

# “Winner” versus “loser” streets? Pedestrianisation and intra-neighbourhood equity

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## ABSTRACT

This study provides a qualitative exploration of the spatial equity implications of Barcelona’s superblocks strategy, focusing on the newly pedestrianised “green axes” implemented in 2023. By examining the extent to which pedestrianisation may contribute to the creation of “winner” and “loser” streets in the same neighbourhood, the study complements previous literature in this area, which has mainly focused on assessing spatial equity between different neighbourhoods. The study is based on 11 qualitative interviews and a focus group with key stakeholders involved in the design and implementation of the superblocks plan. In the findings, I review the main spatial equity implications of the new green axes, identify trade-offs between equity and viability of implementation, and examine the measures taken by the municipality to minimise inequities between streets. My findings show that the spatial equity implications of pedestrianisation are complex and multidimensional. Although pedestrianisation may strengthen inequities between streets, the gains experienced by pedestrianised streets are not limited to residents living on those streets. However, pedestrianised streets risk becoming a victim of their success, experiencing significant public space and gentrification pressures. Transforming more streets simultaneously might contribute to spread these pressures more evenly, but risks creating greater political and social backlash.

## 1. Introduction

Reducing urban car usage through street transformation strategies has become a widely accepted objective for urban policy, both to increase liveability and curb the negative externalities of motorised traffic (Montgomery 2013; Nieuwenhuijsen and Khreis 2016; King and Krizek 2021). However, implementing such measures in a spatially and socially equitable manner remains a challenge. At a local level, street transformation schemes may contribute to the creation of “winner” and “loser” streets or areas, in which some streets are benefited while others are affected negatively by a redistribution of traffic externalities between streets (e.g. increased travel times or traffic congestion) (Appleyard 1981). Likewise, street transformations which reduce traffic externalities and improve public space may contribute to increase residential and commercial property prices, thereby raising the prospect of “green gentrification” (Anguelovski et al. 2022; Anguelovski, Honey-Rosés, and Marquet 2023; Oscilowicz et al. 2020) and the accompanying displacement of residents and businesses (Appleyard 1981; Özdemir and Selçuk 2017).

The present study contributes to the literature on street

transformations and spatial equity through a case study Barcelona’s superblocks plan, arguably one of the most ambitious and internationally prominent city-wide street transformation strategies. This plan has evolved significantly in recent years, shifting from the original “superblock” model to a strategy based on near-pedestrianised “green axes” (see Section 2). The present paper focuses mainly on the implications of the new pedestrianised green axes implemented in 2022–2023, placing them within the context of the broader superblocks plan. As argued by ANONYMISED, a key merit of Barcelona’s isotropic street grid is that, since most of its streets share a standard layout, it offers both a valuable case study and conceptual model to examine the implications of different traffic calming strategies for equity between streets. In contrast to previous literature (e.g. Rodgers et al. 2010; Aldred et al. 2021; Thomas, Furlong, and Aldred 2022), a key contribution of the present study is its focus on *intra-* rather than *inter-neighbourhood* equity: rather than examining inequities between neighbourhoods, I focus on spatial inequities between different streets in the same neighbourhood.

Through semi-structured interviews with key stakeholders, I address the following key questions:

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- What do key stakeholders perceive as the main implications of Barcelona's new green axes for spatial equity between different streets in the same neighbourhood?
- Which trade-offs exist between intra-neighbourhood equity and the political and social viability of street transformation schemes?
- What policy measures has the municipality implemented to minimise potential inequities arising from the implementation of the new green axes?

Critically, the goal of my article is to understand how municipal planners (and other key stakeholders) have reflected on the spatial equity impacts of the new green axes and taken them into account when planning and implementing pedestrianisation measures, rather than to empirically assess these impacts. At a theoretical level, this exercise offers a valuable means of exploring the key challenges that pedestrianisation schemes present for intra-neighbourhood spatial equity, providing the basis for follow-up empirical research which explores how equity impacts are felt by residents and street users. At a more practical level, this focus on the perspective of urban designers and planners may hold useful practical lessons for policy-makers in other cities who are seeking to implement comparable street transformations.

It is also important to note that I focus on the spatial equity of the new green axes from a *place*-based perspective rather than a *movement*-based perspective (Carmona et al. 2018): in other words, I discuss the equity impacts of pedestrianisation for street residents and local businesses, rather than for people travelling through them. While the new green axes can be understood as a mobility-oriented traffic calming strategy just as much as a public space one, the present article does not explore their equity impacts for urban mobility itself.

Finally, I restrict myself to considering *distributional* equity of outcomes between streets, rather than procedural equity related to planning processes and citizen participation. As I see it, a proper discussion of procedural equity would require a much more in-depth examination and warrant a separate article (see Zografos et al. (2020) on this topic). My choice to focus on distributional equity also draws upon Fainstein's (2010) argument that the turn towards communicative planning has led to an excessive focus on process rather than outcomes, and ignores the fact that at least in some cases, "paternalism and bureaucratic modes of decision making may produce desirable outcomes" in terms of urban equity (p. 32).

Throughout the article, I use both the terms *street transformation* and *pedestrianisation*, understanding the latter as a specific type of the former. While Barcelona's new green axes are strictly speaking semi-pedestrianised since they do not completely prohibit motor vehicles (similar to "living street" or "woonerf" strategies), they clearly prioritise pedestrians over other transport modes: for reasons of succinctness, I simply refer to them as *pedestrianised* throughout the article. In other passages, however, I talk about pedestrianisation schemes within the context of a wider range of *street transformation* strategies which entail expanding public space at the cost of motorised traffic. These include measures which are related but not equatable to pedestrianisation, such as traffic reduction and calming measures (Lockwood 1997), shared space schemes, and "street experiments" involving tactical redesign or temporary elements (Bertolini 2020; VanHoose et al 2022).

In the remainder of the Introduction, I review existing research on street transformations and spatial equity, linking it to wider debates on urban and transport justice. In the following section, I provide an overview of Barcelona's superblock strategy and its evolution through time. The rest of the article is conventionally divided into Methods, Findings, and Discussion and Conclusions.

### 1.1. Street transformations and spatial equity

Building upon ideas of spatial and environmental urban justice (Smith 1984; Fainstein 2010), planning and transport researchers have long been concerned about the existence of spatial inequities regarding

the distribution of benefits and costs of transport infrastructure (Hay and Trinder 1991; Graham and Marvin 2001; Feitelson 2002). While most empirical research in this area has traditionally focused on issues such as transportation accessibility and large-scale infrastructure investments, more recent studies have also turned their attention to the spatial equity of street transformation measures designed to expand public space and active travel facilities at the cost of motorised vehicles, such as cycling infrastructure (Lubitow and Miller 2013; Stehlin 2015), traffic calming schemes (Rodgers et al. 2010; Thomas, Furlong, and Aldred 2022), and low traffic neighbourhoods (Aldred et al. 2021).

Such studies can be inscribed within a growing wave of academic interest in how the distribution of space between different uses intersects with spatial equity issues at the street level (Nello-Deakin, 2019; Creutzig et al. 2020; Attard et al. 2023). As research in this area has highlighted, the design of existing streets tends to unduly privilege motorised traffic over other transport modes such as pedestrians and cyclists. More broadly, dominant design and engineering practices tend to prioritise the "movement" over the "place" function of streets, thereby prioritising mobility at the cost of public space (Carmona et al. 2018; Mehta, 2014).

Existing research, however, has mostly assessed the spatial equity of street transformations either at a city-wide level or at a street level, rather than at the intermediate level of the neighbourhood. At a city-wide level, empirical studies have primarily explored potential spatial inequities in the provision of traffic calming features and street closure schemes between affluent and deprived neighbourhoods (Kravetz and Nolan 2012; Thomas et al. 2022; Aldred et al. 2021; Fischer and Winters 2021). At the level of the street, meanwhile, the equity of street transformations has been discussed through the lens of just streets or "complete streets" (Hartman and Prytherch 2015; Prytherch 2018). As defined by Prytherch (2018, p. 43), a "just street" is one which "fairly distributes the rights and responsibilities of mobility in the public sphere, maximizing access for all while reducing inequity between people and the modes they choose to travel, produced through transparent and democratic decision-making [...]".

In between the city and the street level, there is a dearth of research considering the spatial equity implications of street transformation schemes *between different streets in the same neighbourhood*, i.e. from an intra-neighbourhood perspective. Although some studies have examined the implications of traffic calming schemes for their immediately surrounding area, they mainly limit their attention to quantitatively assessing traffic impacts (Drabicki, Szarata, and Kucharski 2020; Melia and Calvert 2021; Nello-Deakin 2022). The present study contributes to this area of research by adopting a more holistic perspective which includes traffic impacts, but also issues like public space usage, social interaction, and gentrification (Litman 1999; Crouse 2004). Despite being more than 40 years old, Appleyard's *Liveable Streets* (1981) arguably continues to provide the most comprehensive treatment of the topic. As argued by Appleyard, equity is a key evaluation dimension of traffic calming schemes: "Who gains and who loses, and by how much from a change in traffic patterns"? (1981, p. 155). Appleyard subscribes to a utilitarian perspective in which traffic calming schemes are justified if they improve conditions for most neighbourhood residents, even if a small number of residents end up losing as a result. Adversely affected residents, he suggests, may be compensated financially by the local government, either financially or otherwise (e.g. free double-glazed windows). To this utilitarian perspective, he juxtaposes the ethical principle that traffic calming schemes are only acceptable if no one loses, but considers it excessively idealistic.

Given the multidimensional impacts of street transformations, it is difficult to assess them based on a single equity principle or philosophical theory of justice (Martens 2016; Gössling 2016; Pereira, Schwanen, and Banister 2017; Verlinghieri and Schwanen 2020; Lewis, MacKenzie, and Kaminsky 2021). While a utilitarian perspective may be excessively crude, more elaborate theories such as Rawls' egalitarianism are difficult to apply to a complex issue such as street transformations

(rather than a primary good such as money). As argued by [Creutzig et al. \(2020\)](#), it is difficult to apply even simplified ethical principles for ensuring a fair allocation of street space: “given practical concerns it is desirable to combine them together in pragmatic manner” (p. 729). In the present study, I am not so much concerned with ideal definitions of equity, but with the more modest goal of avoiding the creation of new inequities, or an increase in existing ones. This conception of equity is most closely with sufficientarian and prioritarian principles ([Lewis, MacKenzie, and Kaminsky 2021](#)), as well as with the “maximax” principle put forward by [Martens, Golub, and Robinson \(2012\)](#): applied to street transformations, this would mean seeking to minimising traffic levels on individual streets, while simultaneously observing a maximum allowable difference in traffic levels between streets.

## 2. Case study: The “Barcelona Superblock” strategy

Over the past decade, the superblock concept has gained traction as a key strategy to expand public space in the city of Barcelona. Perhaps because of the appeal of its conceptual simplicity, the idea of superblocks has gained widespread international attention in urbanist circles. The original superblock model proposes a  $3 \times 3$  grouping of the regular city blocks of Barcelona’s *Eixample* district ([Rueda 2019](#)); streets within the resulting “superblock” are semi-pedestrianised, while the outer boundaries of the superblock function as main streets for traffic ([Fig. 1](#)).

Despite the novelty of its application to the *Eixample* district, the concept evolved out of previous traffic calming schemes in the neighbourhoods of la Ribera and Gràcia during the 1990s and early 2000s. The first “official” superblock was implemented as an experimental scheme in the relatively quiet neighbourhood of Poblenou in 2016. This scheme sparked local controversy on account of its perceived top-down nature, but was finally kept in place after some design modifications. This was followed by the implementation of a second superblock in the more central neighbourhood of Sant Antoni during 2017-20, characterised by greater neighbourhood participation and a flexibilisation of the original model, resulting in a more irregularly sized area ([Fig. 2](#)).

### SUPERBLOCK MODEL

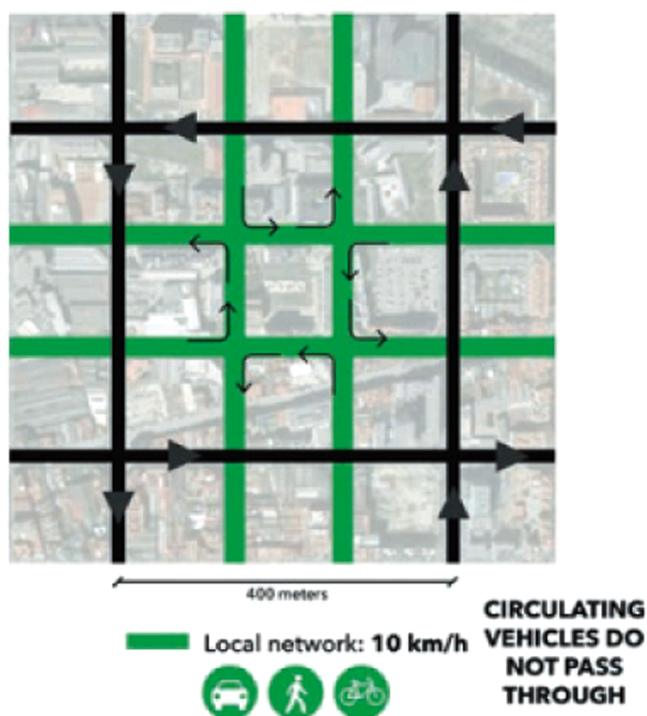


Fig. 1. Original superblock model (source: [Rueda, 2019](#)).

This departure from the original superblock model increased further in the subsequent interventions during 2020-2023, which entailed the creation of a series of four semi-pedestrianised “green axes” along the length of selected streets ([Figs. 2 and 3](#)). Making use of the opportunity provided by the COVID-19 pandemic, traffic capacity on these streets was first reduced using tactical measures in 2020 (see [Nello-Deakin, 2022](#)), leading to their subsequent definitive redesign and semi-pedestrianisation (September 2022 to June 2023). These transformations were accompanied by the development of a long-term vision for the whole Eixample district based on additional “green axes” ([Fig. 4](#)). This vision was labelled as “Superblock Barcelona”, effectively entailing a change of scale from a neighbourhood to a city-wide strategy. To a large extent, the move from the original superblocks towards the green axes strategy can be understood as a pragmatic response to the difficulties of implementing the original superblocks vision within the context of the dense and highly consolidated urban fabric of the Eixample district. As explained by [Magrinyà et al. \(2023\)](#), implementing the original superblocks strategy in the Eixample district would have required substantial changes to the basic traffic network and street directions, which would have likely caused significant disruption and social resistance, as well as jeopardised the spatial coverage of the existing bus network.

Paralleling its deployment on the ground, Barcelona’s superblocks have attracted increasing academic research, focusing on its theoretical premises ([Rueda 2019](#)), public health impacts ([Mehdipanah et al. 2019](#); [Mueller et al. 2020](#)), climate justice dimensions ([Amorim-Maia et al. 2023](#)), local politics ([Zografos et al. 2020](#)), effects on motorised traffic ([Nello-Deakin 2022](#)), and implementation process ([Scudellari, Staricco, and Vitale Brovarone 2020](#); [Staricco and Vitale Brovarone 2022](#)). Nonetheless, most of this research focuses on the first superblock in Poblenou, rather than the more recent “green axes”. Writing about the Poblenou superblock, [Staricco and Vitale Brovarone \(2022\)](#) anticipate some of the key questions regarding spatial equity animating the present paper, pointing out that “it turned difficult for residents to understand why one street could be full of trees and birds and without cars, while the next one is identical but must support all car traffic” (p. 5). These authors tentatively suggest that the new green axes might result in similar feelings of discrimination among residents living in streets parallel to the new green axes, but do not explore this question empirically. The equity implications of Barcelona’s superblocks plan have lately also been explicitly discussed in a commentary by [Anguelovski, Honey-Rosés, and Marquet \(2023\)](#), who argue that it has largely overlooked critical issues related to distributional, relational, and procedural equity. Their article, however, is intended to raise questions rather than answer them: as they point out, most questions regarding the equity impacts of superblocks are complex and require further research. The present article aims to provide a step towards answering some of them.

## 3. Methods

My research is informed by 11 semi-structured interviews with key stakeholders, supplemented by a focus group with municipal planners. Interviewees included key figures from local government and related organisations responsible for the design of the superblock strategy, and representatives from residential and commercial neighbourhood associations in the Eixample district, who had been involved in public participation processes. Interviewees from local government included both politically appointed and technical staff with varying degrees of authority, including senior positions which had played a critical role in the overall design of the superblocks strategy. [Table 1](#) provides a summary of interviewee profiles. A common interview guide was used to provide a basic list of themes, but was adapted to allow each interview to proceed in a conversational manner. Interviews lasted between 30 minutes and over 1 hour, generally taking around 50 minutes.

The focus group included 7 participants from the municipal planning team working on the superblocks strategy, and lasted 90 minutes. Since



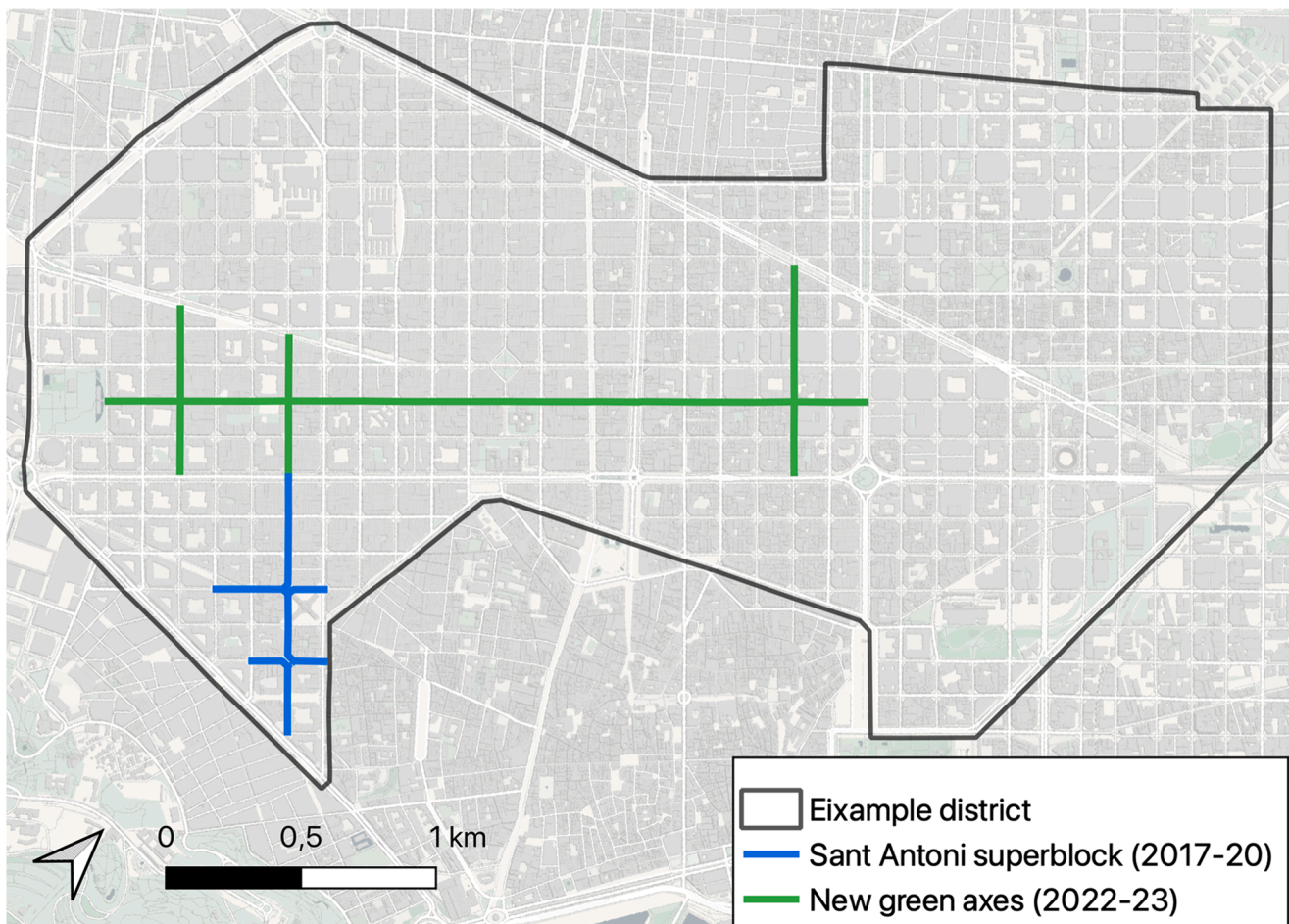


Fig. 2. Sant Antoni superblock and new green axes (source: author).



Fig. 3. Consell de Cent Street before and after its conversion to a green axis (source: Google Street View/author).

all participants were used to working together as a team, I judged that conducting a focus group instead of individual interviews would provide a welcome counterpart to the remaining interviews, allowing for more spontaneous exchanges which might not have surfaced in an interview context.

To structure the analysis, I thematically coded interview and focus group transcripts using QACDAS. I developed and gradually refined most codes inductively from the interviews themselves, even though the interview guide and research questions provided some initial categories. The objective behind the coding process was not to provide a defined code list or quantifiable information, but simply to facilitate the development of a coherent structure to present interview findings. To

illustrate the findings, I include selected quotations (translated from Catalan). For each quotation, I specify the type of respondent in parentheses (N=neighbourhood association, B = business association, M = Municipality of Barcelona, including related agencies and transport consultancies, F= Focus group), together with the interviewee number for individual interviews.

#### 4. Findings

Reflecting the research questions presented in the Introduction, I have structured my findings into three subsections: 1) Spatial equity implications of new green axes; 2) Trade-offs between equity and



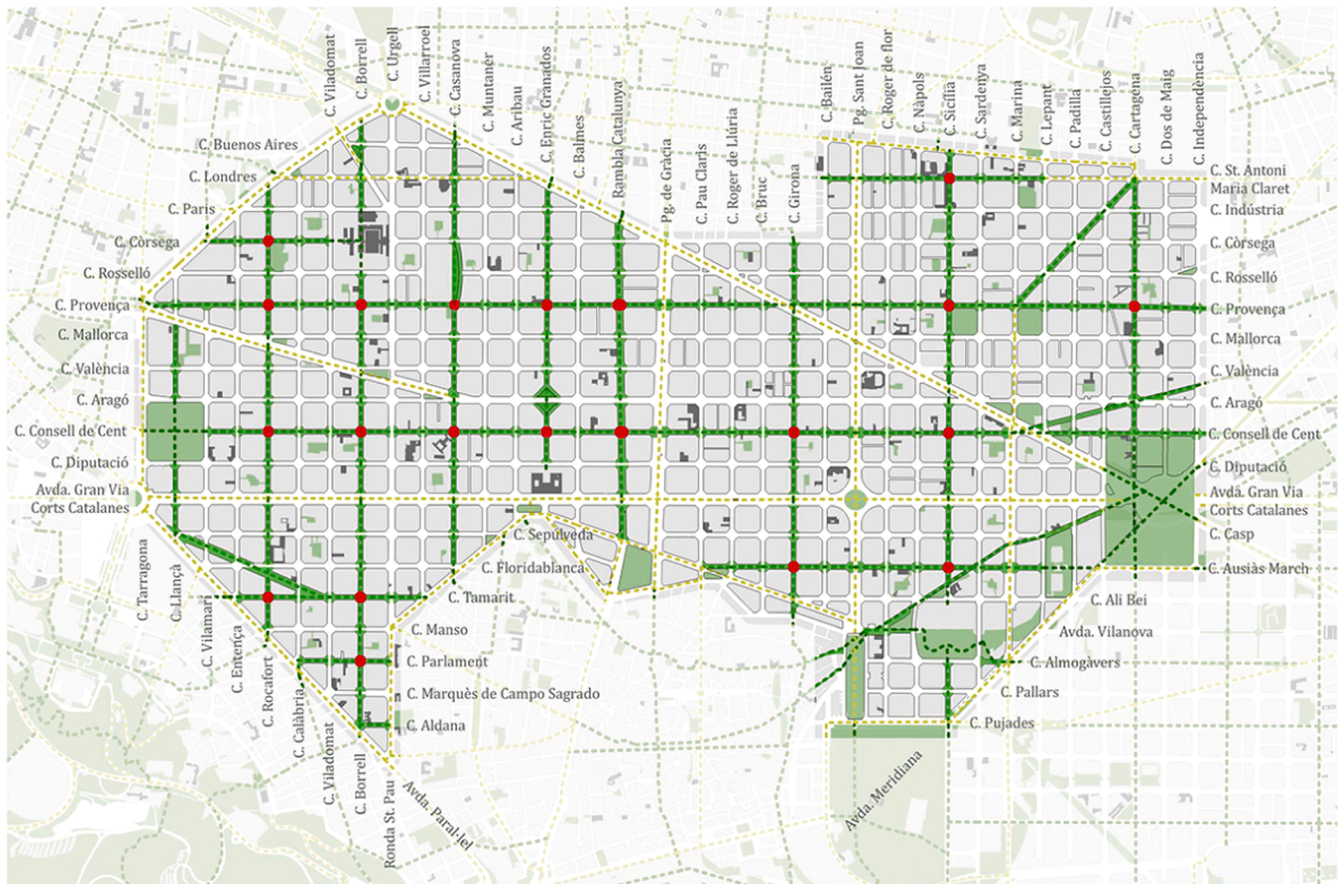


Fig. 4. Long-term green axes strategy (source: Municipality of Barcelona).

Table 1

List of interviewees.

Interviewee no.	Organisation	Role
1	Neighbourhood association (Sant Antoni neighbourhood)	President
2	Local business association (Sant Antoni neighbourhood)	President
3	Neighbourhood association (Dreta Eixample neighbourhood)	President
4	Municipality of Barcelona	Former mobility councillor of Eixample district
5	Transport consultancy	Technical support to Municipality of Barcelona
6	Transport consultancy	Technical support to Municipality of Barcelona
7	Municipality of Barcelona	Former director of Urban Strategy
8	Local business association (Dreta Eixample neighbourhood)	President
9	Neighbourhood association (Esquerra Eixample neighbourhood)	Spokesman (urbanism)
10	Municipality of Barcelona	Former director of Urban Ecology Agency
11	Municipality of Barcelona	Chief Architect of the Barcelona City Council

viability of implementation; and 3) Policy measures. Based on the results of the coding process, I present the findings for each subsection in the form of initial key statements or theses (highlighted in *cursive*), which I then explain in detail.

#### 4.1. Spatial equity implications of new green axes

1) *Pedestrianising some streets may lead to the perception that other streets are worse than before.* Most interviewees believed that the new green axes might lead to short-term traffic displacement to adjacent streets, but argued that traffic evaporation would eventually cause traffic levels to return to their original values (an assertion which preliminary evidence (Nello-Deakin 2022) appears to support). Interviewees generally found it difficult to place a value on what they considered an “acceptable” level of traffic displacement, but argued that pedestrianisation measures were acceptable as long as traffic levels on adjacent streets would not increase in the long run.

However, various interviewees pointed out that even if traffic on adjacent streets remained unchanged, the reduction of traffic on the new green axes would create a stark contrast between pedestrianised and non-pedestrianised streets, leading to a heightened perception of relative differences between them. This might lead people to perceive non-pedestrianised streets as worse than before the implementation of the new green axes:

*It's like if you redecorate your living room at home, the rest has to be decent too, because if not it will look grotty... You have to repaint, check the furniture... It has to look visually and spatially tidy, so that what you have not redesigned does not appear too contrasting and forlorn (F).*

2) *The green axes strategy avoids the edge effect created by the original superblocks model.* Most interviewees argued that although the green axes strategy was less ambitious than the original 3 × 3 superblocks model, it proved easier to implement within the context of the Eixample district, where the implementation of the original superblocks would have required impracticable changes to bus routes and street directions. The weaker conceptual clarity of the green axes strategy was

seen as a disadvantage by some but an advantage by others, allowing for a more flexible and piecemeal implementation. A couple of interviewees also noted that in contrast to delimited historical centres, the regular street grid of the Eixample district made it difficult to single out a specific area for pedestrianisation:

*...the axes become self-evident when you understand that the Eixample is not a historic centre, like the neighbourhoods of Gràcia o Sant Andreu, but a network which connects old historic centres... When you come to terms with this, you understand that you can at most create hierarchies [between streets]. (3, N)*

While accepting that the new green axes created new hierarchies between streets, various interviewees argued that these differences were less problematic than in the original superblock model implemented in the Poblenou neighbourhood. In Poblenou, the clear distinction between streets within the superblock and the boundary streets surrounding the superblock had led to strong perceived inequities between residents of different streets:

*..., the idea of the precinct was tremendously negative, and the big neighbourhood conflict emerged at the perimeter [of the superblock]. The residents of the [perimeter] street created an anti-superblocks platform, it was brutal, precisely because this discourse of the precinct generated the idea that there were winners and losers. (7, M)*

In contrast to the perceived edge effect created by the original superblock, various interviewees argued that the green axis concept shifted the narrative away from the idea of a pedestrian precinct, towards the idea of pedestrian connectivity between neighbourhoods. In other words, they argued that the linear and two-dimensional character of the green axes emphasised their role as a pedestrian *corridor* rather than a barrier – as opposed to the original superblocks, which were perceived as pedestrian islands creating a stark divide between those living inside and outside them. While not entirely free from this edge effect, the fact that there is no “inside” the new green axes (beyond the street itself) means that this effect might be less strong – or at least be perceived as so – than in the original superblocks model.

**3) Pedestrianised streets risk becoming a victim of their success.** While the public space and environmental quality gains for newly pedestrianised streets are self-evident, interviewees pointed out that they are not without pernicious consequences. These can be broken down into two main concerns: the risk of residential and commercial gentrification, and the potential of excessive street life. The prospect that the new green axes may lead to an increase in real estate prices has been subject to extensive public debate in Barcelona, with anecdotal preliminary evidence suggesting that street transformations may indeed raise property values on pedestrianised streets (Blanchar 2023; Cols 2023). Most interviewees shared this concern, but pointed out that spiralling property prices are a district- and city-wide problem, suggesting that traffic calming measures at most add a small extra effect on top of broader trends. As many interviewees argued, the fundamental problem is the current lack of regulation of the property market in Spain, particularly regarding the rental sector, where the municipality lacks the ability to impose any type of rent control mechanism<sup>1</sup>. However, all interviewees agreed that the prospect of gentrification should not constitute an excuse for not pedestrianising streets: “The fundamental cause of gentrification is not the green axes, but the lack of a housing policy” (3, N).

Given the lack of public space in the Eixample district, interviewees noted that there is a risk that gains from reductions in traffic externalities on the new green axes would end up being outweighed by the tumult created by public space use and outdoor recreation, a tendency which is visible in some streets in the Sant Antoni superblock:

*What the pedestrianised axes have is the noise of human life. It's not idyllic. They don't have noise and pollution, but if they are successful, they will have many people playing, shouting... in such a dense city, all streets are noisy (9, N).*

**4) For residents, increasing inequity between streets is offset by public space gains for the whole neighbourhood.** Most interviewees considered that the gains from the new green axes would not be restricted to residents living on them, but extend to the neighbourhood as a whole. In this respect, they judged that the benefits of gaining a new public space would outweigh the potential resentment of residents living in “loser” streets, which bear the brunt of motorised traffic externalities:

*We have obtained new spaces which we didn't have and which are very close to everyone. I don't think that it's only a gain for the people who live on this street. It's a gain which extends... Within 150 metres, I have one of these streets. (F)*

*You don't live strictly by your window or balcony, many people will value and prefer having a good street and a new square nearby even if it is not their own street. I think that most people, in terms of their daily lives, will undoubtedly be better off. (5, M)*

In the context of a district starved for open public space, some interviewees also argued that the pedestrianised quality of the new green axes was more important than their quantity or even distribution within the neighbourhood. From this perspective, pedestrianising a reduced number of streets was seen as preferable to implementing more diffuse traffic calming measures (e.g. lane reduction) over a larger number of streets.

**5) New inequities between streets are more problematic for local businesses than for residents.** In contrast to residents, for street-level businesses it is much more important whether pedestrianisation measures are implemented precisely on their own street or not. As put by an interviewee, “Location has a very strong impact on commercial rental prices. A location which costs €4000 might cost five times less on the perpendicular street 20 metres away... Residential prices are not so strictly linked to being on a specific street” (5, F). For this reason, interviewees considered that the prospect of commercial gentrification was more concerning than that of residential gentrification. Furthermore, commercial gentrification might be amplified by the indirect effect of residential displacement and touristification (which might also intensify because of pedestrianisation):

*The [population] census here has decreased during many years. There are many people, but not censused... These people are in the neighbourhood but are not residents. And their consumer behaviour is very different: a resident does the shopping, the other goes to the restaurant. (8, B)*

Compared to residents, interviewees noted that the impacts of street calming also vary more between different types of businesses. While for most businesses increased footfall might be expected to have a beneficial impact, specific types of businesses which are more reliant on car access (e.g. auto dealership and repairs, hardware stores) might be adversely affected by pedestrianisation, potentially impelling them to move away from their existing premises.

#### 4.2. Trade-offs between spatial equity and viability of implementation

Based on the coding process, I identified three main trade-offs between intra-neighbourhood equity and the political and social viability of street transformation. These trade-offs are closely interrelated, and point to a more overarching point: more ambitious street transformation measures which simultaneously affect as wide an area as possible are likely to be more equitable, but more difficult to implement.

*Trade-off 1: Transforming busy vs. quiet streets*

**Transforming relatively quiet streets is easier, even though transforming busier streets would be more equitable.** Most interviewees

<sup>1</sup> The recently approved (May 2023) national housing law has changed this, but at the time of writing its application and effects remain largely speculative.



considered that it made more sense to focus on pedestrianising streets with low traffic levels, rather than attempting to reduce traffic levels on busy streets. This amounts to strengthening existing street hierarchies: “when you introduce new [street] hierarchies, in a way what you are doing is emphasising more certain hierarchies which already existed” (3, N). As another interviewee argued, there exists a basic trade-off between equity and efficiency: a more hierarchical street network means that traffic externalities are less evenly distributed between streets, but allows both to maximise traffic efficiency and free up more space for pedestrians. Likewise, a focus group participant noted that redesigning streets for pedestrian priority is only possible along secondary streets, since public transport corridors would make this impossible on main traffic arteries. Finally, most interviewees noted that transforming relatively quiet streets was a more politically viable strategy:

*As a sociopolitical strategy it had to be done like this, because if transforming the easy streets has created such an uproar, if you had done it in places like Aragó Street [a heavily trafficked street], it would all have exploded. I think that one has to start with the easy streets, because the difficult thing is showing that this is attractive. (9, N)*

At the same time, some interviewees pointed that pedestrianising quiet streets sometimes necessarily entailed complementary interventions on busy streets. Without the creation of a new bike lane on a busy parallel street, for example, it would have been impossible to transform Consell de Cent Street into a pedestrianised green axis, since this entailed the suppression of its dedicated bike lane. As many interviewees argued, there ultimately needs to be a short- and long-term strategy for all types of streets in the intervention area. This principle was seen essential both from a mobility perspective, and to minimise perceived grievances or inequities between streets: “There is a project for local, secondary and primary streets. This is why it’s important to talk of a joint transformation, and not to interpret that primary streets lose out” (6, M).

#### *Trade-off 2: Wide vs. narrow geographical coverage*

**Transforming more streets at the same time would be more equitable but more difficult.** In order to reduce the pressures faced by the new green axes, various interviewees argued that it would have been preferable to transform more streets at the same time:

*If you create a green axis which is the only one in the city, it will probably face a series of pressures, not only in terms of housing prices, but also noise at night. If you spread it out, you dilute these pressures. (6, M)*

*If you build an single axis, it will become a commercial axis which is likely to attract the likes of Zara and H&M, but if you have twenty-one of them... (F)*

Likewise, multiple interviewees argued that in order to achieve a significant reduction of motorised traffic at a neighbourhood rather than a street level, it was essential to increase the number of traffic-calmed streets:

*This is why it’s so important to widen the scope. If we stop with these four streets, we won’t have achieved absolutely anything, other than an elongated square on Consell de Cent Street. There will be no real influence on the system. (F)*

Against this perspective, other interviewees argued that accelerating the pace of street transformation would not give the city enough time to assimilate these changes, both in terms of traffic impacts and social acceptability:

*I think it would have been a mistake to think that going faster would have been better for the transformation process. We could have ended up with a counterproductive situation, generating a collapse which might lead to a counterreaction. (11, M)*

*... we face a lot of pressure from both sides, from those who say that we do nothing and from those who say we are destroying the city. Finding this balance and giving people enough time to digest these changes is very important for me. It’s not only a technical issue, it’s also about allowing the population to process it, to mentally consolidate it, which is normal. You’re transforming their city. (F)*

#### **Trade-off 3: Tactical vs. permanent redesign**

**Tactical interventions would be more equitable, but less publicly acceptable than permanent street redesigns.** As various interviewees noted, the expediency and low cost of tactical interventions make it possible to rapidly implement traffic calming measures on many streets, thereby contributing to a more equitable distribution of impacts between streets. By contrast, the cost of permanently redesigning street sections requires the municipality to concentrate its efforts on a small number of streets. As put by a focus group participant, “Our commitment to maximum quality means reduced [geographic] coverage, and I think this coverage is essential in order to effect change”. Another interviewee reflected that tactical measures were the only realistic way of scaling up superblock proposals given municipal budget constraints: “You will spend 65 million euros to create three streets and two squares, whereas with 300 million I could create 500 superblocks” (10, M).

However, other interviewees argued that relying on tactical urbanism would have not been politically feasible. This low public acceptability can be traced back to the media backlash faced by tactical interventions during the COVID-19 pandemic (ANONYMOUS), and to the existence of a Barcelona-specific culture of high urban design standards: “This is a very vain city. A city which demands a quality in design, because we are used to a very high quality” (11, M). Furthermore, some interviewees pointed out that the reversible nature of tactical measures risks perpetuating discussions on whether such measures should be kept, opening the door to their removal if less progressive political parties come to power. Finally, some interviewees argued that permanent redesigns were preferable – even if it at the cost of reduced geographic coverage – because they created more attractive public spaces, thereby acting as seductive examples which might convince more people of the desirability of street transformation. Echoing this point, some interviewees argued that traffic calming measures (e.g. lane reduction, changes of street direction) need to be accompanied by tangible public space gains to be socially acceptable: “A key lesson from the Poblenou superblock is that you can’t – or it isn’t advisable – to transform mobility without citizens perceiving a gain in public space, because otherwise they just see it as a nuisance” (5, M).

#### 4.3. Policy measures

**1) Effectively addressing the risk of gentrification requires the collaboration of supramunicipal administrations.** As previously mentioned, the ability of the municipality to implement effective measures to combat residential and commercial gentrification is severely constrained by its limited legal competences on real estate and housing. Most interviewees argued that there was little the municipality could do beyond exerting political pressure for legislative changes at a national level. While the approval of a national housing law in May 2023 has finally provided a mechanism to limit rental increases in “stressed” municipalities like Barcelona, it excludes critical aspects such as short-term and touristic lets, and its effectiveness remains to be seen. Various interviewees noted that although the municipality can – and has – pursued other measures such as buying up specific buildings and pursuing municipal housing projects, the opportunities to do so in the Eixample district are minimal. Such measures might be important at a symbolic level to show that the municipality is doing its best to combat gentrification, but in practice do little to tackle the structural forces driving increases in real estate prices.

**2) The “uses plan” provides a significant but insufficient measure to prevent the substitution of local businesses.** As previously discussed,

pedestrianisation is likely to affect local businesses more strongly than residents. Although the municipality cannot control commercial rental prices, in February 2023 it approved a new regulation (the “Eixample Uses Plan”) which limits the types of new businesses which can be opened on newly pedestrianised streets. The main goal of this regulation is to avoid the excessive proliferation of cafes and restaurants, which has been an unwanted outcome of previous pedestrianisation schemes. Most interviewees saw this an important measure, but considered it insufficient. Some noted that limiting this regulation to the new green axes might displace new cafes and tourist-oriented businesses to adjacent streets, and considered it would have been better to implement a neighbourhood-wide regulation (as had been previously done in the Sant Antoni neighbourhood). Likewise, focus group participants also argued that the municipality ought to do more to compensate small businesses for the potential loss of customers during the period of roadworks:

*...some businesses cannot survive the roadworks. And there is no type of help. The only possible deduction is for those that turn over more than a million euros. Small businesses have no kind of help during the roadworks, which is terrible. (F)*

### 3) The municipality lacks effective land value capture mechanisms.

While the new green axes are funded by the municipality, the likely increases in residential and commercial real estate value benefit existing property owners. Various interviewees pointed out that the municipality lacks an effective mechanism to capture these increases in real estate value for the public purse. Beyond contributing to cover the cost of street redesign, land value capture mechanisms could provide the municipality with funds to compensate adversely affected residents and businesses, thereby contributing to minimise inequities arising from pedestrianisation. Although Spanish municipalities can theoretically request “special contributions” (i.e. impact fees) from property owners who will benefit from improvements to public infrastructure, Barcelona has long renounced to this mechanism. As a couple of interviewees pointed out, “special contributions” frequently face legal and social contestation, and are used to finance new urban developments that can unambiguously be considered an improvement for property owners. Given the heavily disputed status of the new green axes, requesting special contributions would have scarcely been a viable option. Beyond special contributions, there exists a municipal tax levied on increases in land value whenever properties are resold, but multiple exceptions and discounts undermine its potential.

## 5. Discussion and conclusions

As evidenced by my interview findings, the implications of the new pedestrianised green axes for spatial equity between streets are complex and multifaceted. Even if the green axes do not cause an increase in traffic externalities on surrounding streets, it is undeniable that they do increase relative inequities regarding the overall attractiveness of different streets in the same neighbourhood. In this respect, the charge that pedestrianisation may create “winner” and “loser” streets seems partially warranted.

However, this is mitigated by two other important points. Firstly, the gains experimented by pedestrianised streets are somewhat ambiguous, since they risk engendering new negative impacts precisely as the result of their increased attractiveness (e.g. property price increases, noisy recreational and tourist activities). In extreme cases, it is plausible to envisage that these new negative impacts may end up exceeding those of car traffic; whether justified or not, these concerns may in turn lead to significant reticence or opposition to pedestrianisation among local residents. Secondly, many of the public space gains of pedestrianisation are not confined to residents of pedestrianised streets, but extend to residents of the whole neighbourhood, who benefit from access to new recreational spaces which act as a sort of “public square” for the neighbourhood.

Despite its intuitive appeal, this suggests that while focusing on the impacts of pedestrianisation for spatial equity *between streets* constitutes a relevant geographic scale in some aspects (e.g. traffic displacement, impact on shop patronage), in other aspects (e.g. access to green and public space) it may be more appropriate to assess spatial equity impacts at a neighbourhood-wide scale. This highlights the need to assess the spatial equity of street transformations through a multi-scalar lens, which considers both intra- and inter-neighbourhood inequities (e.g. Aldred et al. 2021). Likewise, it is important to bear in mind that focusing exclusively on *spatial* equity between streets risks obscuring more meaningful social equity impacts between different population groups on the same street (e.g. homeowners vs. renters, grocery stores vs. cafes).

Echoing the conclusions of Creutzig et al. (2020), this complexity means that it is difficult to evaluate the spatial equity impacts of pedestrianisation based on a single equity principle or theory of justice. While this might lead us to argue for a more intuitionist approach, I concur with Pereira, Schwanen, and Banister (2017) that this is ultimately unhelpful, since it does not provide any clear guidelines for public policy. As far as public policy is concerned, I suggest that a sufficientarian approach based on minimum and maximum street-level thresholds for various “goods” and “bads” (e.g. traffic noise, pedestrian space) is likely to provide the most readily applicable way to assess the spatial equity impacts of street transformation schemes. Admittedly, this raises the question of who should set these thresholds (and at what level). While they would have to be adapted to the local context of different cities or neighbourhoods, I suggest that widely recognised public health guidelines (e.g. WHO air quality and environmental noise guidelines, EU air quality standards) might provide a useful starting point for municipal authorities to set their own thresholds.

Secondly, my findings point out to the existence of interrelated trade-offs between inter-street equity and the political and social viability of street transformations. These are essentially related to the pace and geographic scope of implementation: rather than permanently pedestrianise a reduced number of streets at a high expense (as in the case of Barcelona’s new green axes), from a spatial equity perspective it would arguably be preferable to implement more diffuse traffic calming measures using lower cost tactical measures on a wide number of streets. To minimise potential spatial inequities, this suggests that municipalities should strive to reduce traffic levels simultaneously on as many streets as possible (while also bearing in mind the need to retain a certain level of street hierarchy to enable efficient traffic circulation). However, this is likely easier said than done. Indeed, this need for expedience needs to be balanced with the city’s capacity of digesting changes: if the pace of transformation is too fast, street transformation schemes risk creating a wave of backlash which might ultimately be counterproductive, leading to increased polarisation of opinion (Powell, 2023; Nello-Deakin 2023) and blocking future transformation proposals.

In Barcelona, the shift from the original superblocks model to the more pragmatic green axes strategy exemplifies some of these trade-offs. While the original superblock model is arguably more egalitarian (with the important exception of perimeter streets), it ultimately proved too difficult to implement in the Eixample district, evolving to the more circumscribed green axes strategy. While the linear character of the green axes may reduce the risk of creating “ghettos” of privilege by spreading the benefits of pedestrianisation through a wider area in comparison to the original superblocks (Anguelovski et al. 2023), this linearity also limits the potential for a transformative area-wide reduction in traffic levels.

Thirdly, my findings suggest that the most concerning equity impacts of pedestrianisation – at least in the context of Barcelona – relate to increasing property values and gentrification rather than motorised traffic. While discussions of traffic impacts often figure prominently in the public debate, I argue that these constitute a distraction from the more intractable problem of gentrification. As abundant empirical



evidence suggests, the negative traffic impacts of street transformation schemes are frequently overblown and tend to disappear over time (e.g. Cairns et al. 2002; Chung, Yeon Hwang, and Kyung Bae 2012). Moreover, municipalities can effectively reduce traffic levels using a range of tested “push-and-pull” measures (e.g. parking restrictions, congestion charging) (Buehler et al. 2017). The same cannot be said for gentrification: in contrast to traffic issues, municipalities often lack legal instruments to combat increases in real estate prices, whose impacts might be longstanding and difficult to revert. On this point, I suggest there is a greater need to examine street transformation strategies through the lens of green gentrification (Anguelovski et al. 2022). While recent years have witnessed the emergence of multiple studies exploring the connection between new cycling infrastructure and gentrification (e.g. Stehlin 2015; Flanagan, Lachapelle, and El-Geneidy 2016), the connection between pedestrianisation schemes and gentrification still appears to be underexplored (for a notable exception, see Özdemir and Selçuk 2017).

Finally, my findings show that only relatively modest policy measures have been implemented to address potential spatial inequities arising from the implementation of new green axes. This is largely attributable to the uneven competences of Barcelona’s local government: while it has almost full control over traffic management and public space, its autonomy in domains such as housing and taxation is much more limited. On this point, my findings suggest that land value capture mechanisms might offer a promising, but uncertain means of contributing to redress potential spatial inequities arising from street transformation schemes. While land value capture schemes are common in the case of public transport investments (Medda 2012; Mathur 2019), their potential application to pedestrianisation schemes remains largely unexplored.

In conclusion, the case of Barcelona’s new green axes illustrates that the implications of pedestrianisation for intra-neighbourhood spatial equity between streets are complex and multidimensional. In my findings, I identify five main perceived spatial equity implications of the new green axes among key stakeholders: 1) Pedestrianising some streets may lead to the perception that other streets are worse than before; 2) The green axes strategy avoids the edge effect created by the original superblocks model; 3) Pedestrianised streets risk becoming a victim of their success; 4) For residents, increasing inequity between streets is offset by public space gains for the whole neighbourhood; and 5) New inequities between streets are more problematic for local businesses than for residents. In response to my second research question, I identify three key interrelated trade-offs between spatial equity and the political and social viability of street transformation schemes: 1) Transforming busy vs. quiet streets; 2) Wide vs. narrow geographical coverage; and 3) Tactical vs. permanent redesign. Finally, my findings suggest that although municipal planners are generally keenly aware that pedestrianising selected streets may locally exacerbate inequities between streets – in particular concerning real estate values and gentrification processes – they largely lack adequate policy instruments to effectively minimise or reduce these inequities.

To close, I would like to outline some limitations and directions for further research. As pointed out earlier, this article does not focus on procedural equity, but this is a critical dimension which requires further investigation if we are to obtain a complete picture of spatial equity issues surrounding street transformation. Similarly, and despite the implications of the green axes for implications for urban mobility and active travel in particular, this article does examine their spatial equity implications from the perspective of local mobility and accessibility. Future research in this direction, I suggest, would help complement my static perspective on inter-street equity, which focuses on streets as *places* rather than spaces for *movement* (Carmona et al. 2018). Thirdly, many of my findings may not be extrapolable to other urban settings: in particular, they may not apply to cities with lower densities, with a clearer street hierarchy (i.e. high street vs. residential streets), or where the pressures of gentrification and touristification are absent. Likewise,

my findings related to policy measures are strongly related to the local and national governance and legislative framework in Barcelona and Spain. Accordingly, it would be interesting for future research to explore the intra-neighbourhood equity implications of street transformation schemes in different geographic contexts.

Lastly, there is a need for follow-up research on the equity impacts of Barcelona’s superblocks scheme, both in terms of objective data and resident perception. At the time of carrying out the fieldwork for the present article, the street redesign of the new green axes was nearing completion, and being heatedly debated as one of the key themes of the upcoming local election (May 2023). While this meant that my research addressed an extremely topical issue, it also meant that interview discussions largely focused on prospective – rather than revealed – impacts of pedestrianisation. In order to assess the mid- and long-term equity impacts of the superblocks strategy, we will need to wait a few years before we can revisit this question with a strong set of empirical data.

### CRedit authorship contribution statement

**Samuel Nello-Deakin:** Conceptualization, Investigation, Writing – original draft, Writing – review & editing.

### Declaration of competing interest

The author has no conflict of interest to report.

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