

Who's afraid of pedestrianisation? Residents' perceptions and preferences on street transformation

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ABSTRACT

While urban pedestrianisation schemes typically attract vociferous opposition, it is often unclear whether these negative views are representative of the general population. For this reason, understanding how residents perceive the impacts of such schemes is critical to their evaluation. To this aim, this article assesses residents' perceptions and preferences regarding the pedestrianisation of multiple streets in the Eixample district of Barcelona in recent years, through a representative survey of the district's residents ($n = 1211$). Our research examines how residents' views on pedestrianisation vary depending on their mobility habits, sociodemographic background, and the level of traffic calming of the street they live on. Our results show that most respondents (66%) consider that the impacts of existing pedestrianisations have been positive regardless of whether they live on a pedestrianised street or not, even though residents of recently pedestrianised streets are more positive than those living on other streets. At the same time, many residents of pedestrianised streets consider that the benefits of reduced traffic externalities may be partially counterbalanced by new problems caused by an intensive use of public space (e.g. noise from people and cafes, touristification, nightlife). Our results also show that there is a strong relationship between support for pedestrianisation, age and mobility habits: daily car and motorbike users are much less supportive of pedestrianisation than public transport users and cyclists, while support for pedestrianisation decreases markedly with advancing age.

1. Introduction

Responding to a broader trend towards car-free or car-light urban environments, pedestrianisation and street transformation schemes have become a widespread tool to improve urban liveability and reduce motorised traffic externalities (Montgomery, 2013; Nieuwenhuijsen & Khreis, 2016). While the social and environmental benefits of pedestrianisation and traffic calming are well-documented (Bertolini, 2020; Mueller et al., 2020), urban pedestrianisation schemes almost invariably generate a wave of political and public backlash, which is often amplified by certain sectors of the local media (Hickman & Huaylla Sallo, 2022; Nello-Deakin, 2023; Sadik-Khan & Solomonow, 2016). Nevertheless, it is often unclear whether critical voices represent the views of the general population, or merely those of a vociferous and well-organised minority with an interest in preserving the existing status quo. In most cases, neither the municipal government nor the local media have the time or money to spend on collecting representative data of how the local population evaluates pedestrianisation schemes; as a

result, local debates over pedestrianisation tend to be based on opinions, anecdotal evidence and unrepresentative surveys which offer little clarity about the views of the general population. Likewise, public participation and consultation processes typically only attract specific stakeholders and population groups, whose views may differ from those of the population at large (Arnstein, 1969; Fainstein, 2010).

In the present study, we address this issue through a representative survey which examines how residents evaluate the pedestrianisation of multiple streets in the Eixample district of Barcelona over the past few years. A key contribution of our study is our focus on comparing how residents value pedestrianisation measures *depending on the type of street they live on*, that is, based on the level of traffic calming of their street of residence. In doing so, our study seeks to echo the spirit of Appleyard's pioneering *Livable Streets* (1981), which distinguished between three types of streets based on their traffic intensities, and examined how residents' perceptions and behaviours varied depending on the type of street they lived on. This street-level focus provides a valuable complement to recent literature on street transformations and urban equity

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(Aldred et al., 2021; Rodgers et al., 2010; Thomas et al., 2022), which has mainly centred its attention on assessing equity between different neighbourhoods rather than between different streets in the same neighbourhood.

Our paper seeks to answer the following main two research questions.

- Do residents consider themselves to be positively or negatively affected by existing street pedestrianisations in the Eixample district, and why?
- What level of traffic calming would residents ideally like, both for their own street and the neighbourhood as a whole?

For both these questions, we assess differences in respondents' answers based on type of street of residence, sociodemographic characteristics and habitual travel behaviour. In addition to comparing differences between groups, we use binary logistic regression to identify significant predictors of support for pedestrianisation.

In the rest of the Introduction, we briefly discuss existing research on pedestrianisation, and introduce our case study. After this, the paper is conventionally structured into Methods, Results and Discussion.

1.1. Pedestrianisation and street transformations

Dating back to early accounts such as Appleyard (1981) and Hass-Klau (1990), research on pedestrianisation and street transformation schemes has grown slowly but steadily. While academic interest in pedestrianisation has waxed and waned over time, it has reemerged as a key area of policy-relevant research in the aftermath of the COVID-19 pandemic, this time in connection to a broader research agenda on street experimentation and tactical interventions (Honey-Rosés et al., 2021; Vecchio et al., 2021; Glaser & Krizek, 2021; Vitale Brovarone et al., 2023).

As argued by Castillo-Manzano et al. (2014, p. 195) the main conclusions which emerge from studies on pedestrianisation are remarkably robust despite the variety of intervention types, settings, and research methods: "A joint analysis ... quickly leads to the conclusion that the lessons that can be learned from these studies are very similar, and that their conclusions can therefore be easily extrapolated from one city to another, irrespective of the country of origin." Put briefly, in most cases pedestrianisation schemes face significant resistance prior to implementation, but are typically considered successful once in place. Indeed, most pedestrianisation schemes have been found to have positive impacts for local environmental conditions, street life and economic activity (Allirani et al., 2024; Hahm et al., 2017; Hass-Klau, 1990; Kang, 2016; Soni & Soni, 2016; Yoshimura et al., 2022). Likewise, various studies suggest that support for pedestrianisation schemes tends to increase over time after their implementation (Castillo-Manzano et al., 2014; te Boveltdt et al., 2023).

Barriers to pedestrianisation appear to be quite similar across contexts, including opposition from residents, businesses, and motorists, concerns over transport and parking, issues of cost, and lack of institutional and political support (Parajuli & Pojani, 2018; Sadik-Khan & Solomonow, 2016). At the same time, and as summarised by Hagen and Tennøy (2021), "several studies have revealed 'silent' public support for schemes involving street-space reallocation" (p. 3). Nevertheless, in some contexts pedestrianisation schemes may also generate justified worries related to residential and commercial gentrification (Anguelovski et al., 2023; Appleyard, 1981; Nello-Deakin, 2024; Özdemir & Selçuk, 2017). Likewise, crowdedness and conflicting space uses may also lead to negative public perceptions of pedestrianisation, as reported by Villani and Talamini (2023) in the context of high-density Asian cities.

As might be expected, most studies assessing public opinions on permanent pedestrianisation schemes have done so through surveys (Amistad, 2010; Castillo-Manzano et al., 2014; Melia & Shergold, 2018;

Hagen & Tennøy, 2021; te Boveltdt et al., 2023), thereby providing a concrete output for policy evaluation. Nevertheless, survey characteristics vary widely between studies: some target local residents and/or visitors (e.g. Castillo-Manzano et al., 2014; Melia & Shergold, 2018), while others focus on local businesses (e.g. Hagen & Tennøy, 2021) or even students (Gundlach et al., 2018). Likewise, the timing of surveys varies widely, including ex-ante, ex-post, and before-and-after studies. Finally, survey methods and sample representativeness are highly variable, ranging from convenience-based online surveys to street intercept and panel surveys. While many studies include some level of purposive sampling, few of them are based on truly representative sampling. Despite the increasing volume of studies on pedestrianisation, the fact remains that "basic studies on factors associated with support or contestation are surprisingly scarce", and that "existing knowledge on the relation between personal attributes and support for pedestrianisation is rather erratic" (te Boveltdt et al., 2023, p. 2). Car ownership and travel behaviour, age, political orientation, and neighbourhood of residence are among the factors which have been found to be significantly related to views on pedestrianisation, but findings are not always consistent between studies (te Boveltdt et al., 2023).

The present study contributes to this literature through a case study of recent street pedestrianisations in the Eixample district of Barcelona, which form part of the city's wider superblock strategy. The key value of our study rests on its reliance on sociodemographically representative survey data, and our focus on comparing the views of residents living on different types of streets. In this respect, our study draws direct inspiration from Appleyard's (1981) *Liveable Streets*, seeking to update this perspective to a European context, and relate it to current debates on urban liveability, car-free cities, and urban proximity models such as the 15-min city (Montgomery, 2013; Nieuwenhuijsen & Khreis, 2016). The context of Barcelona also stands out because of its high urban density and benign climate, which translates into a high demand for public space, accompanied by strong real estate speculation and touristification. In such a context, the potential impacts of pedestrianisation may be more intense than in settings where there are fewer competing demands on public space.

1.2. Barcelona's superblocks and green axes

The pedestrianisation of various streets in the Eixample district can be inscribed within Barcelona's long-term superblock strategy (Mueller et al., 2020; Rueda, 2019), which the city has become internationally renowned for in urbanist circles. While strictly speaking these measures might be more accurately described as semi-pedestrianisation since motorised vehicles are allowed as guests (as in "woonerfs" or "living streets"), throughout the article we use the term *pedestrianisation* for purposes of comprehensibility and simplicity. Indeed, the physical design of the new green axes is clearly designed to prioritise pedestrians over motorised traffic (see Fig. 2), with public space and urban design characteristics that go significantly beyond a those of a more modest traffic calming or shared space scheme. Although motor vehicles can access the new streets if needed (e.g. access to parking, loading and unloading during specific hours), through traffic has been eliminated by forcing vehicles to turn onto adjacent streets at each intersection. In practice, the continuous physical presence of strollers and passersby during most of the day also forces motorised vehicles to yield to pedestrians and move at very slow speeds, meaning that the green axes effectively function as pedestrianised spaces.

Although the roots of Barcelona's superblock strategy can be traced to preexisting neighbourhood traffic calming strategies, the first self-proclaimed superblock was implemented in 2016 in the relatively quiet neighbourhood of Poblenou. This was followed by a second superblock in the denser and more central Sant Antoni neighbourhood in the Eixample district (Fig. 1), which flexibilised the original definition of a superblock to cover a more irregular area. This departure from the original superblock model has been subsequently carried further in the

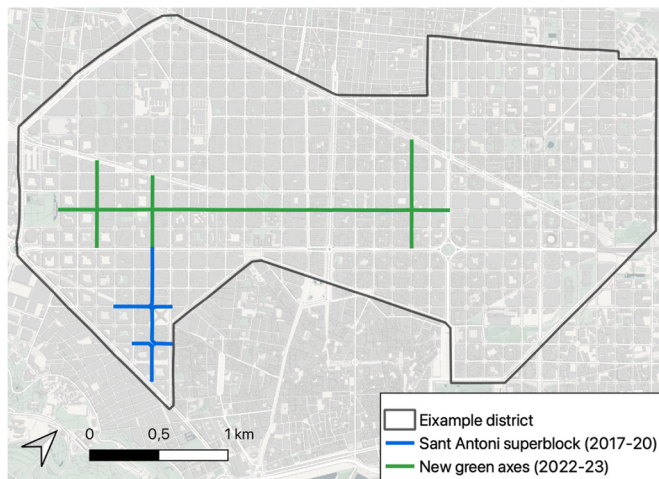


Fig. 1. –Superblocks and green axes in the Eixample district.

“green axes” strategy presented in 2020, which over the mid- to long-term aspires to create semi-pedestrianised 21 streets in the Eixample (approximately 1 out of every 3 streets). The city sees these green axes as the natural evolution of the superblock strategy rather than a break with it, and presents them as part of a city-wide “Superblock Barcelona” plan which includes a range of interconnected traffic calming, public space and urban greening strategies, with the ultimate goals of fostering climate adaptation, urban liveability and social cohesion.

The key objectives of the new green axes include creating new public and green spaces, and reducing motorised traffic externalities. Although the Eixample is among Barcelona’s more central and prosperous areas, its dense urban fabric means it is heavily trafficked and public space is scarce. With a population density of 35,676 inhabitants/km² and 2.1 m² of green space per inhabitant in 2022 (compared to a city average of 7.4 m²),¹ the district also has the highest pollution levels from motorised traffic in the city, exceeding European and WHO air pollution guidelines. In recent years, growing evidence of the health costs of the status quo have led to the emergence of local advocacy groups seeking to curb motorised traffic (e.g. *Eixample Respira* [“Eixample Breathes”], *Revolta Escolar* [“School Revolt”]), which have exerted significant pressure on local authorities to implement traffic calming measures. Although recent years have seen some progress on this front, (e.g. new bike and bus lanes, lower speed limits on certain streets, traffic calming around schools), it was not until the opportunity provided by the COVID-19 pandemic in 2020 that the municipality took a more significant step by reducing traffic capacity along three of the proposed green axes using tactical urbanism measures (Nello-Deakin, 2022). Making the most of available EU post-COVID recovery funds, this was followed by the definitive pedestrianisation of four green axes (Fig. 1) from September 2022 to June 2023.

As displayed in Fig. 2, the extent of the street-level changes caused by the implementation the newly pedestrianised green axes is difficult to overstate. The decision to redesign these streets using high-quality but costly permanent elements can be understood as a response to the media-led backlash to the tactical urbanism measures implemented in the aftermath of COVID-19, which were widely depicted as ugly and unsuccessful (Nello-Deakin, 2023). The scale of street transformations – as well as the cost and duration of the roadworks – means that the new green axes have been controversial, leading to the polarisation of popular and political opinion, and even an ongoing judicial dispute against the municipal government which has been described as a form of “urban

lawfare” (Montaner, 2023). Interestingly, the new green axes have attracted criticisms from both conservative and progressive circles, albeit not for the same reasons. Beyond commonplace concerns over traffic impacts, a key element in the debate has been the centrality of spatial equity discussions (Angelovski et al., 2023; Nello-Deakin, 2024), in which the new green axes have been accused of creating new inequities between neighbouring streets. More generally, the green axes strategy has been criticised because of its focus of public investment on an already relatively wealthy district. The green axes have equally been a prominent element of debate in the run-up to the municipal election of May 2023, which led to the narrow defeat of outgoing mayor Ada Colau, thereby casting doubt on the future of the green axes/superblock strategy.

2. Method

Under direction from the researchers, an in-person street survey addressed to 1211 residents of the Eixample district was carried out in September 2023 by a third-party survey company. The survey lasted approximately 10 min and relied on stratified sampling, including quotas for age and gender (sociodemographically representative of the wider district population), neighbourhood and type of street of residence. Streets were classified into the four categories listed in Table 1 and mapped in Fig. 3. As argued by Nello-Deakin (2022), the fact that most of the Eixample’s streets share a standard layout makes it a particularly valuable case study to examine the implications of pedestrianisation for equity between streets in the same neighbourhood. Indeed, the majority of streets within the Eixample’s orthogonal grid share a set of common characteristics which makes them very similar in appearance and character (e.g. 20 m. cross-section split evenly between motorised traffic and tree-lined sidewalks, regular spacing of intersections, chamfered street corners, similar building heights), a regularity can be traced to the egalitarian aspirations of Cerdà’s 19th-century urban expansion plan (Wynn, 1979). For this reason, our survey only targeted residents of “regular” streets within the Eixample, whose similarities make them readily comparable, and easy to classify in the four below categories. Since including them would have undermined the underlying logic of our survey and its focus on “comparable” streets, we excluded the small number of streets with a markedly different typology (e.g. large avenues, passages – see unmarked streets within the grey area in Fig. 3), which tend to be very different in character (i.e. more commercial and less residential), and do not neatly fit the four street categories defined in our survey.

Based on the total population of the Eixample district, we established a target sample size of 1200 to guarantee a global margin of error of $\pm 5\%$ (95% CI); given the reduced number of streets in the *recent pedestrianisation* and *consolidated pedestrianisation* categories, these were overrepresented in the sample (Table 1) in order to obtain more reliable results (the margin of error for these two categories was estimated at $\pm 7\%$). In the end, a total of 1211 valid survey responses were obtained. Since respondents were asked their exact residential address, we were also able to geocode their residence as shown in Fig. 3.² As detailed in the Results section, this made it possible to classify respondents according to their distance of residence to pedestrianised streets.

The survey evaluated residents’ views on existing and future pedestrianisations in the Eixample district, as well as their ideal street preferences regarding pedestrianisation/traffic calming levels. In the Appendix, we include an outline of the survey to provide a summary of its contents and structure. While some previous studies (Castillo-Manzano et al., 2014; Semple & Fountas, 2023) evaluate views on pedestrianisation using a numerical or Likert scale, in our survey we made a conscious choice to assess residents’ opinions in a binary way,

¹ Source: Municipality of Barcelona. https://ajuntament.barcelona.cat/estadistica/catala/Estadistiques_per_territori/Documents/districtes/02_Eixample_2023.pdf.

² To preserve respondent privacy, a small amount of random jitter has been added to the points in Fig. 3.



Fig. 2. Consell de Cent Street before and after pedestrianisation (source: Google Street View/authors).

Table 1
Survey street categories.

Type of street	Definition	No. of survey respondents
Recent pedestrianisation	New (semi)pedestrianised “green axes” implemented during 2020–2023	209
Consolidated pedestrianisation	(Semi)Pedestrianised streets implemented prior to 2020	202
Secondary	Conventional streets with moderate traffic intensities (average daily traffic (ADT) < 15,000)	400
Main	Conventional streets with high traffic intensities (ADT > 15,000).	400

simply asking them whether they considered the overall impact of pedestrianisation to be positive or negative (we nevertheless allowed options for neutral or mixed views, in which respondents considered that pedestrianisation had had both positive and negative impacts simultaneously).³ While a numeric scale might have enabled a more granular analysis, it would also have added to survey complexity and length, and potentially deterred from the clarity of some conclusions. Given the aspiration of our research project to provide clear empirical findings which contribute to ongoing local public debates on pedestrianisation, we also considered this approach to be preferable at a communicative level.

Our analysis of survey data involved two main steps. Firstly, we undertook exploratory and descriptive analyses to identify the most relevant survey findings. In the Results, we present a summary of the most notable results, drawing particular attention to how residents’ perceptions and preferences vary depending on their sociodemographic

background and type of street of residence. Building upon this descriptive analysis, we then used binary logistic regression to evaluate how individual and geographic characteristics affect residents’ views on street pedestrianisation (1 = perceives pedestrianisation as positive, 0 = perceives pedestrianisation as negative). Inevitably, this meant excluding the small proportion of respondents (14%) who expressed mixed or indeterminate views on pedestrianisation, whose response cannot be assessed through logistic regression. The list of variables included in the model was refined iteratively, based on both theoretical considerations and the results of preliminary analyses. In the Results, we present two final models. The first model focuses on existing street pedestrianisations, while the second model – restricted to residents of non-pedestrianised streets – focuses on residents’ views on the hypothetical future pedestrianisation of their own street of residence. The final list of independent variables included as predictors in both models can be found in Table 6 in the Results section.

3. Results

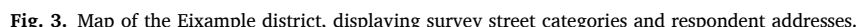
3.1. Survey population

In Table 2, we provide a summary of key characteristics of our survey population compared to the overall population of the Eixample district. This shows that the sociodemographic characteristics of our sample are closely representative of the district population, even though higher education levels are somewhat overrepresented.

3.2. Perceived impacts of street pedestrianisation

66% of all respondents considered that existing street pedestrianisations in the Eixample district had had a positive impact, while 20% regarded them negatively (the remaining 14% correspond to mixed or indeterminate views). As shown in Fig. 4, residents of recently pedestrianised streets are the most positive about pedestrianisation, but there is a clear majority support for pedestrianisation among residents of all street types, with relatively small differences between categories. There is also a clear relationship between daily mobility habits and views on pedestrianisation (Fig. 5): regular private motor vehicle users are much

³ To be precise, residents of pedestrianised streets (*consolidated* and *recent pedestrianisation* categories) were asked about the impacts of the pedestrianisation of their own street, while residents of non-pedestrianised streets (*main* and *secondary* street categories) were asked about the impacts of the pedestrianisation of other streets in the Eixample district. In our analysis, we treat this question as a single variable (i.e. “perceived impacts of pedestrianisation”) to enable aggregation across street categories.



		Survey	District census (2021)
Gender	Male	46%	47%
	Female	54%	53%
Age (population above 18)	18–29	17%	17%
	30–44	28%	28%
	45–59	22%	23%
	60–74	20%	19%
	75+	13%	13%
Employment status (census data from 2020, based on population above 16)	Housework	2%	4%
	Student	6%	12%
	Unemployed	8%	7%
	Retired	28%	22%
	Working	56%	56%
Education level (census data based on population above 16)	Compulsory (primary or secondary)	10%	28%
	Optional or advanced secondary	22%	26%
	Tertiary	68%	45%

markedly with increasing age, declining from 79% for both the age categories 18–29 and 30–44, to a mere 44% for the age category 75+. Interestingly, we did not find evidence of any relationship between support for pedestrianisation and gender, with an almost identical rate of support for pedestrianisation for both genders (66% in both cases).

In [Tables 3 and 4](#), we list the 10 most mentioned positive and negative impacts of existing pedestrianisations. As can be seen, the perceived positive impacts of pedestrianisation are similar for residents of pedestrianised and non-pedestrianised streets, with most answers focusing on the gain of public space and the reduction of traffic externalities. By contrast, there is a clear difference when it comes to negative impacts: while residents of pedestrianised streets are mainly preoccupied by a perceived excessive or anti-social use of public space, the complaints of the residents of non-pedestrianised streets are more centred on mobility issues.

In addition to being asked about the perceived impacts of existing street pedestrianisations, residents of non-pedestrianised streets were asked whether they thought that the hypothetical future pedestrianisation of their own street would have a positive or negative impact. On this point, 61% of these respondents considered that the pedestrianisation of their own street would be positive, a similar percentage to the proportion who evaluate existing pedestrianisations positively (main/secondary street categories in Fig. 4). Respondents' answers to both these questions are significantly related according to a chi-squared test (>99% confidence level), presenting a moderate Cramér's V value of 0.25.

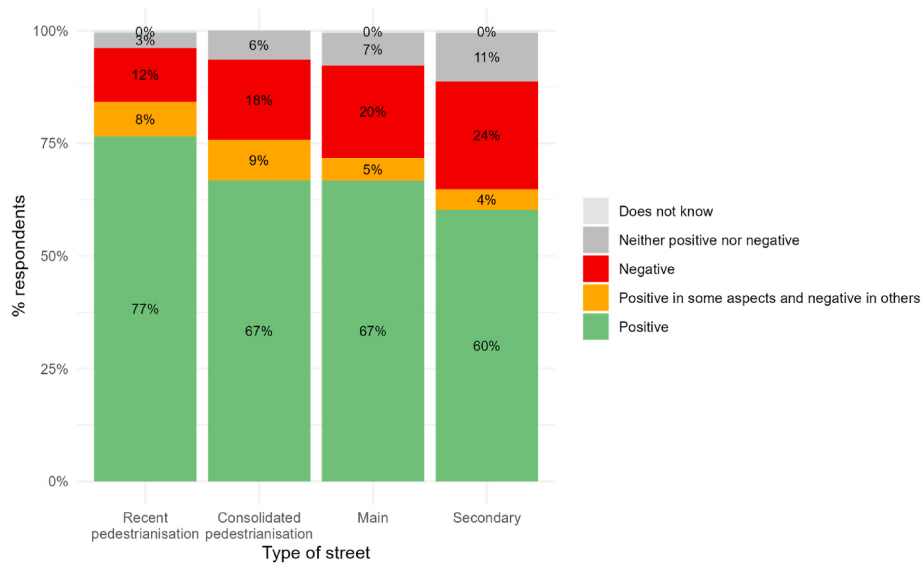


Fig. 4. Perceived impacts of pedestrianisation by type of street of residence.

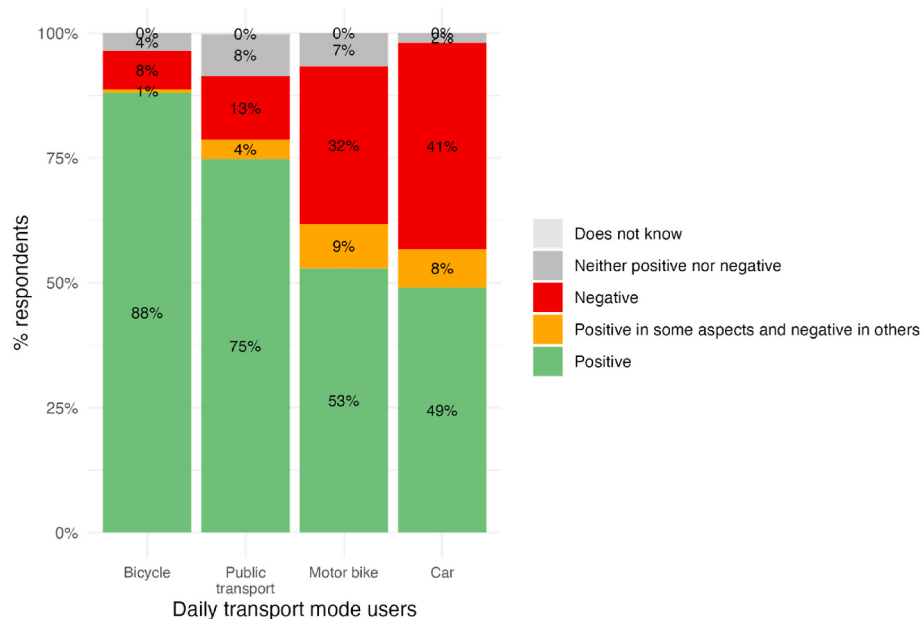


Fig. 5. Perceived impacts of pedestrianisation by mobility habits.

3.3. Ideal street preferences

Beyond asking respondents about the perceived impacts of existing street pedestrianisations, our survey included a range of questions designed to gauge what level of traffic calming they would ideally like – regardless of real-world constraints – both for their street of residence and neighbourhood as a whole. For their own street, 47% of respondents said they would prefer to live on a pedestrianised or shared space street, 28% on a street with wide sidewalks and a single traffic lane, and 23% on a street with at least two traffic lanes. As illustrated in Fig. 6, residents of pedestrianised streets were much more likely to express a preference for living on a street with higher levels of traffic calming. It does not seem that residential self-selection plays a major role in explaining this trend, since most residents of pedestrianised streets (82%) already lived on them prior to pedestrianisation. Out of the remaining 18% who had moved to an already pedestrianised street, only 7% stated that living on

a pedestrianised street had been an important factor in choosing their new address.

Respondents were also asked whether they thought it would be preferable for some streets in their neighbourhood to dedicate more space to pedestrians and others to traffic, or instead to have a similar balance between traffic and pedestrians on all streets. This question was intended to assess residents' preferences for more localised versus more diffuse traffic calming interventions (thereby resulting in a more hierarchical or uniform street network). Since the new green axes have been accused of damaging the equitable nature of Cerdà's 19th-century urban expansion plan by increasing inequities between streets, this issue is particularly relevant to ongoing debates on intra-neighbourhood equity. As shown in Table 5, a slight majority of respondents expressed a preference for a more hierarchical street network, but differences by type of street of residence are relatively small.

Table 3
Perceived positive impacts of pedestrianisation.

Positive impacts				
Residents of pedestrianised streets % (n)			Residents of other streets % (n)	
1	More public space to rest/stroll	21% (158)	More public space to rest/stroll	30% (371)
2	Less noise	18% (138)	Less noise	13% (165)
3	More interaction with neighbours	9% (66)	Less traffic	8% (101)
4	Less traffic	9% (66)	Less pollution	8% (99)
5	Less pollution	8% (59)	More interaction with neighbours	6% (76)
6	More greenery	6% (48)	More greenery	5% (66)
7	More beautiful	6% (44)	More peaceful	5% (60)
8	More peaceful	6% (42)	More beautiful	4% (55)
9	Less traffic danger	5% (35)	Easier to travel by foot	3% (34)
10	Strengthens local commerce	2% (16)	Less traffic danger	3% (32)

Table 4
Perceived negative impacts of pedestrianisation.

Negative impacts				
Residents of pedestrianised streets % (n)		Residents of other streets % (n)		
1	Too much tumult/street life	23% (43)	More difficult to circulate in motorised vehicle	22% (86)
2	Dirtier	15% (28)	Roadworks	14% (57)
3	Anti-social behaviour	11% (20)	Too much tumult/street life	11% (43)
4	More difficult to circulate in motorised vehicle	10% (18)	Unruly bicycles and e-scooters	9% (34)
5	Conflicts between transport modes, unclear traffic rules	8% (15)	Increased traffic congestion on nearby streets	8% (33)
6	Increased parking difficulties	6% (11)	Increased parking difficulties	6% (25)
7	Too many outdoor cafe terraces	5% (9)	Dirtier	4% (17)
8	Unruly bicycles and e-scooters	4% (8)	Problems with loading vehicles, illegal parking	3% (12)
9	More tourists	4% (8)	More tourists	3% (11)
10	Roadworks	2% (4)	Conflicts between transport modes, unclear rules	3% (10)

3.4. Binary logistic regression

To better understand the key factors shaping support for pedestrianisation, we selected a shortlist of variables to include as potential predictors of support for pedestrianisation. In Table 6, we provide a short description of the final variables included in the binary logistic regression models. To avoid multicollinearity issues, we discarded some variables which presented high collinearity with other variables; this resulted in a final variance inflation factor (VIF) of 2.6, which shows that the model presents low levels of multicollinearity. Both to improve the fit of the model and make the results clearer to interpret, we also recoded various variables into a reduced number of categories.

Using the same independent variables, in Table 7 we present summary results for two different regression models. The first assesses respondents' support for existing street pedestrianisations, while the second assesses respondents' support for the hypothetical future pedestrianisation of their street of residence. Accordingly, the second model only includes respondents in the main and secondary street categories.

Echoing our descriptive results, these models confirm the centrality of age and daily mobility habits as key explanatory variables of support for pedestrianisation. Habitual private motor vehicle use is negatively related to support for both existing and future pedestrianisations, while public transport use and cycling are positively related to support for

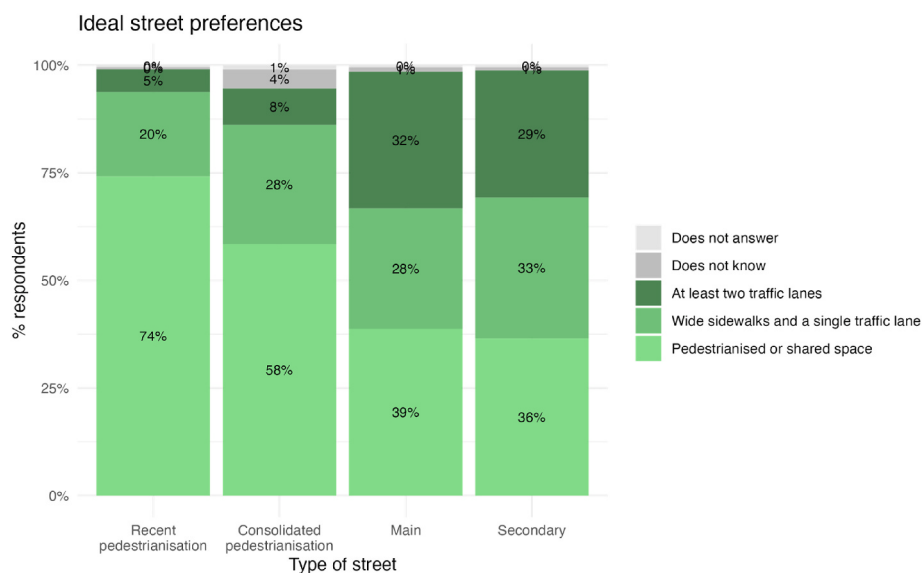


Fig. 6. Ideal street preferences.

Table 5

Ideal street preferences for whole neighbourhood.

Street preferences for whole neighbourhood	Consolidated pedestrianisation	Recent pedestrianisation	Main	Secondary	Total
Some streets with more traffic and others with pedestrian priority	57% (116)	62% (130)	52% (209)	50% (200)	54% (655)
All streets the same, with space for both traffic and pedestrians	38% (77)	32% (67)	44% (174)	46% (184)	41% (502)
Does not know	3% (6)	3% (7)	3% (13)	3% (11)	3% (37)
Does not answer	1% (3)	2% (5)	1% (4)	1% (5)	1% (17)
Total	100% (202)	100% (209)	100% (400)	100% (400)	100% (1211)

Table 6

Description of the variables included in regression models (reference category in bold).

Variable	Description	Categories
Street_category	Type of street according to predefined survey categories	- Main - Secondary - Recent pedestrianisation - Consolidated pedestrianisation
Distance_pedestrianised	Euclidean distance to pedestrianised street	- 0–150 m - 150–500 m - + 500 m
Neighbourhood	Neighbourhood of residence (official administrative division)	- Antiga Esquerra de l'Eixample - Nova Esquerra de l'Eixample - Dreta de l'Eixample - Sagrada Família - Sant Antoni - Fort Pienc
On_street	Respondent's home has rooms directly facing street	- Yes - No
Shopping	Frequency of visiting businesses/cafes on own street of residence	- Daily/almost daily - Non-daily
Social_interaction	Frequency of interaction with neighbours on own street of residence	- Daily/almost daily - Non-daily
Motorised_transport	Frequency of car/motorbike use	- Daily/almost daily - Non-daily
Public_transport	Frequency of public transport use	- Daily/almost daily - Non-daily
Bicycle	Frequency of bicycle use	- Daily/almost daily - Non-daily
Age	Age of respondent	- 18–29 - 30–44 - 45–59 - 60–74 - 75+
Gender	Gender of respondent	- Male - Female
Home_ownership	Home ownership status	- Owner - Renter
Time_living_address	Time living in current address	- <5 years - >5 years
Small_children	Presence of children below 12 in household	- Yes - No
Education_level	Educational level of respondent	- Primary or secondary - Tertiary - Post-tertiary

existing pedestrianisations. Age is inversely related to support for existing pedestrianisations, but does not seem to affect preferences for future pedestrianisation (except for the youngest age group). Lower education levels, meanwhile, are associated with lower support for both existing and future pedestrianisations. The models also show that support for both existing and future pedestrianisations is inversely related to the time respondents have lived in their current address, with long-term residents being significantly more negative about pedestrianisation.

Likewise, the model confirms the lack of significance of variables such as gender and home ownership. Living more than 500 m away from pedestrianised streets is associated with lower support for existing pedestrianisation, but does not seem to affect support for future

pedestrianisations. Beyond the effect of distance, there also appears to be some evidence of a neighbourhood-level effect, in which neighbourhoods with few pedestrianised streets show lower rates of support for existing pedestrianisations. Street category, meanwhile, is only partially statistically significant for Model 2 (future pedestrianisation). Somewhat unexpectedly, respondents who report interacting less frequently with their neighbours on their street of residence are also more favourable to existing and future pedestrianisation. Finally, there appears to be some evidence that having small children and an apartment directly facing the street increases support for future pedestrianisation.

Table 7

Summary of binary logistic regression results (1 = perceives pedestrianisation as positive, 0 = perceives pedestrianisation as negative).

Variable	Category	Model 1: Existing street pedestrianisations			Model 2: Future pedestrianisation of street of residence		
		Coefficient	SE	OR	Coefficient	SE	OR
Intercept	–	2.12 ***	0.43	8.33	1.28 **	0.4	3.6
Street_category	Secondary	–0.28	0.21	0.76	–0.56 **	0.18	0.57
	Consolidated pedestrianisation	0.11	0.3	1.12	–	–	–
	Recent pedestrianisation	0.42	0.31	1.52	–	–	–
Distance_pedestrianised	Between 150 and 500m	–0.06	0.23	0.94	0.27	0.2	1.31
	More than 500m	–0.77 *	0.36	0.46	0.22	0.33	1.25
Neighbourhood	Fort Pienc	–0.76.	0.44	0.47	–0.56	0.41	0.57
	Antiga Esquerra de l'Eixample	0.09	0.3	1.09	–0.63 *	0.3	0.53
	Nova Esquerra de l'Eixample	–0.04	0.27	0.96	–0.55 *	0.27	0.58
	Sagrada Família	–0.56.	0.31	0.57	–0.34	0.3	0.71
	Sant Antoni	–0.3	0.32	0.74	–0.03	0.33	0.97
On_street	Yes	–0.19	0.19	0.83	0.4 *	0.18	1.49
Shopping	Daily	–0.03	0.18	0.97	–0.13	0.18	0.88
Social_interaction	Daily	–0.3.	0.18	0.74	–0.46 *	0.18	0.63
Motorised_transport	Daily	–1.36 ***	0.21	0.26	–0.88 ***	0.23	0.41
Public_transport	Daily	0.46 *	0.19	1.58	0.04	0.19	1.04
Bicycle	Daily	0.6.	0.34	1.82	0.21	0.29	1.23
Age	18–29	–0.01	0.33	0.99	–0.73 *	0.3	0.48
	45–59	–0.62 *	0.27	0.54	–0.29	0.27	0.75
	60–74	–0.48	0.32	0.62	–0.12	0.32	0.89
	+75	–1.19 ***	0.35	0.3	–0.53	0.36	0.59
Gender	Male	–0.1	0.17	0.9	0.16	0.18	1.17
Home_ownership	Renter	0.14	0.19	1.15	0.19	0.2	1.21
Time_living_address	Less than 5 years	0.99 ***	0.25	2.69	0.6 *	0.24	1.82
Small_children	Yes	0.39	0.26	1.48	0.51 *	0.26	1.67
Education_level	Post-tertiary	0.02	0.25	1.02	0.01	0.24	1.01
	Primary or secondary	–0.62 **	0.19	0.54	–0.35.	0.2	0.7
Significance levels: $p < 0.001 = ***$, $p < 0.01 = **$, $p < 0.05 = *$, $p < 0.1 = .$		Nagelkerke R^2 : 0.301			Nagelkerke R^2 : 0.169		
		N = 1026			N = 716		

4. Discussion

In line with previous research (e.g. Amistad, 2010; te Boveldt et al., 2023), our findings confirm the existence of majority support for pedestrianisation initiatives once schemes have been implemented. Our results also partially echo those of previous research reporting higher levels of support for pedestrianisation among residents living on or near pedestrianised streets (Castillo-Manzano et al., 2014). However, our study shows that existing pedestrianisations are judged positively by a majority of residents across all street categories, to the point that differences between street categories are not statistically significant once distance to pedestrianised streets is considered.

Admittedly, these results need to be understood in the context of a dense city with a high pedestrian modal share (52.8% in 2022 according to the official EMEF mobility survey), and a strong tradition of municipally led transformative public space and urban design projects. Although the new pedestrianised green axes suffered heavy political and societal contestation, the fact remains that Barcelona provides a propitious local context for pedestrianisation initiatives which may not be readily comparable to other cities. In lower density contexts with higher levels of car dependence, pedestrianisation schemes are likely to face an entirely different set of challenges (e.g. Scerri & Attard, 2023). The same can be said for high-density cities which in principle may provide an auspicious context for pedestrianisation, but are characterised by markedly different political and planning cultures (Parajuli & Pojani, 2018; Villani & Talamini, 2023). As argued by Villani and Talamini (2023), this highlights the need for more studies on pedestrianisation from non-European cities. Nevertheless, we believe the findings of our study are likely to be echoed in relatively comparable European cities, particularly Mediterranean cities with a strong pedestrian and public space culture.

Regarding the relationship between support for pedestrianisation and sociodemographics, our results partially agree with those of previous research. In line with previous studies (Semple & Fountas, 2023), regular cyclists and public transport users are more supportive of

pedestrianisation than regular car and motorbike users. Nevertheless, our study found a strong inverse relationship between support for existing pedestrianisations and age, which runs against the findings of some previous studies (Amistad, 2010; Castillo-Manzano et al., 2014). In a way this is surprising, since many aspects of pedestrianisation (e.g. increased outdoor seating, less exposure to traffic, improved walking conditions, higher urban vitality) might be expected to be particularly beneficial for older people (Akinci et al., 2022). It would seem, then, that this potential benefit is outweighed by a tendency towards greater conservatism and resistance to change with aging (Cornelis et al., 2009; Glenn, 1974). In future research, it would be valuable to explore whether this tendency can be simply attributed to a greater status quo bias among older people, or whether it may also be partially explained by a greater dependency on motorised transport (including taxis and buses) as a result of infirmity. For public policy and in the context of an ageing population, this also suggests that it may be worth paying especial attention to the potential (perceived) impacts of pedestrianisation on older residents, making sure that their needs and perceptions are adequately considered in consultation and participation processes (Musselwhite, 2017; Phillips et al., 2013).

Seemingly contradicting the relevance of applying a “gender lens” to urban design and mobility (Gauvin et al., 2020), we also want to highlight that we found no evidence of a gender gap regarding residents’ views on pedestrianisation. This is contrary to our theoretical expectations: we had anticipated to see somewhat lower support for pedestrianisation among men, because of their greater reliance on motorised private transport, longer travel distances, and self-identification with automobility, in contrast to the greater prominence of local care-related trips among women. This convergence of opinions between both genders, we suggest, may be partially explainable by the strong emphasis the municipality of Barcelona (as well as regional and national government) has placed on gender equality policies – both in urban policy and more broadly – in recent years.

While residents of newly pedestrianised streets benefit from radical reductions in traffic noise (and related externalities), our results suggest

that these gains may be partially offset by the noisy street life generated by an intensive use of public space, particularly at nighttime and in a touristic city. As some residents of pedestrianised streets noted, their new role as a neighbourhood- or even city-wide destination for visitors and tourists had changed the character of the street and resulted in there simply being “too many people” (in the words of a survey respondent). Likewise, the fact that residents from consolidated pedestrianised streets are somewhat less positive than residents of recent pedestrianised streets suggests that residents may become less enthusiastic about pedestrianisation over time, possibly because of the gradual emergence of certain negative consequences or side effects of pedestrianisation.

For public policy, this suggests that it is important to have a clear strategy to avoid newly pedestrianised spaces from becoming over-successful, both through pre-emptive measures (e.g. limiting cafe terraces, regulating new business permits) and ongoing monitoring once pedestrianisation has been implemented (e.g. pedestrian counts, noise monitoring). In the absence of such a regulatory strategy, conflicts arising from crowdedness and competing street uses may ultimately lead to the defeat of pedestrianisation projects, as documented by Villani and Talamini (2023) in the even denser urban context of Hong Kong. As highlighted by previous accounts (e.g. Zamanifard et al., 2018; Alvarado Vazquez & Casiano Flores, 2022), the governance of public spaces is extremely complex in practice, involving a range of both formal and informal interactions between various municipal departments (e.g. waste, traffic, parks, business, police), private actors (e.g. business owners) and civil society. For this reason, it seems recommendable to establish a formal governance framework for new pedestrianised streets which clearly outlines the responsibilities of various actors and creates a space of dialogue between stakeholders, to ensure a collaborative approach to their long-term maintenance and use.

We were also surprised that concerns about gentrification and real estate speculation did not come across strongly in the survey, with only a small minority of respondents mentioning them. This contrasts with the relative prominence of local public debates and news items on gentrification, both before and after the inauguration of the new green axes. In part, this may be attributable to our survey design, which allowed for answers on the topic but did not explicitly seek them out. We made an intentional choice to ask about the impacts of pedestrianisation using open questions (providing interviewers with a list of pre-codes for classification) to avoid influencing responses, but this may have led people to focus on the more immediately tangible advantages and disadvantages of pedestrianisation, rather than complex long-term processes such as gentrification. As we see it, this does not mean that residents do not harbour significant real estate concerns, but merely that these were perceived as less salient than the drastic changes experienced in public space. Multiple open comments at the end of the survey do mention the issue of gentrification, linking it to a wider sense of neighbourhood loss which intersects with city-wide dynamics: “It was foreseeable that there would be speculation and displacement of those of us who have lived years here ... There is lots of noise because tourists do whatever they want, and these are streets where normal Barcelona working class people live, old people, it is not a bourgeois neighbourhood”. This reflects some of the inevitable limitations of a short street survey, which is unable to fully capture this type of complex feelings and perceptions. For this reason, we believe it is important to complement survey-based evaluations of pedestrianisation schemes with in-depth qualitative methods (e.g. Appleyard, 1981; Vitale Brovarone et al., 2023).

To close, we would like to outline some limitations and directions for future research. Time and budget constraints meant that we were not able to carry out a before-and-after survey as in some similar studies (te Bovelde et al., 2023), which would have enriched our findings. Likewise, our survey was carried out only a few months after the finalisation of the new pedestrianised green axes, meaning that residents’ views are only based on their short-term experience of them. Our survey sought to partially overcome this limitation by comparing the views of residents of

recent versus consolidated (pre-2020) pedestrianised streets, but it would be interesting to revisit our survey in a few years to explore if perceptions of the new green axes have shifted. Although our study provides a comprehensive single time snapshot of support for pedestrianisation, focusing on the long-term trajectory of pedestrianisation schemes is equally crucial (Villani & Talamini, 2023). Castillo-Manzano et al. (2014), for instance, found perceptions of pedestrianisation to improve over time in a study of Seville (Spain), but the same might not be true in our case.

Another interesting question would be to examine how the new green axes are perceived not only among residents also but among the daily visitor population of the Eixample district, which is significant given the centrality of the area. This is a relevant question, since a main critique of the new green axes has been that they make the area more difficult to access for visitors. Likewise, replicating our survey among local business owners from different street categories would be an valuable exercise, since the impacts of pedestrianisation are likely to be greater for local businesses than residents (Melia & Shergold, 2018; Özdemir & Selçuk, 2017). Finally and moving beyond our case study, we suggest that future research might investigate the extent to which public support for pedestrianisation schemes can be considered as a case of “pluralistic ignorance”: namely, that most people believe that rates of public support for pedestrianisation are lower than they are. Pluralistic ignorance has been acknowledged as a barrier to mobility policies such as urban traffic speed reduction (Pilkington et al., 2018) and has been widely demonstrated to exist for a range of sustainability and climate action policies (Geiger & Swim, 2016; Sparkman et al., 2022).

5. Conclusion

Echoing the results of previous studies, our representative survey examining residents’ perceptions of street pedestrianisations in the Eixample district of Barcelona provides evidence of majority support for pedestrianisation schemes after their implementation. The main perceived benefits of pedestrianisation include the increase of public space, and the reduction of negative traffic externalities. For residents of pedestrianised streets, the main perceived negative impacts of pedestrianisation relate to the risk of excessive street life and associated tumult; instead, residents of non-pedestrianised streets, are primarily concerned about the impact of pedestrianisation on motorised traffic circulation.

Variables which are positively related to support for existing pedestrianisations include living close to pedestrianised streets, being a daily cyclist or public transport user, and education level. By contrast, travelling daily by motorised vehicle, being a long-term resident at the same address, and older age are inversely related to support for pedestrianisation. Respondents’ support for the future pedestrianisation of their own street of residence shows a very similar explanatory pattern, with the presence of some additional significant variables (e.g. presence of small children in the household, having rooms directly facing the main street). Regarding ideal street preferences, almost half of survey respondents would prefer to live on a pedestrianised or shared space street, a percentage which is significantly higher for respondents who already live on pedestrianised streets.

Finally, a key finding of our study is that pedestrianisations are judged positively not only by residents of pedestrianised streets, but also by most residents of non-pedestrianised streets. To some extent, this suggests that equity concerns based on the idea that the new green axes would create “winner” and “loser” streets are not keenly felt by most residents: instead, pedestrianised streets are seen as a positive (or negative) development for the whole neighbourhood.

To sum up and in line with previous research, our results confirm the existence of a “silent majority” supporting pedestrianisation schemes after their implementation, which contrasts with the strong negative portrayal of Barcelona’s new green axes by large parts of the local political and media establishments. For municipal policymakers seeking to

implement similar street transformations, this is an encouraging conclusion. While pedestrianisation schemes will always encounter resistance from certain quarters, drawing attention to the existence of such a popular majority in favour of pedestrianisation may hopefully encourage local politicians to be less afraid to propose and implement such schemes.

CRediT authorship contribution statement

Samuel Nello-Deakin: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Candela Sancho Vallvé:** Visualization, Formal analysis, Data curation. **Zeynep Sila Akinci:** Writing – review & editing, Software, Formal analysis.

Declaration of competing interest

The authors have no conflict of interest to report.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.habitatint.2024.103117>.

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