowadays is identified as cyclo-tourism (Cox, 2013).

According to Cox (2013), a cyclotourist is defined as a person who makes a journey by bicycle for the express purpose of leisure, and whose choice of the bicycle as the means of mobility is elective, not forced by necessity. Due to the use of a bicycle, the experience of such a tourist becomes influenced by several specific factors that can be different from the ones affecting regular visitors: specific interactions with the surroundings; the establishment of a physical and kinaesthetic relation with the destination; major influence of physical factors (such as the terrain, topography, surface texture, humidity, wind, sun, rain and other weather patterns); and the transformation of the bike into an experience creation tool. The sensations and feelings generated or affected by these factors will play a major role in the tourism context, as they will not only impact the cycling experience of the visitors, but also their perception of the destination, both during and after the travel.

Cyclotourism has frequently been approached as a rural phenomenon. Nevertheless, the use of bicycles as part of the urban tourist experience has considerably grown during the last years, with attractions and activities increasingly promoting the use of the bike by tourists. For example, a recent survey conducted in Copenhagen shows that 7% of foreign visitors use the bicycle during their stay in the Danish capital. Nevertheless, it is necessary to mention that the diffusion of cycling activities amongst tourists is frequently related to the destinations' own cycling culture, thus creating noticeable differences between cities (Nilsson, 2019).

The overall growth of urban cycling correlates with the rise of other travel tendencies. In this sense, an increasing number of tourists are opting to adopt a slow tourism approach in its travels, focusing on the deceleration of the travel pace, the reduction of their carbon footprint, the extension of their stay in a destination, and the deepening of the cultural interactions with the local population. The use of bicycles to explore a destination fits adequately with this travelling style, as allows sustainable transport and, at the same time, provides immersing, unique and memorable experiences (which can lead to an enhancement of destination loyalty), and allows the visitors to act in a more similar way to the local inhabitants. Apart, and focusing on one of the most used cycling tools by tourists, bike-sharing systems provide not only the previously cited benefits, but also others of high importance to visitors, such as convenience, flexibility, and reduction of the risk of bicycles being stolen (Chen & Huang, 2021).

Urban mobility in Barcelona: motorized traffic, pedestrians, cyclists, and tourists

Traditionally, Barcelona has been considered as a city that is highly adapted to pedestrian mobility, thanks to its dimensions, the configuration of its urban structure, its climate, its safety conditions, and its commercial and social activities (Ajuntament de Barcelona, 2017). Nevertheless, the 49.2% of Barcelona's public space is reserved to motorized vehicles, whereas space destined to pedestrian use constitutes only the 46.6%. The rest of the public surface is dedicated to other means of transport, like public transport (3%) or bicycle (1.8%) (Ajuntament de Barcelona, 2020).

The geographic position of Barcelona, situated between the coastline and the Collserola hills range, has prompted the creation of a system of beltways to allow motorized vehicles to circumvallate the city. Despite this, the centric situation of the Eixample neighborhood and its rectilinear layout (as well as the dense and historic nature of adjacent areas), has given place to a funnel effect where a lot of motorized vehicles use the wide streets of this neighborhood as a way to cross the city, even surpassing the usage of the cited system of ring roads (**Figure 1**). Considering the vehicles riding across the center of Barcelona, the city council has identified that two out of three have origin and destination points outside the city. Of them, 53% are private vehicles and 15% are vehicles dedicated to the distribution of goods (Ajuntament de Barcelona, 2021).

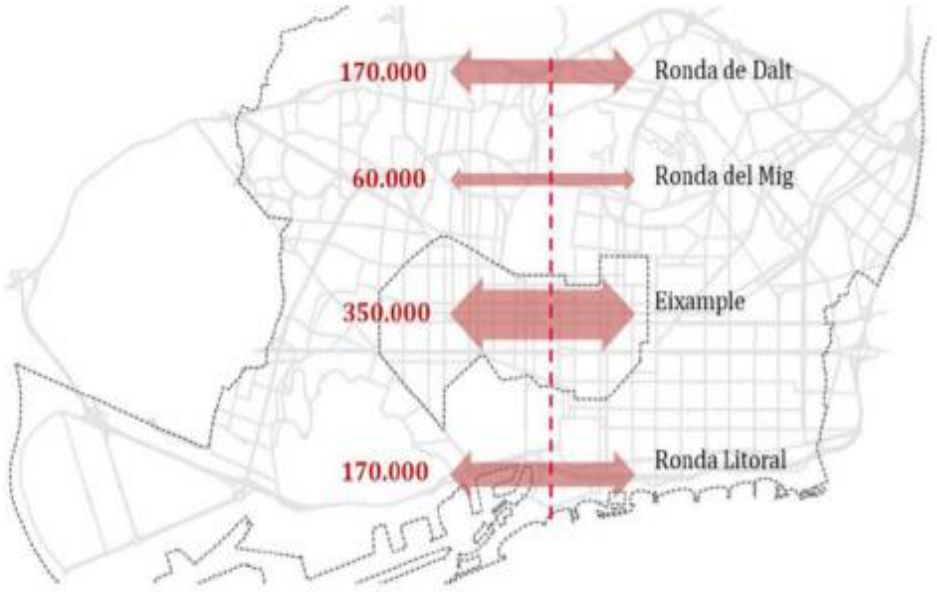

Figure 1. Aggrupation of traffic fluxes in the main roads across Barcelona (Ajuntament de Barcelona, n.d.b).

The traffic density present in the center of Barcelona has derived in some negative impacts for the city. For example, atmospheric pollution has become one of the main public health problems affecting the urban space. According to the Barcelona's Air Quality Improvement Plan 2015-2018, motorized mobility generates 60% of the total NO_2 emissions in the city (**Figure 2**). For its part, the Public Health Agency esteems that the 48% of Barcelona's population is exposed to NO_2 levels that exceed the reference levels stablished by the World Health Organisation. This figure goes up to 95% if the pollutant considered is PM10 particles. The estimated number of deaths attributed to air pollution in Barcelona is, at least, of 350 persons. Additionally, the excess of traffic has created a problem of congestion in the city. In this sense, the extended amount of time that vehicles have to spend in Barcelona's streets has reduced overall fluidity, boosted pollution, noise, and drivers' stress, caused the decrease of the local inhabitants living quality and the deterioration of the city's public image, and contributed to create social and economic hindrances, like the loss of

productive time and the reduction of transport reliability (including surface public transports) (Ajuntament de Barcelona, 2020).

Figure 2. Concentration levels of NO^2 in the streets of Barcelona (Ajuntament de Barcelona, 2021).

The bicycle, due to its sustainable characteristics, has been identified as a mean of transport that could help reduce the number of motorized trips inside Barcelona and their negative consequences. Nowadays, the bulk of the city's cyclable network is constituted by bike lanes, which, in the year 2018, covered an extension of 218 kilometers. A 68,3% of Barcelona's population is situated less than 200 meters away of the cyclable network. Most of the cyclable paths flows through the flatter parts of the city, with inclinations less of 4% in the 91% of the network. Nevertheless, it is expected that the rise in electric bike use will help to reduce the accessibility limitations linked to the steepness of the terrain. In terms of bike parking spots, Barcelona has a total of 37.073 (according to 2019 data), with 35.841 of them placed on the public roads and 1.232 situated underground. The points of major parking concentration are situated in neighborhoods like Ciutat Vella, Eixample, Gràcia and Poblenou, which are important cycling nodes of the city (Ajuntament de Barcelona, 2020).

According to the Barcelona's Municipal Services Survey (interactive dashboard of results accessible in Municipal Data Office, n.d.), the use of bicycles has indeed increased during the last years. In the last survey, conducted in the year 2021, the results show that a 4.1% of the city's inhabitants use a private bike, while a 3,8% use the city's public bike-sharing system. If we look at the data from 2010, the number of users of private bikes was of 1,9% and the users of public bikes, a 1,2%. Despite the growth, though, the use of the bicycle is still lower than other means of transport, like public buses or cars. Additionally, the

adoption of the bicycle seems to suffer from an age divide, with older people showing less interest in using this kind of vehicles. Thus, as displayed in the Municipal Services Survey results, a 6,4% of people from to 25 to 54 years old use private bikes (6% for public bikes). If we take the data for people between 54 to 64 years old, the numbers fall to 3,2% (1,3% for public bikes). In the case of people 65 years old or beyond, only a 0,5% use a private bicycle (0,1% for public bikes). Finally, it is also noticeable that the rise of the use of bicycles shows correlation with an increment of the number of accidents with a bike involved, as shown in **Figure 3**.

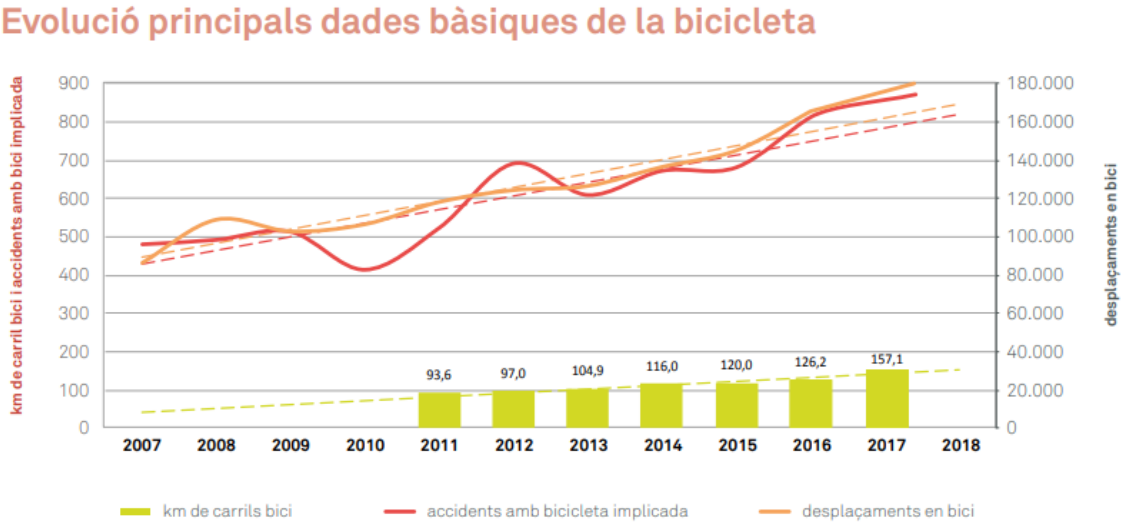

Figure 3. Evolution of the number of accidents with a bicycle involved (Ajuntament de Barcelona, 2018).

Bicycle has also become an important part of the mobility habits of tourists visiting Barcelona. As expected, the movements of this collective have an important effect on the city's overall mobility. As stated in Ajuntament de Barcelona (2020), tourists' movements represent between the 11% and the 14% of all the daily journeys made inside Barcelona. It tends to concentrate in the city's historical center as well as in the main tourist points of interest, being able to create congestion in the transport network and generate saturation and over-exploitation impacts on the public space (**Figure 4**). In comparison to standard mobility behaviors, tourists tend to have a more sustainable modal share, with preponderance of walking (45%) and public transport like metro (33%), urban bus (5%) and touristic bus (4%). For its part, it is estimated that 1% of tourism trips are done by bike.

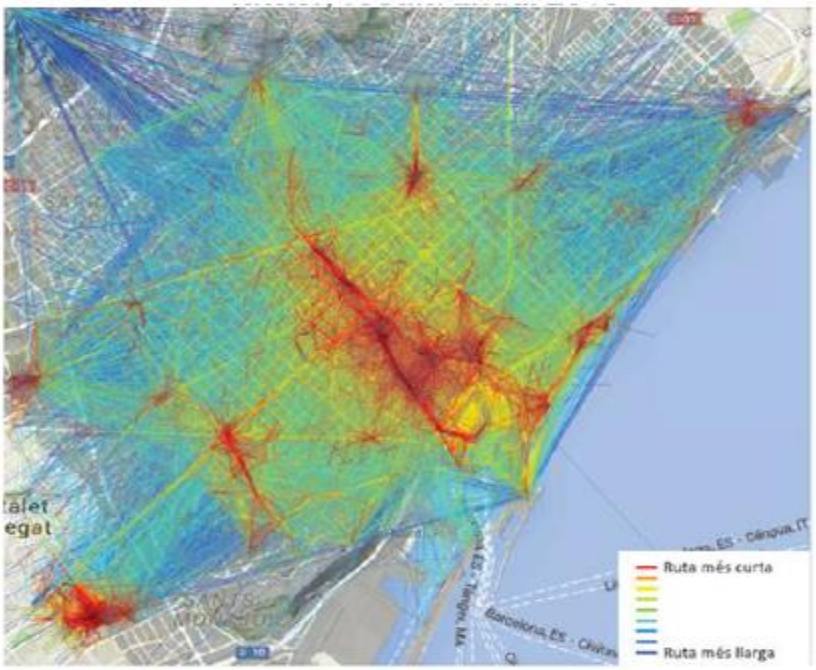

Figure 4. Most frequented routes by tourists according to geolocated data from Twitter (Ajuntament de Barcelona, 2017).

In this context, the bicycle as a vehicle oriented to tourist activities has been considered as a double-edged sword: on the one hand, it is a sustainable mean of transport that is enjoying a growing acceptance among visitors and that powers the attractiveness of the destination; on the other hand, the rise of cycling as a tourist activity has generated some friction between riders and pedestrians, and between visitors and local people. Several conditions have identified as notorious causes of these coexistence problems. For example, problems are more frequent in heavily transited areas like Passeig Marítim or the narrow streets of Ciutat Vella. Frictions have also been identified in bicycle parking spots, which can become saturated by private bike services that use anchorages as rental points. Lastly, one of the main coexistence disruptors have its origin in guided cycling group tours, which have mobilty patterns very different from local cyclists and can difficult their circulation as well as create inconveniences to pedestrians and other vehicles. Apart, cycling tours tend to visit points of tourist interest that already suffer from saturation and cohabitation problems, bolstering the discomfort in those areas. To reduce the unrest, the city council has limited the size of guided cycling tours to 9 persons in streets narrower than 10 meters and to 18 persons in the rest of the city. Additionally, to ensure the local inhabitants access to the city's public bike-sharing system, the use of these public bike by tourists is not permitted (Ajuntament de Barcelona, 2017).

Barcelona and its urban management strategies

During the recent years, Barcelona has developed different plans and strategies that aim to transform multiple dimensions of the urban living experience and contribute to mitigate environmental and climatic problematic through actions like expanding urban greening,

enhance sustainable mobility, reduce overall transportation emissions, increase the public space use, and encourage citizen participation (Zografos et al., 2020). Probably, the two most significative projects related to this transformation efforts are the "Eixos verds" (Green axis) initiative and the "SuperIlles" (Superblocks) model, being both interconnected.

According to Barcelona's city council documentation, which can be consulted in Ajuntament de Barcelona (2021), these projects intend to give place to a new urban model that becomes more safe, healthy, environmentally friendly, social, inclusive, and that promotes the local economy. Nowadays, Barcelona has already implemented several superblocks in neighborhoods such as Sant Antoni, Horta or Poblenou. In these areas, the circulation of private motorized vehicles has been limited and redirected in order to reduce its presence and, at the same time, favorize the creation of pacified spaces where citizens can meet, walk, shop or play. The limitation of traffic has also been connected to the renovation of the urban spaces, creating more infrastructure for the people (e.g., tables and chairs, play areas for children, public chessboards) and increasing the presence of trees, plants, and green areas.

In other areas of the city, where the urban fabric is more modern and does not follow the traditional neighborhood's structure, the green axis model is expected to complement the creation of superblocks by creating a network of pacified streets that connects different parts of the city while creating spaces where the circulation of private motorized vehicles is limited, and the public areas becomes more green, sustainable, and adapted to citizens necessities. The Barcelona's city council plan expects to create 21 green axes, which would represent the transformation of 33,1 km of streets, the increase (+50,52%) of the city's surface dedicated to pedestrians, and the reduction (-40%) of the space reserved for private vehicles (**Figure 5**).

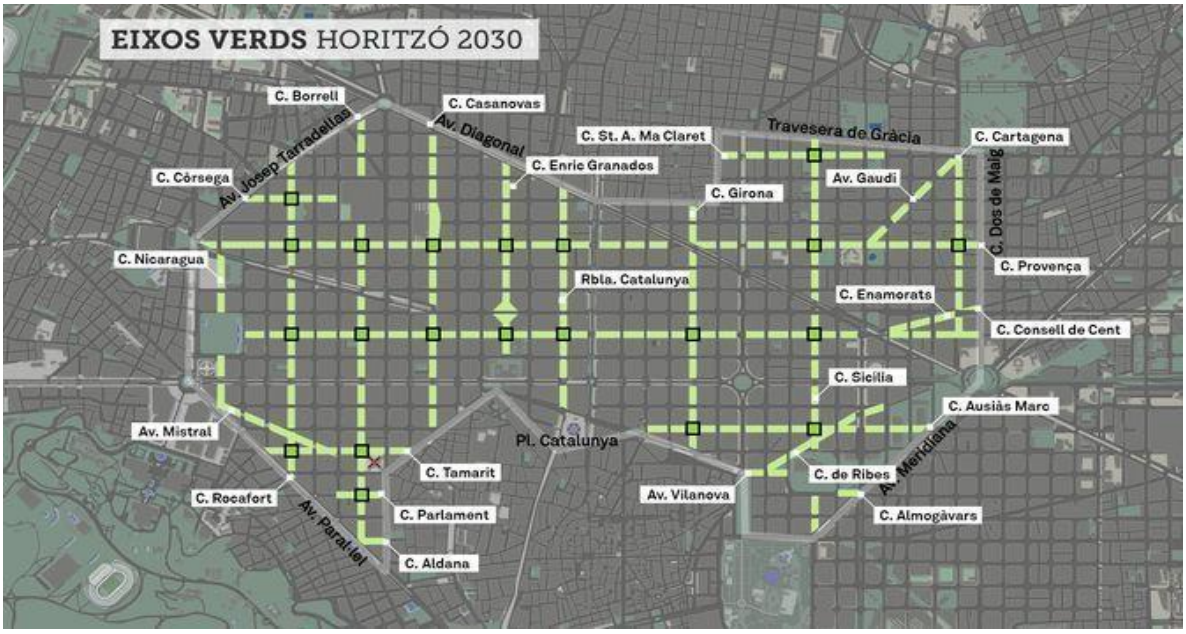

Figure 5. Green Axis Model Horizon for 2030 (CCMA, 2022).

Barcelona and its urban mobility strategy

The described urban models have been designed to positively affect, among others, the mobility inside in Barcelona. In conjunction, the city has developed the "Pla de Mobilitat Urbana de Barcelona 2024" (Barcelona's urban mobility plan for 2024, or PMU), which can be consulted in Ajuntament de Barcelona (2020). This mobility plan is a strategic document that proposes different measures oriented to enhance the city's mobility and its inclusive, safe, efficient, and sustainable development. Apart, considering the impacts of the Covid19 sanitary crisis, the PMU also aims to play a part in Barcelona's recovery after the pandemic. Being so, the three major challenges addressed by the plan are the support of the city's inhabitants' health and safety, the fight against climate change and air pollution, and the contribution to Barcelona's economic and commercial activities.

In order to work on these challenges, the PMU focuses on the improvement of the city's mobility while ensuring the citizen's mobility rights and redirecting the modal share into more sustainable and healthy ways of transport (encouraging the use of active and non-polluting means of transport and restricting conditions for motorized vehicles). Among the main objectives of the plan, and considering their relation to the present research, is possible to highlight the increase of the number of travels realized using sustainable transport modes, the boost of universal mobility (putting the focus on the citizens and enhancing their accessibility conditions and their safety), the improvement and expansion of the cycling infrastructure and the riding safety conditions, and the enhancement of the cohabitation conditions between bikes, other vehicles, and pedestrians.

In terms of numbers, the PMU wants to increase the trips made by bicycle and Personal Mobility Vehicles (PMV) in a 129,4% in the year 2024, taking as a reference the data for the year 2018. This way, the modal share of these vehicles would increase from 2,3% in 2018 to 5% in 2024. To accomplish this increase, the PMU plans to conduct different actions like expand and improve the bike lane network, enhance the city's public bike service (Bicing), increase the offer of safe parking spots for bicycles, adopt safety and control policies related to bike mobility, and perform promotion and education events in relation to this mean of transport.

Considering the development of the bike network, two scenarios are projected: one for the year 2024 and the other for the year 2030. In the 2024 scenario, the main objective is to connect the existing bike lane network, as well as creating new lanes in those neighborhoods where structural deficits have been detected. The expansion of the bike lane network pretends to facilitate the access of all Barcelona's neighborhoods to points of interest (like urban equipment, commercial activity areas or intermodal transport nodes), allowing a more fluid circulation through the city. Beyond the construction of bike lanes, the 2024 scenario also pretends to expand the number of cyclable streets (streets where the speed limit is of 30 km/h or less, or streets where the pedestrians have priority over the vehicles), in order to facilitate the circulation of bikes on the road and their coexistence with motorized vehicles. In the 2030 scenario, the main objective is to integrate the bike network

with the “Eixos Verds” plan. These green axes will expand the cyclable routes through the city and allow a greater connectivity and mobility.

In parallel, Barcelona’s city council also plans to keep conducting actions to improve the Bicing system, some of which are already in motion: the renovation of the fleet with new and more comfortable bikes, the introduction of electric bicycles, the consolidation of the service’s availability (365 days a year, 24 hours a day), the construction of new stations, or the development of a quick reserve system. Thanks to these changes, the city council expects to increase the popularity of this service and reach areas where the orography complicates the accessibility by bike (mainly neighborhoods situated in the mountainous areas of Barcelona, where the inclination of the streets is pronounced). According to the year 2019 data, the service has increased its number of users (rise of 9,4% respect 2018) and the use of electric bikes has experienced a huge rise of 1937% respect 2018. On the contrary, the use of regular bikes has decreased over the years, probably caused by the users’ predilection for the electric model.

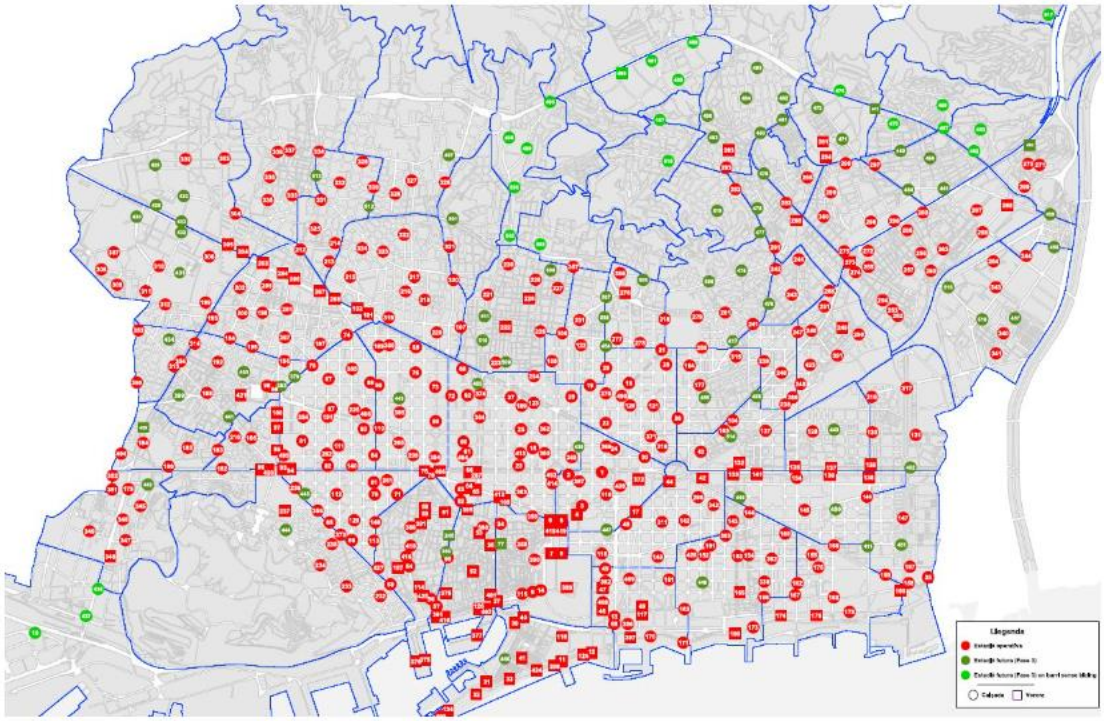

Figure 6. Existing Bicing stations (in red) and of future construction (in green) (Bicing, n.d.).

In relation to the bicycle parking spots and their safety, the city will prioritize the installation of new parking spots in areas close to bike lanes and cyclable routes, putting attention on those zones where the actual parking offer is insufficient or those that allow better conditions for the cyclists’ mobility. Other factors that will also be considered include the population density and the presence of urban equipment, popular spaces, and intermodal hubs, always trying to reduce possible impacts on the public space. In terms of ensuring the safety of the vehicles once parked, several strategies will be implemented: the creation of rotatory public parking spots linked to the city’s public transport card, the

encouragement of public and private initiatives dedicated to the expansion of the bike parking offer, or the promotion of the national bicycle register, designed to deter robberies and help recover the vehicle, among others.

Finally, the PMU also wants to foster the combination of bicycles and public transport, as this formula can become a more sustainable alternative to private motorized cars during the realization of mid or long-distance trips. For this reason, the objective is to adequate public transport to facilitate the entrance of bikes into the transport vehicles or, in other cases, create safe parking spots close to the stations. The main actions that are going to be implemented are the harmonization of the rules that allow the access of bikes on the public transport, the implementation of Park&Ride system adapted to cyclists, the improvement of train stations' accessibility, and the signalization of parking spaces inside the stations, as well as the easiest routes to enter and get out of those stations with the bike.

Barcelona and its tourism mobility strategy

In conjunction with the discussed PMU, Barcelona's city council has also developed the "Estratègia de Mobilitat Turística" (Tourism Mobility Strategy, or EMT), with the ambition to give answer to the impacts on urban mobility derived from the rising number of tourists visiting the Catalan capital. The EMT can be consulted in Ajuntament de Barcelona (2017a).

The main goal of the EMT is to incorporate the tourists' mobility as an inherent part of the city's overall mobility and, this way, facilitate the identification of challenges and the creation of global strategies that promote responsible tourism transport habits, the satisfactory cohabitation between visitors and local inhabitants, and the rational and coherent planification and use of the city's transport systems. To accomplish this goal, the EMT foresees a series of actions, among which it is possible to highlight the following:

- Integrate the tourism mobility in the municipal planification to enhance the concurrence between the tourism strategies and the mobility strategies, improve the public transport planification, and ensure an adequate budget for the public transport systems' maintenance.

- Elaborate mobility plans specific to sites with great visitor affluence to reduce the saturation of those spaces and the transport services leading to them, limit the negative effects over local population and their daily life, and guarantee the city's accessibility as well as the cohabitation between tourists and local inhabitants.

- Encourage trips on foot to reduce the saturation of public transport and the use of motor vehicles, and, at the same time, create pedestrian itineraries that redirect tourism fluxes and limit the overcrowding of certain public spaces.

- Reduce the visitors' movements during peak hours and foster the displacements during periods of the day with less traffic and less public transport demand.

- Establish a regulatory framework to regulate the utilization of bicycles and other personal mobility vehicles and ensure their good use and their cohabitation with other transport modes and pedestrians. Among the foreseen rules, the EMT cites the limitation of cycling groups, the regulation of renting and sharing bike companies, and the control of bike parking spots near highly visited touristic places.

Tourism mobility is also considered in the city's "Pla Estratègic de Turism 2020" (Tourism Strategic Plan, or PET). In this document, several measures to improve tourism mobility are discussed, such as the use of technologies like Big Data or Artificial Intelligence to better adapt to visitors' mobility behaviors, enhance the accessibility by public transport of the main point of tourism interest, and promote the use of sustainable means of transport. The PET also highlights the importance of the destination's marketing strategies and introduces a new tourism marketing plan oriented to long term sustainability and competitiveness. From a mobility point of view, the new marketing approach aims, among others, to promote the utilization of sustainable transport and reduce visitors' carbon footprint. The PET can be consulted in Ajuntament de Barcelona (2017b).

Barcelona and its age-friendly city strategy

Following the principles of the World Health Organisation (WHO), entity that, among others, promotes the development of friendly environments for people of advanced age in order to contribute to their health, social inclusion, safety and active ageing, Barcelona has developed several plans to make of the Catalan capital an age-friendly city. Fruit of the strategies formulated in the Municipal Plan for Old People 2006-2010, Barcelona became, in 2011, a member of WHO's Global Network for Age-friendly Cities and Communities. Nowadays, the city's strategy in relation to people of advanced age is being applied following the guidelines found in the "Pla Barcelona Amigable amb les Persones Grans 2017-2021" (Plan for age-friendly Barcelona, or PBAPG), which can be consulted in Ajuntament de Barcelona (2016).

The mission of the PBAPG is to enhance the quality of life of the people of advanced age living in Barcelona by means of promoting the friendliness of the main environmental factors configurating their daily life. The goal of the plan is to transform Barcelona in an international reference as an age-friendly city that is enjoyable and comfortable for old people. To accomplish this, the plan stipulates a collaboration framework in which the participation of institutions, entities, and persons from all ages are encouraged to engage. As a result of this participative process, the authors of the PBAPG have stablished five strategic lines focused on the daily life conditions, the community, the social and health environment, the provision of services and the civic involvement. Among the measures developed inside each of these lines, it is possible to highlight some that are related to the scope of the present research, such as the organization of activities to promote physical activity, the development of adapted systems of transport to facilitate movements to

locations such as healthcare or commercial shops, the construction of fitness infrastructure and active circuits, or the improvement and optimization of public spaces.

Methodology

To identify the perceptions and assess the experiences of 60+ years old tourists in relation to its cycling mobility in Barcelona, the first step that has been taken is the development of an online survey. With the goal of creating a relevant set of questions, prior to the drafting of the survey, a series of cycling trips have been conducted through different parts of Barcelona, putting special focus on touristic areas of the city (Ciutat Vella, Passeig Marítim, Eixample) as well as parts experimenting important urban transformations (Poblenou, Horta, Sant Antoni). During these trips, and in collaboration with Dr. Wilbert den Hoed from the ENTOURAGE project, notes have been taken and impressions have been exchanged in subsequent conversations. Various rides have also been recorded and posteriorly analyzed to detect important aspects that might have been obviated while cycling. Fruit of this process, not only it has been possible to develop a more comprehensive questionnaire, but also gain a deeper level of understanding about the mobility and urban realities existing nowadays in Barcelona. Additionally, the analysis of academic literature and Barcelona's policy documents have also played an important role in the identification of topics that had to be considered while designing questions for the participants.

The questionnaire has been created with an online platform that allow the correct visualization of the survey in all types of electronic devices. Apart, the utilization of this kind of devices have allowed the use of skip logic branching, which contributes to reduce the time visitors must spend answering and to limit the presence of non-relevant questions for each participant. The questions included in the survey are of general character and are designed to obtain information about aspects like the familiarity of the visitor with cycling, the overall satisfaction with their cycling experience in the city, and the evaluation of certain factors like safety, noise, presence of vehicles, and quality of the bike lane network, among others. In the case of the tourists that have not used a bicycle during their stay in Barcelona, the set of questions differ, centering its aim in the identification of the motives that have prompted them to not doing so. The complete set of questions can be consulted in the Annex section of this work.

In order to access the survey, the interested persons can scan a QR code that send them to a web containing the questionnaire. This QR code has been printed in several flyers (design available in the Annex section) both in English and Spanish, which have been considered the most understood languages by tourists visiting Barcelona. The flyers have been placed in areas where tourism activities take place, taking into special consideration those that, for its characteristics, can accommodate cycling experiences. Among these locations, it is possible to highlight some of the city's most visited attractions (like Sagrada Família, Passeig Marítim o Fonts de Montjuïc), bike rental shops, and Barcelona Turisme's (Destination Management Organization of Barcelona) points of information. Nevertheless, considering

that the research is oriented to people older than 60 years old and some of them might not be used to digital tools or would prefer a face-to-face interaction, in person surveys have also been conducted, aided by a tablet with access to the questionnaire. These face-to-face encounters have been held in the same spots where the previously cited flyers have been placed. Both for the distribution of flyers and the realization of on-site surveys, the permission and the collaboration of the companies and entities managing the spots have been asked. Additionally, to accomplish a greater level of dissemination, the survey has also been posted in several travel forums and Facebook pages related to tourism and Barcelona, targeting people that had recently visited the Catalan capital or was planning to do it soon.

The treatment of the data obtained during the research has been done using the analytics tools offered by the aforementioned surveying platform. The results obtained are completely anonymous and confidential and will not be transferred to third parties except in cases of legal obligation. The participants will have the possibility to exercise their rights of access, rectification, cancellation, and opposition of the data they provide at any moment. The results of the questionnaire will be stored within the surveying platform, which has been certified (ISO 27001:2013) as a company able to manage risks to the security information. The servers owned by the company are co-located at off-site data centers and monitored for unauthorized access twenty-four hours a day. They undergo periodic SOC 2 audits conducted by an independent accounting firm. The compiled data will only be maintained until the formal end of the research process and will be completely deleted afterwards. The results will be shown in an aggregate form, eliminating the possibility of identifying individual responses.

The second major strategy that has been considered to interact with tourists older than 60 years old and understand their cycling experiences and perceptions is the realization of face-to-face meetings with them. These meetings were planned to be of two different types, in function of the preference of the participant. The first type consisted of having a conversation with them after they have used the bike in the city, with the goal of talking through their impressions and opinions within a more informal and unscripted scenario. The second type consisted in realizing a go-along cycling trip with the visitors, accompanying them and assessing on real time their perceptions, as well as asking them about specific topics in particular moments or certain points of the route. To enroll participants for these activities, the previously discussed survey included a message asking for the collaboration of the respondents. In the case of on-sight surveys, the participants were also asked if they had the desire to participate in go-along rides. Unfortunately, at the moment of writing this thesis, it has not been able to enroll any participant for this kind of activities. Nevertheless, as the research of cycling perceptions of 60+ year old tourists will continue under the ENTOURAGE project, it is possible that this methodology can be implemented in the near future.

Results and discussion

At the end of the surveying process, **34 responses** have been obtained from a total of **285 visualizations** (approximately a **12% response rate**). The average response time has been **3 minutes**. Out of the 34 responses recorded, **20** were **complete responses**, while **14** were **dropouts**. Dropouts are surveys where the participant has emitted some answers but has decided to leave without getting to the end. Despite the option of discarding these responses could be considered, it has been decided to take them into account for two reasons. First, because the obtention of the maximum quantity of information possible has been prioritized. Second, because the structure of the survey, designed using skip logic branching and without mandatory responses, implied that the number of answers to each question would systematically vary in function of the options chosen by each different participant. Taking this into account, all responses recorded have been considered valid, even if, at the end, a complete survey for every participant it was not obtained. In order to know how many answers are available for each question, the number of respondents will be cited. The full report of results can be consulted in the Annex section of this document.

To begin the survey, the participants were asked two questions to determine their familiarity with the city of Barcelona and with the use of the bicycle. Therefore, the first question asked them if it was their first time visiting Barcelona, while the second one was if they usually cycle in their hometown. For the first one (27 total answers), the results show that for 22.2% of the participants, this was their first time travelling to the Catalan capital, while 77.8% of them already visited the city previously. In terms of familiarity with the use of a bicycle (25 total answers), 40% of the participants indicated that they never or almost never use the bike, 24% use it occasionally, and 36% use it in a regular way (**Figure 7**).

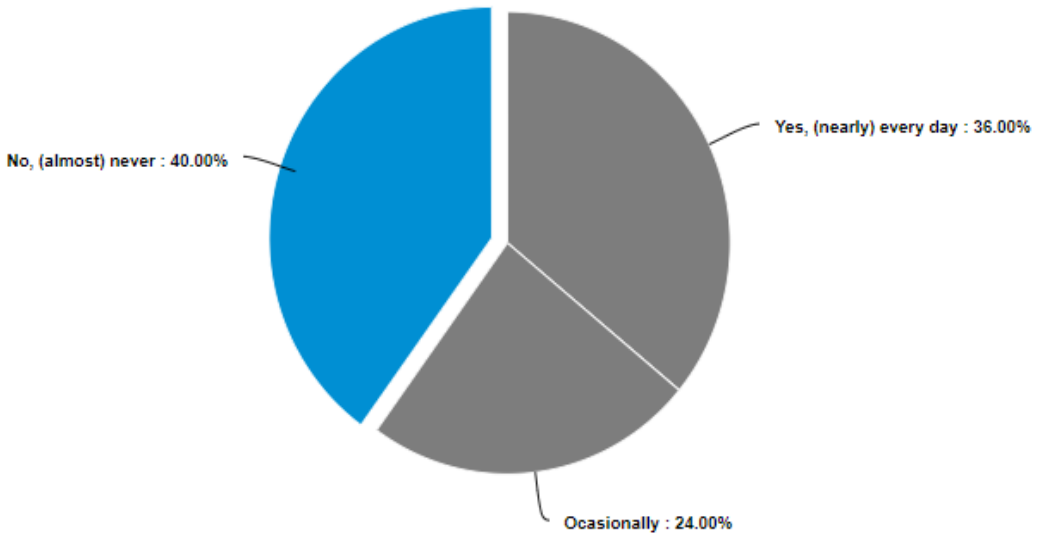

Figure 7. Participants' use of bicycles in their hometown.

The next question implied the use of the first skip logic branching, as the participants were asked if they used the bicycle during their stay in Barcelona. Depending on the answer, the next questions varied in order to assess their cycling experience or, in the contrary, explore the motives conforming their decision to not use this kind of vehicle. This question was answered by 27 persons, with 11 indicating that they had cycled in the city, and 16 stating that they did not (**Figure 8**).

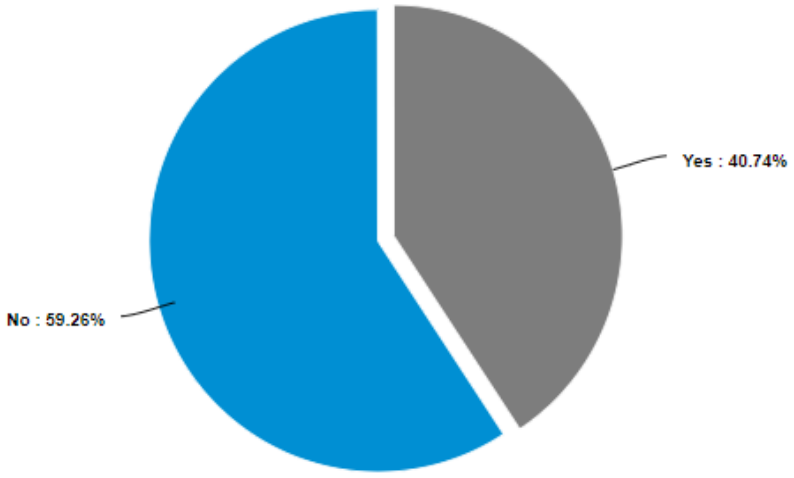

Figure 8. Participants' use of bicycles during their time in Barcelona

At this point, the questions oriented to the people that have indeed used the bicycle in Barcelona will be firstly discussed. The first one of these questions was related to the type of bicycle they used during their stay in the city. Considering that a same person could use different types of bicycles, multiple answers were allowed (giving place to a total of 13 answers collected). The results show that a majority of visitors (46.15%) used a rental bike from a rental shop. This, added to the 7.69% of the participants that have indicated that they have used a bicycle from a cycling sightseeing tour, highlights the importance of the rental shops as providers of a great number of the bicycles used by tourists visiting Barcelona. It is important to address that, as it has been previously discussed, bike rental shops are a type of businesses that have been under scrutiny due to the realization of cycling tours and their saturation effects on the streets and points of tourism interest. In relation to the rest of the results, a 30.77% of the participants have indicated that they used a private bike, while a 15.38% signaled that they used an electric bike, a type of vehicle that has been identified by Barcelona's city council as more inclusive (due to the reduced effort necessary to ride it) and a tool to facilitate the access to more isolated neighborhoods (like the ones situated in the proximities of Collserola mountains).

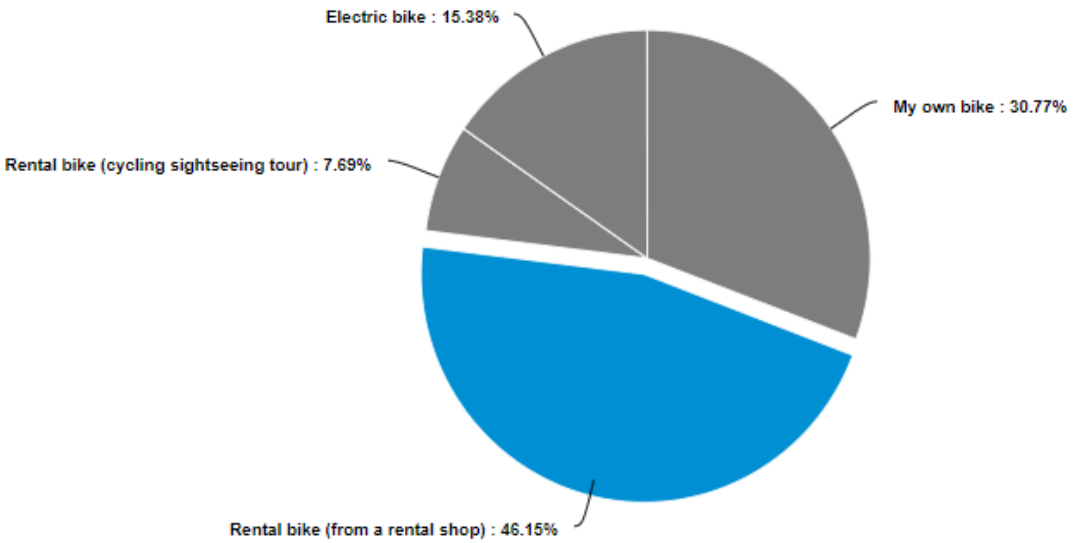

Figure 9. Participants' use of different types of bicycles.

The next question made reference to the objective of the cycling trips of the participants. Again, several answers were allowed, giving place to a total of 13 responses collected. The data obtained (**Figure 10**) indicate that the most popular motive to use a bike was to move from one point to another (46.15%), followed by sightseeing (38.46%), and doing sport (15.38%). These results show that a great portion of the cycling activities conducted by older tourists are similar to the ones associated with local cyclists: moving across the city and doing sport. Hence, to properly address the creation of cycling infrastructures in the city, the surplus of external users should be taken into account. On the other hand, the cycling sightseeing activities are unique to visitors, so they will require the creation of specific strategies in case they have to be controlled.

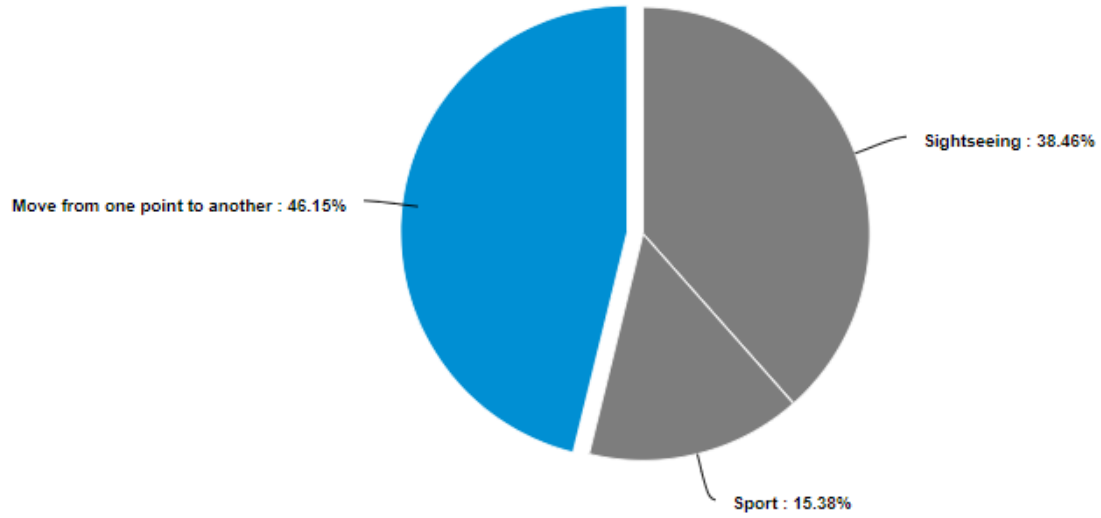

Figure 10. Participants' objectives while cycling.

As it has been aforementioned, some areas of Barcelona have been identified as the ones suffering more pressure from tourism and cycling sightseeing activities. According to the compiled data (**Figure 11**), the area more frequented by the participants of the survey (20 responses collected) have been the seaside (35%), followed by the historical center (15%), Poblenou (15%), Eixample (15%), the mountain neighborhoods (10%) and Gràcia (5%). The remaining 5% of the answers were placed in the category "Other", which allowed the participants to write their own options. Among the responses obtained were areas like Sarrià, Valldoreix, Sant Cugat, La Floresta and Vallvidrera.

Analyzing these results, it is possible to confirm that Barcelona's centric areas are the ones more visited by our participants. Nevertheless, it is important to signal that these areas offer very different urban characteristics, cycling infrastructure, and capacity to absorb tourists. Therefore, the impacts and cycling experiences of older tourists will differ if their done in the narrow streets of Ciutat Vella, or in wider, more adapted areas like the Passeig Marítim or some streets of l'Eixample. On the other hand, it is important to notice the percentage of participants that have cycled in Barcelona's mountain neighborhoods (even more if we consider that some of the answers in the category "Other" are in or close to Collserola). These areas are not traditionally associated to tourism activities, so its appeal among visiting cyclists could be interesting to exploit in order to take tourists away from the city center (even though, especially in the natural areas, the environmental impacts of cycling activities should be considered).

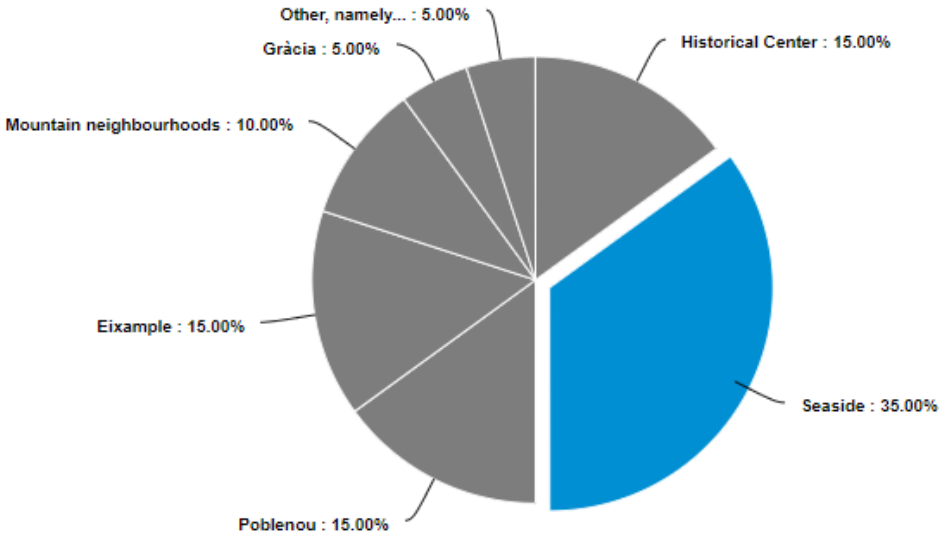

Figure 11. Areas of Barcelona visited by participants.

In the next question, the participants were asked about their satisfaction with their cycling experiences. The results (10 responses collected) indicate that 60% had a satisfying experience, with 20% having a very satisfying experience, and the remaining 20% having a neutral one. The results are predominantly positive, with no participants signaling a bad experience. Nevertheless, to further delve in some details of the visitors' experience, some

additional questions were asked in order to assess how the participants graded particular aspects related to cycling in Barcelona. In these questions, as well as in the rest oriented to assess the participants' level of satisfaction, a 5-point Likert scale has been used (1 signaling very dissatisfied, 3 signaling neutral, and 5 signaling very satisfied).

The different aspects assessed were safety, comfort, noise levels, condition of the surface, signalization and wayfinding, bike accessibility to tourism points, interaction with pedestrians, interaction with motorized vehicles, and interaction with other cyclists. The general results (**Figure 12**) show and overall positive level of satisfaction, with an average value of 3.54. The aspects more highly valued are safety (score of 4 out of 5) and interaction other cyclists (score of 4 out of 5), while the ones with a smaller score are the condition of the surface (score of 2.9 out of 5) and the signalization and wayfinding (score of 3.22 out of 5).

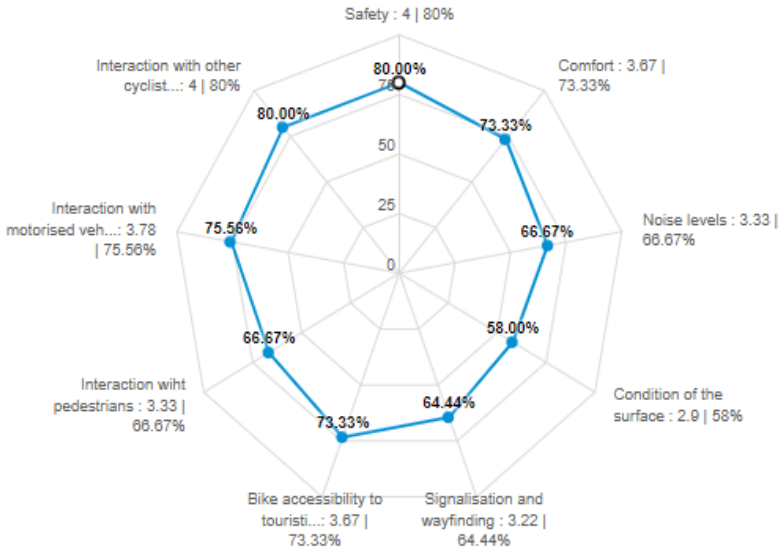

Figure 12. Participants' levels of satisfaction with selected cycling aspects.

If the individual results of each aspect are analyzed, it is possible to observe that, in general, the option more widely chosen tends to be "satisfied". For example, the evaluation of safety (9 answers collected) shows that 66.67% of the participants were satisfied, 22.22% were very satisfied, and 11.11% were not satisfied. For comfort (9 answers collected), 66.67% expressed satisfaction, 11.11% were very satisfied, and 22.22% were not satisfied. The aspects where the level of satisfaction was lower were condition of the surface, signalization and wayfinding, and interaction with pedestrians (with 44.4% of participants expressing dissatisfaction, in front of the same percentage expressing they were either satisfied or very satisfied). Another result worth highlighting is the one referring to the interaction between participants and motorized vehicles (9 answers collected), which could be identified beforehand as a possible source of dissatisfaction, but instead gets general positive valuations (66.67% of participants expressed satisfaction and 11.11% expressed

they were very satisfied). The complete set of results (in percentages) has been grouped in the following **Table 1**:

	Very dissatisfied	Not satisfied	Neutral	Satisfied	Very satisfied
Safety	0	11.11	0	66.67	22.22
Comfort	0	22.22	0	66.67	11.11
Noise levels	11.11	11.11	22.22	44.44	11.11
Condition of the surface	20	20	20	30	10
Signalization and wayfinding	11.11	11.11	33.33	33.33	11.11
Bike accessibility to tourism points	0	11.11	33.33	33.33	22.22
Interaction with pedestrians	0	44.44	11.11	11.11	33.33
Interaction with motorized vehicles	0	11.11	11.11	66.67	11.11
Interaction with other cyclists	0	11.11	0	66.67	22.22

Table 1. Summary of the results obtained during the assessment of selected cycling aspects.

Considering that cycling lanes are one of the more basic infrastructures to allow fluid bicycle circulation through a city (both for local inhabitants and tourists), and the construction of new ones is one of the major staples in the mobility and urban plans developed by Barcelona's city council, the next set of question was designed to assess the perception of participants of several aspects related to Barcelona's network of bike lanes. These aspects were availability, condition, width, waiting space at traffic lights, facility to cross the streets, cycling fluidity, continuity of the lane network, presence of other cyclists, interaction with pedestrians, and interaction with motorized vehicles. The general results (**Figure 13**) show and overall positive level of satisfaction, with an average value of 3.48. The aspects more highly valued are cycling fluidity (score of 3.89 out of 5) and the condition of the lane (score of 3.78 out of 5), while the ones with a smaller score are the facility to cross the streets (score of 3.11 out of 5) and the continuity of the lane network (score of 3.2 out of 5).

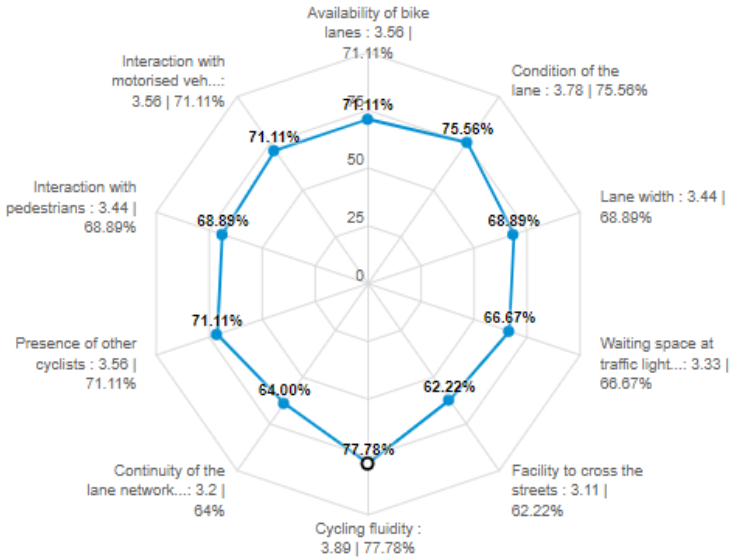

Figure 13. Participants' levels of satisfaction with selected bike lane network aspects.

As in the previous assessment previously discussed, if the individual results of each aspect are analyzed, it is possible to observe that the more common answer by participants is expressing a certain level of satisfaction. The aspects that have been assessed by a majority of participants as average or below are the waiting space at traffic lights, the facility to cross the streets, and the continuity of the lane network (even though in these case, positive and negative answers are at 50% each one). The complete set of results (in percentages) has been grouped in the following **Table 2**:

	Very dissatisfied	Not satisfied	Neutral	Satisfied	Very satisfied
Availability of lanes	22.22	0	0	55.56	22.22
Condition of the lanes	0	22.22	11.11	33.33	33.33
Lane width	11.11	0	33.33	44.44	11.11
Waiting space at traffic lights	11.11	11.11	33.33	22.22	22.22
Facility to cross the streets	11.11	22.22	22.22	33.33	11.11
Cycling fluidity	0	0	33.33	44.44	22.22
Continuity of the lane network	10	20	20	40	10
Presence of other cyclists	0	22.22	11.11	55.56	11.11
Interaction with pedestrians	11.11	0	33.33	44.44	11.11
Interaction with motorized vehicles	0	22.22	11.11	55.56	11.11

Table 2. Summary of the results obtained during the assessment of selected bike lane network aspects.

The different questions introduced down below asked the participants about specific topics that they could have encountered during their ride. These topics were bike parking, the access to public transport with the bicycle, and the circulation in areas with pedestrian priority. As not all the participants were expected to have an experience related to these topics, skip logic branching has been used. In this sense, if the participants indicated that they had an experience related to one of the topics, a specific set of questions were presented to them. On the contrary, they were referred to the following set of questions.

As mentioned, the first question asked the participants if they parked their bike at some moment during their cycling experience in Barcelona. Of the 10 persons that answered this question, 8 parked their bike, while 2 did not. When asked about the kind of parking spot they used (9 answers collected, with multiple answers accepted), 66.67% indicated they parked their bike in on-street free spots, 22.22% indicated private parking, and 11.11% signaled VadeBike parking (shared private on-street parking spots with extra security features managed by a private company). The option of underground free parking spots received 0 votes, indicating a possible lack of information about the existence of such infrastructure. As it can be seen (**Figure 14**), the more widely used form of parking by the participants is the more common in Barcelona's streets, which can cause some frictions with local users.

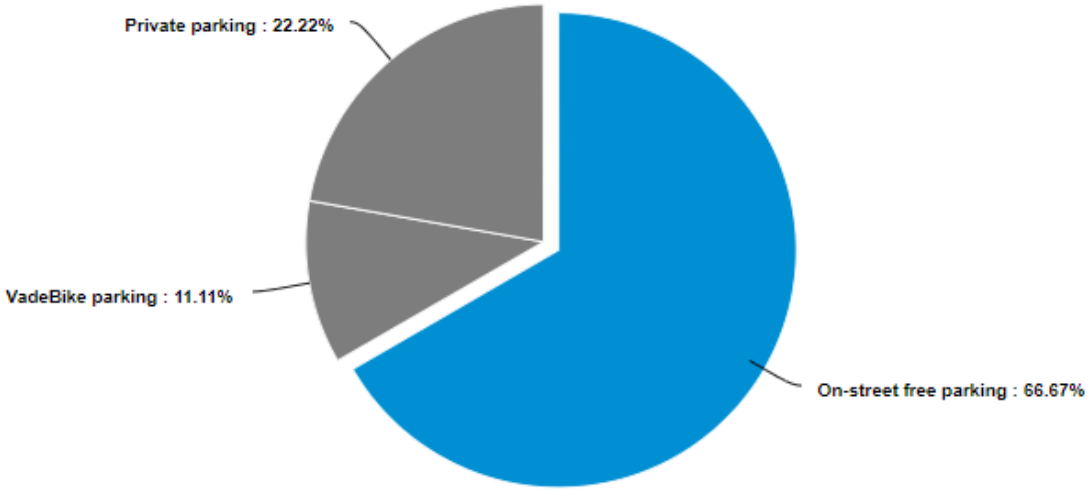

Figure 14. Participants' use of different bike parking modalities.

To detect if some of these frictions could appear caused by a lack of parking space, the next question asked the participants about the availability of that space. The results (7 responses collected) indicate that 57.14% of the participants said that they there was a lot of space, 14.29% said that there was enough space to park easily, and 20.57% said that the number of bikes present in the spots difficulted the act of parking (**Figure 15**).

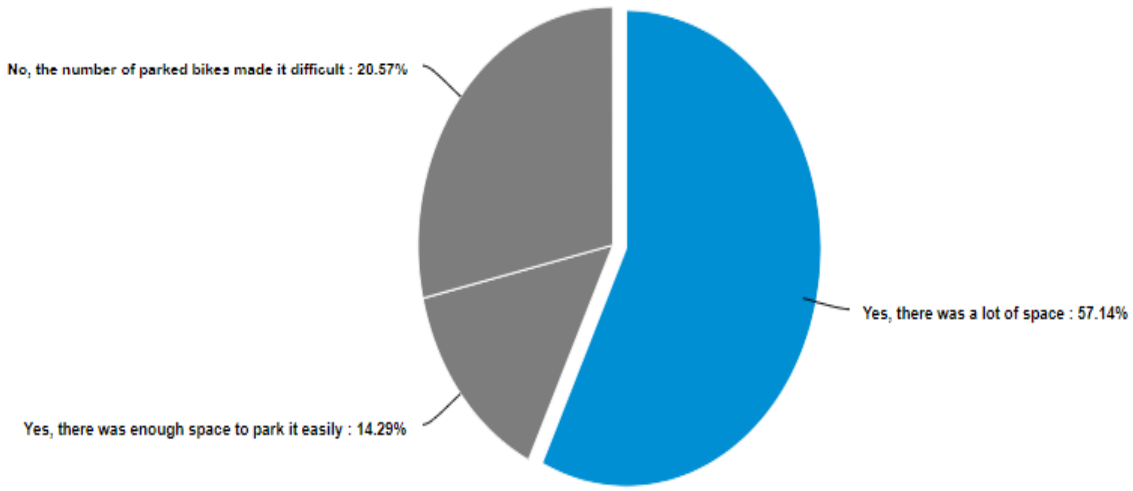

Figure 15. Participants' assessment of bicycle parking space availability.

The next set of questions made reference to the use of public transport while carrying a bicycle. The first question of the set asked if the participants used the public transport during their rides. Of the 10 persons that answered this question, only two answered that they did. Considering that the next questions were only answered by these two participants, the answers might not be representative. Thus, they will be used to shed some first light on the subject but should be expanded with additional data. When asked about what kind of public transport the participants used while carrying a bike, one of them responded the train, while the other responded the subway. In terms of assessing several factors related to the use of public transport with their bike (**Figure 16**), the participants expressed greater levels of satisfaction with the accessibility (both to the stations and the transport vehicles) and with the interaction with other passengers. On the other hand, they expressed lower levels of satisfaction with aspects such as the space to put away the bike and the comfort in the vehicle.

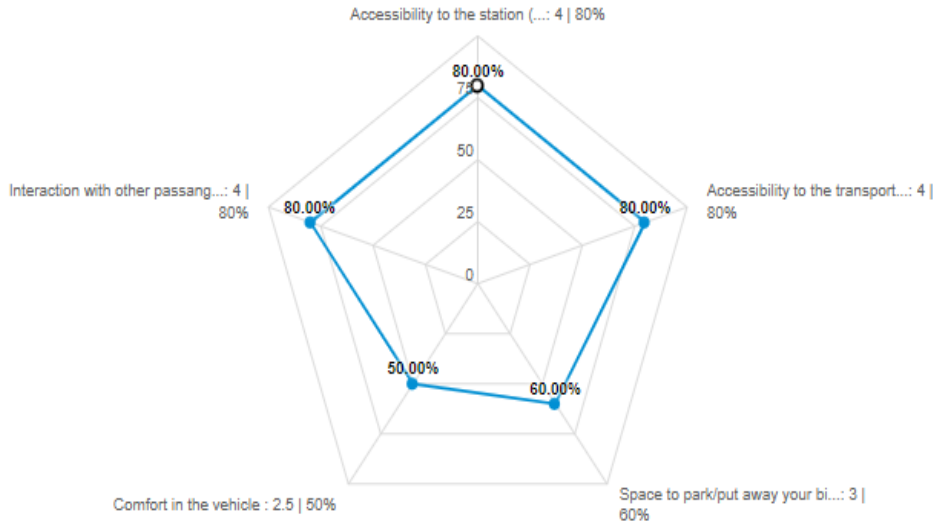

Figure 16. Participants' levels of satisfaction with selected public transport aspects.

The third set of specific questions was related to the circulation through areas with pedestrian priority, such as the streets in Ciutat Vella or the Superblocks, as these parts of the city dispose of unique characteristics and norms, and several of them are located around points of high tourism interest. Thus, these are spaces that can generate frictions between local inhabitants and tourists and negatively affect the experiences of both collectives. The first question of the set asked if the participants indeed cycled in these areas. Of the 10 persons that answered the question, 5 did affirmatively and 5 did negatively. The next question for the 5 persons that circulated in zones with pedestrian priority was if the rules regulating these parts of the city were clearly identifiable and understandable. 40% of the participants expressed that they were, while 40% expressed that they were not. The remaining 20% signaled that they did not know or notice that they had to follow different rules. The results might indicate a lack of information on the subject and the necessity to expand or further highlight explanatory measures, such as the signs at the beginning of the areas or the paintings on the asphalt.

To assess in a greater extent the participants' cycling experiences in zones with pedestrian priority, the last question of the set asked them to evaluate different aspects, such as the space availability to ride a bicycle, the atmosphere, the signalization, the noise levels, the interaction with other vehicles, and the interaction with pedestrians (**Figure 17**). The one more distinctly valued in a positive way was the atmosphere, with a punctuation of 4.4 out of 5. The space to ride and the interaction with vehicles both obtained a score of 3.8 out of 5, followed by the signalization and the noise levels with 3.6 out 5. The analyzed factor with a lower score was the interactions with pedestrians, with 3.4 out 5.

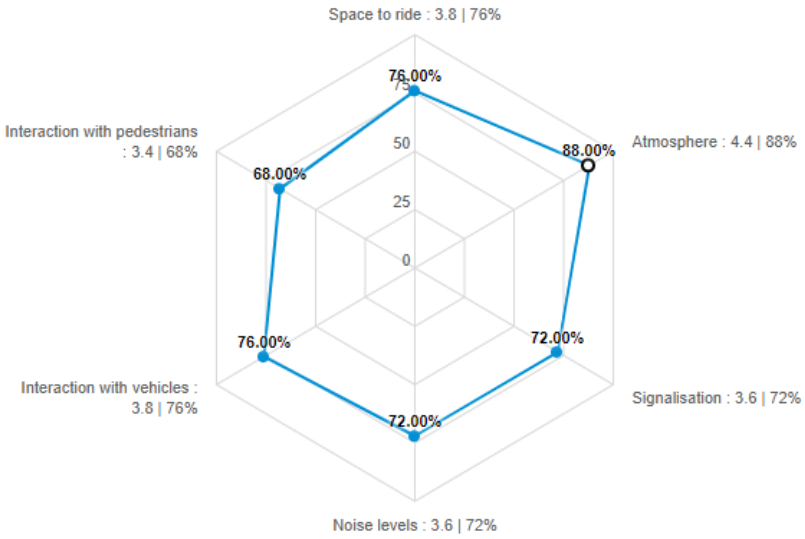

Figure 17. Participants' levels of satisfaction with selected pedestrian areas aspects.

Finished the series of questions of specific topics, the participants were asked to open ended questions. The first one asked them to highlight positive and negative impressions of their cycling experience. From the six responses collected, several factors are worth noticing. For example, the positive comments are fewer than the negatives, but they highlight the beauty of Barcelona (with one participant emphasizing good cycling experiences in the city's mountain areas), the potential it has for cycling, and the considerate behavior of motorized vehicles drivers. On the other side, as negative aspects, the participants highlighted the hot weather, the lack of space for bikes (making a negative comparison with the situation in the Netherlands), the fear of getting the bike stolen, the feeling of unsafety in narrow roads shared between bikes and roads, the discontinuity of the bike lane network, the difficulty to understand circulation rules and which were the correct spaces to cycle in, the chaos experimented in traffic junctions (with a lot of vehicles and pedestrians wanting to use the same space), and the use of the bike lanes by different kinds of users, such as skaters, rollerbladers, scooters and even pedestrians. The second open ended question asked the participants what aspects related to cycling in Barcelona should be changed or improved. In the four answers registered, most of the comments are related to the bike lane network, stressing aspects such as the necessity of more lanes, the need to improve the cleanliness of such lanes, and the desire to not have to ride on the pedestrian sidewalks when there is no clear cycling option.

Before entering to analyze the demographic inquiry presented to all the participants at the end of the survey, hereafter will first be discussed the questions presented to the participants that stated that they did not use a bicycle during their trip in Barcelona. Specifically, this collective was asked to cite what questions moved them to discard the practice of cycling while in the city (**Figure 18**). Of the 18 responses collected (the choosing of multiple answers was allowed), the aspect more widely chosen was the existence of safety concerns (27.78%). The second aspect more selected was that the participants did

not think that Barcelona had adequate infrastructure to allow satisfactory cycling experiences (22.22%). An 11.11% of the responses signaled that the participants not cycled in their hometown. Other options, like not thinking cycling was a good option to visit a city, not liking to ride in an unknown place, not wanting to take care of a bike during vacation, finding cycling too tiring, and not have thought about cycling in Barcelona at all, each received 5.56% of the votes. The remaining 11.11% of the answers were given to the option "Other reasons". Inside this category, one participant indicated that he prefers to walk while visiting a city, while another complained that despite being interested in using a bike, the participant could not find a suitable rental option (making a negative comparison with other European cities and criticizing the fact that Barcelona's public bikes were not available for visitors).

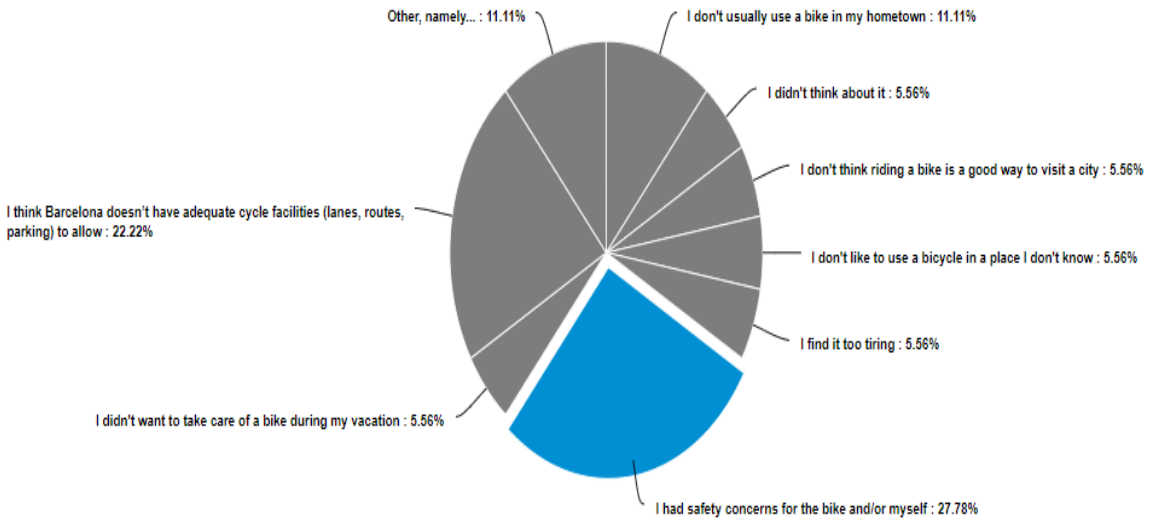

Figure 18. Participants' reasons to not use a bicycle during their stay in Barcelona.

As it has been mentioned, the survey ended with a demographic inquiry for all the participants, independently of their previous answers. The goal of these questions was to better know the profile of the participants and detect some possible common characteristics among them. The filling of the different demographic questions was voluntary, so the participants were not obliged to answer questions they did not want to. For this reason, not all the fields received the same number of answers. The demographic information solicited was age, gender, country of origin, purpose of the stay, length of the stay, type of accommodation used, and location of the accommodation. The number of responses recorded is 18.

In terms of age, 17 responses have been collected. The lowest stated age is 60 years old, while the largest is 76 years old. The majority of the participants (64.7%) have an age between 60 and 64 years old. For its part, 11.8% of the participants have an age between 65 and 69 years old. The remaining participants (23.5%) have an age between 70 and 76 years old, a noticeable number if the physical demands of cycling are considered (**Figure**

19). In relation to gender, 17 answers have been collected, with 58.8% of the participants identifying as female and 41.2% as male.

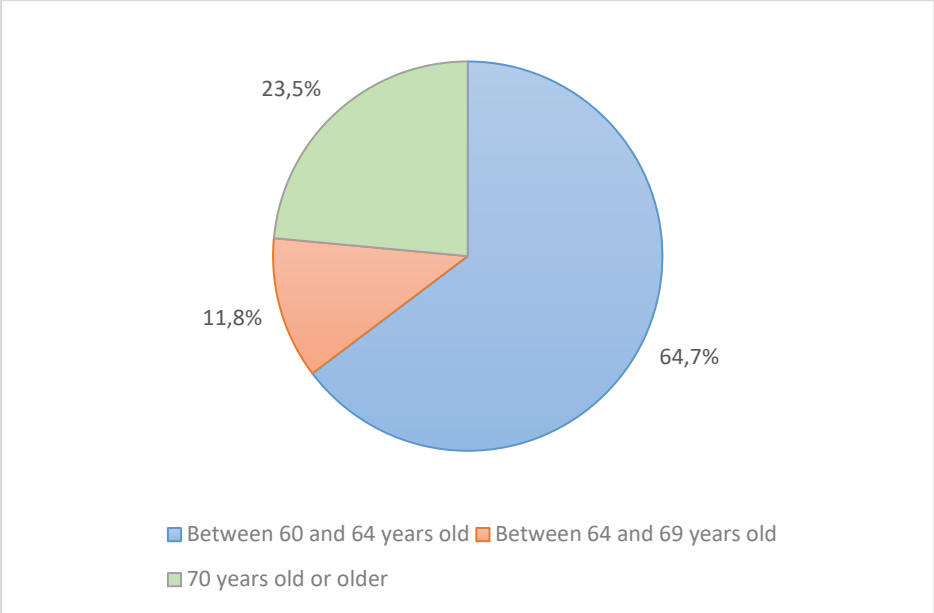

Figure 19. Participants' age distribution.

For its part, the question about country of origin has recorded 18 answers. The results can be observed in **Figure 20**. It is interesting to see the importance of the Dutch market (38.9%) when discussing the use of bikes in Barcelona, stressing the importance that cycling cultural background can have in the adoption of this mean of transport while practicing tourism.

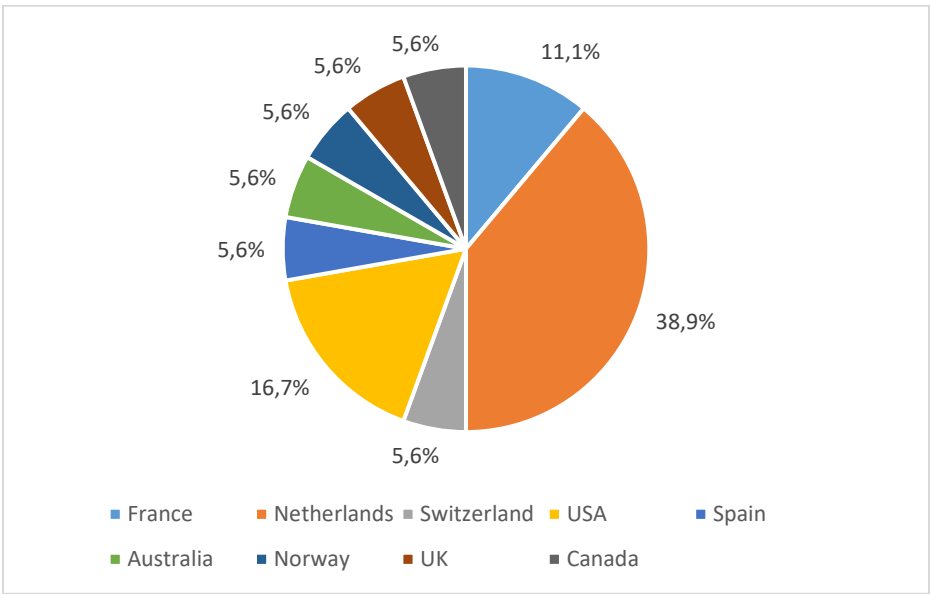

Figure 20. Participants' country of origin.

Another question asked to the participants was the motive of their trip. The most mentioned motive was vacation (61%), followed by visiting family (28%), and business and work (12%). Despite the undoubtable importance of the tourists spending their holidays in Barcelona, it is also noticeable the weight of the persons arriving in Barcelona to work or to visit family that is staying a longer time in the city. These groups of visitors would probably have different behaviors than regular tourists and, in some cases, even more similar to local inhabitants. Hence, it would be interesting to consider their particularities while regulating tourism cycling mobilities. If we combine the previous results with the responses related to the duration of the stay, we can see that most of the participants (71%) remained in Barcelona for a week or less. All except one of the persons staying for less than a week came to the city for vacation, while the remaining one came for business. The rest of the responses indicate that one person stayed 14 days in Barcelona (also for vacation), another one stayed 1 month (visiting family), two persons stayed 6 weeks (visiting son), and one have stayed in Barcelona for work related reasons for 5 years already.

The last two demographic questions were related to the type and location of the accommodation used by the participants during their trip. In terms of type of accommodation (**Figure 21**), the number of answers collected were 16. Hotels were the most used accommodation (31%), followed by AirBnb (19%) and family or friends houses (19%). Apartments were the next more popular option (13%), followed by hostels (6%), cruises (6%), and private rented houses (6%). In relation to the location of the accommodations, 14 answers were collected. The responses indicate that the accommodations were primordially located in centric areas of Barcelona, except one participant that stayed in Lloret de Mar (7% of the responses). Inside the city, the most popular neighborhood to stay in for the participants was Eixample (36%), followed by Ciutat Vella (21%). Other areas like Poblenou, Marina and Port Olímipic received one vote each, which would make a 21% of the responses if grouped (aggrupation possible due to their proximity and similar characteristics). Finally, Sarrià represents the remaining 7% of the answers. As it is possible to note, most of the discussed locations are close to popular tourism attractions and are usually identified as areas affected by tourism in some degree.

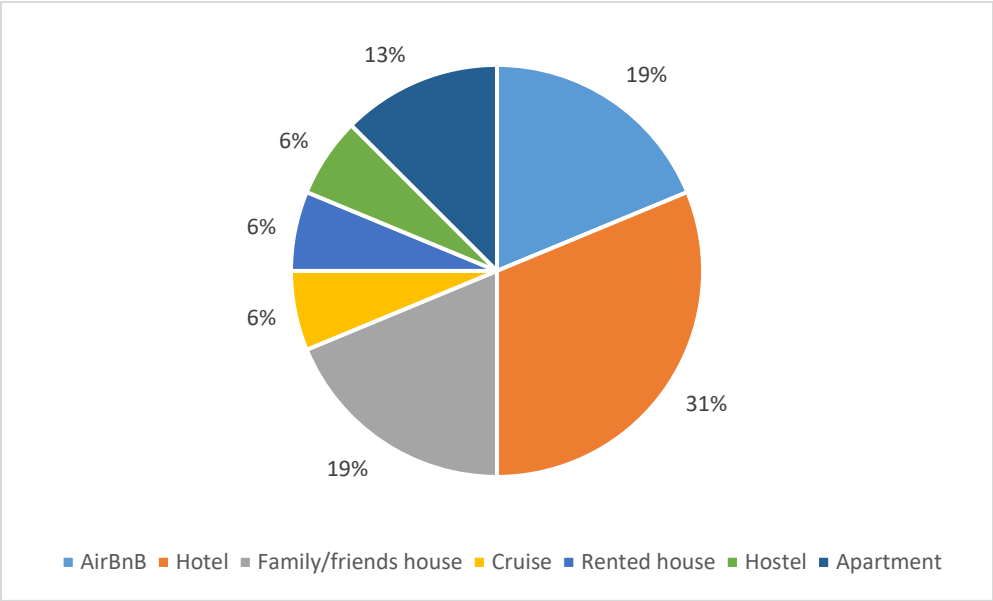

Figure 21. Type of accommodation used by participants.

Conclusion

From the obtained results, there are several points that are worth pointing out. The first one that stands out is the fact that, despite the 60% of the participants in the study have indicated that they use the bicycle in their hometown, only a 40% have indeed used it during their visit in Barcelona. This points out that, as it could be expected, some people older than 60 years old tend to regard the bike as a tool to use in their daily activities, and not while visiting a city. In fact, while answering why the participants did not use a bicycle in their trip, several of them chose options that indicated that they did not think riding a bike was a good way to discover a city, they found it too tiring, or they did not want to take care of the vehicle during vacation.

Nevertheless, one of the major conclusions that can be extracted from the responses obtained is that the tourists that indeed used the bicycle in Barcelona had, overall, good and satisfactory experiences. Especially remarkable are the levels of satisfaction associated with factors that could give place to some frictions and bad experiences, like safety, condition of the bike lanes, and interaction with cyclists and motorized vehicles. These factors not only are important in order to promote the use of bicycles (both for tourists and local people), but also to project a destination image associated with sustainability, modernity and comfort. Particularly important is the satisfaction results in relation to the safety, as safety concerns have been identified as the main preoccupation cited by participants that decided not to ride a bicycle through Barcelona. In relation to this, the same analysis of satisfaction with different aspects have also shed light on the factors that are lacking behind and should be improved to make cycling more attractive and popular among older tourists (and, in fact, to the rest of the population): noise levels, signalization, condition of the streets surface, bike lanes continuity, and easiness to cross the streets, among others discussed in the previous section of this work.

Another factor that can affect the adoption of the bicycle as mean of transport for tourists is, of course, the availability. In this sense, one of the negative responses written by one participant explicitly states that the respondent tried to use a bike but could not find a suitable option, which derived in an unsatisfactory experience. In connection with this opinion, the results have shown that most of the participants that took a bike used one provided by rental companies, both like regular rented bikes or as part of a guided cycling sightseeing tour. The rental shops, and particularly the cycling tours some of them organize, have been identified as points of conflict with the local population and the city council, due to the saturation of the public space that they can cause. Nevertheless, if cycling is to be promoted among tourists, their weight in the supply chain must be considered. At this point, is also necessary to mention that Barcelona's public sharing system is only available for local inhabitants. Despite the present system's infrastructure might not be able to support both local and visitors, a possible expansion for tourism uses could be evaluated.

Another aspect interesting to consider, especially in terms of urban and mobility planning, is which ones are the most frequented areas by older cyclists riding through Barcelona. The results obtained indicate the popularity of traditional tourism areas (correlated as well with the location of the participants' accommodations), but also highlight that a lot of places visited by the study's respondents are located in zones in transformation or that are (or can easily be) adapted to sustainable autonomous mobility (Poblenou, Eixample, Passeig Marítim). Thus, it is possible to reach the conclusion that the evolution of Barcelona into a more sustainable and accessible city could make it more attractive and more satisfying for older tourists. At the same time, it would be useful to take into consideration the participants' satisfaction evaluation to identify what aspects should be closely accounted while planning and conducting these transformation processes.

All in all, the realization of this study has shown Barcelona as a city immerse in numerous transformation processes derived from the necessity to face, among others, environmental threats, demographic changes, overtourism and tourism dependance, urban and mobility challenges, and, of course, other systemic shocks derived from the Covid19 sanitary crisis. In this situation, the city council has started to design and implement several plans, with the goal of giving answer to these challenges and contribute to the positive evolution of the Catalan capital. Efforts have been conducted in order to make Barcelona a more modern, attractive, sustainable, and accessible city. Fruit of these efforts, the bicycle has become a symbol of sustainable autonomous mobility, a tool that can allow all Barcelona's inhabitants to move freely and quickly across the city without creating noise or pollution. It has also become a popular attraction for tourists, that have started to use these vehicles to discover Barcelona in an original way.

The present work has confirmed that a good percentage of tourists older than 60 years old also see the bicycle as a good way to visit to Barcelona. In fact, as previously discussed, most of them value in a positive way the cycling experiences they have had in the city. Nevertheless, the study also shows that there are some aspects that, without the correct approach, can cause, both to tourists and local people, unpleasantness that can derive in

frictions and unsatisfactory experiences. Additionally, the consideration of these negative aspects, added to fears of safety or the hustle associated to the use of a bike, causes that a considerable number of older tourists directly opt to not use the bicycle at all, despite all the benefits derived from this mean of transport.

Nevertheless, does Barcelona really want to promote cycling among visitors? In this sense, it seems to be a certain degree of inconsistency between the city's strategic plans, that want to promote sustainable and active mobility, global accessibility, and, in general, promote the use of the bicycle, with some of the implemented policies regarding tourists, that seem oriented to limit the visitors' accessibility to bikes. Being certain that tourists visiting Barcelona already have mobility behaviors that tend to be more sustainable than the ones exhibited by local inhabitants, it seems counterproductive to try to restrict their access to bicycles. At the end, if Barcelona is trying to become more bike friendly, it seems probable that the tourists would want to mix with the locals and exhibit the same mobility habits, especially if the infrastructure is already there to use it and enjoy. At the same time, the results of the study tend to show that tourists older than 60 years old (a collective specially interesting for a destination that is trying to attract new segments of visitors and move away from mass tourism models) that have used a bicycle have had a good experience, so the embrace of tourism cycling activities could even be utilized to market a different kind of tourism experiences, more active and sustainable. Additionally, the extended range of mobility that bikes allow (particularly if electric bikes are considered) could even facilitate the desaturation of Barcelona's centric areas and the promotion of less visited peripheric areas, like the city's mountain neighborhoods or even adjacent municipalities.

An argument could be made, though, that Barcelona's policies are not trying to alienate tourists from the use of the bikes but to limit possible conflictive situations. In this case, the question that presents itself is if the city is able to absorb, not only the rising local demand of bicycles and cycling related infrastructure, but the possible additional demand created by tourists. This fact even gains more importance if we consider the target group formed by tourists older than 60 years old, which, depending on their age (as previously discussed, the results indicate that visitors older than 70 years old are using the bicycle in the city), could need certain conditions to be able to ride through Barcelona with comfort and safety. According to the obtained results, there are several factors that are already limiting the number of visitors that decide to cycle through the city and affecting the perceptions of those who finally decide to take the bicycle. Thus, these aspects should be considered during the implementation of the transformation processes that Barcelona is experimenting, especially if the use of bicycles by tourists (and older tourists) is not to be discouraged.

In conclusion, the present study has presented an overview of Barcelona and its current and future challenges and, in light of the city's sustainable and accessible mobility approaches, has studied how the use of bicycles is perceived by tourists older than 60 years old visiting the Catalan capital. This collective presents an opportunity for a destination that is trying to attract new segments of the market and move away from traditional forms of mass tourism,

but also some problematics, tied both to frictions between tourists and local people, as well as to the infrastructure and conditions necessary to allow good cycling experiences for older tourists, a group that tend to be forgotten in tourism decision making processes. The results have shown light on the characteristics of these segment of visitors and has allowed a first evaluation of the factors that move them to use or not use a bicycle, as well as the aspects that affect positively and negatively their cycling experiences.

Nevertheless, before finishing, it is necessary to mention the limitations of this work and propose some ways to improve it or expand it in future research projects. Probably, the most important limitation of the study is the low rate of response accomplished, which limits the research capacity to allow more well-founded conclusions (especially in those more specific questions that have received quite a low number of responses). Despite having promoted the survey during several months, coinciding with peak tourism season in Barcelona, the number of persons that have answered the proposed questions has been lower than expected. Factors like the length of the survey, the language utilized in the questionnaire or the digital means necessaries to answer the questions might have contributed to this lack of participation and should be accounted in future research. In order to expand the grade of response, more face-to-face surveys should also be conducted, as it facilitates the answering process and creates a more direct relation between researcher and participant. Additionally, the experience gained during the surveying process indicates that the in-person approach has generated a greater rate of response. In a similar way, the inability to enroll visitors in ride along activities and in-depth interviews has also been a limitation to the scope of the study that could be addressed by stablishing more direct contact with the target public. Lastly, another way that should be considered to facilitate the level of participation is doing it in periods of less tourism activity, when the weather is less hot and the flows of the city allow more pleasant and quiet interactions with visitors.

Another limitation of the study can be found in the dissemination spots for the flyers used to promote the survey. In this sense, the selection of spots was based in the necessity to obtain a certain level of responses. For this reason, places like bike rentals or info points close to areas popular for cycling were selected. Thus, despite these places should indeed be targeted, the results obtained from them could be biased in some degree, as probably the people that goes to a bike rental shop already has some interest in cycling. Thus, it should be taken into account that the percentage of participants that have indicated that they used the bike in Barcelona would probably be lower if the surveying spots selected were more diverse.

Finally, the last major limitation detected is related to the online dissemination of the survey. As in the previous case, the goal of obtaining a certain number of answers has prompted the utilization of online methods to promote the study. Despite the response rate indeed incremented after each online promotion effort, the anonymity and the extended reach provided by internet also creates a falsification hazard, as the questions could be answered by people that might not be part of the segment targeted by the study. Being so, in order to limit the effect of false answers, the realization of more surveys, especially face-

to-face, is encouraged, as a bigger number of responses should dilute the presence of invalid answers. Nevertheless, it is necessary to mention that, during this study, no extreme or out of place answers have been detected.

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Annex

The annexed documents can be accessed through the following link:

https://drive.google.com/drive/folders/1YUawcVta79C-yp2KpRsVlYzHcuI6upMc?usp=sharing