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Perceived health, wellbeing and equity impacts of Barcelona's Green Axes: a rapid qualitative study of residents and public-space users

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Research Article

Keywords: urban health, superblocks, green space, qualitative research, health inequalities, Barcelona

Posted Date: September 28th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11034195/v1

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Abstract

Empirical evidence on how residents experience Superblock-type interventions remains scarce. In 2022 Barcelona implemented the first phase of the Green Corridor (Eixos Verds) project, a linear pacified axis with a single-level platform, a 10 km/h speed limit and a 12% increase in green cover. A quasi-experimental evaluation found significant improvements in the quality of public space but little change in its observed use. This qualitative study explored residents' and users' perceptions of the intervention's effects on their well-being and its intermediate determinants, according to gender and age. A spontaneous ethnographic approach combined participant observation with intercept interviews in March 2024, using theoretical sampling with maximum variability; 64 people aged 21–95 years (34 women) participated. Thematic content analysis was triangulated by two researchers. Eight themes emerged: pollution, noise, green spaces, mobility, uses of the built environment, socioeconomic fabric, social interaction, and well-being. Participants reported more tranquillity, physical activity, social interaction and thermal comfort, with benefits concentrated among older adults, children and caregiving women. Concerns focused on residual traffic and micromobility in shared space, which generated a "false sense of security" among vulnerable groups, as well as poorly maintained vegetation, nightlife noise and gentrification. Read alongside the quantitative evaluation, these perceptions explain its null results on use of space—people stay rather than pass through—and show that measured gains in safety and maintenance do not automatically translate into perceived ones. Sustained health benefits require designs that protect vulnerable users, explicit maintenance plans and anti-gentrification measures.

INTRODUCTION

The urban environment—spatial planning, air quality, noise and the availability of green space—is a major determinant of health and health inequities [1]. With an estimated 7 billion people expected to live in urban areas by 2050 [2], understanding and improving the health effects of urban design has become a central public health priority.

Traffic-related exposures are among the most consistently documented. Long-term exposure to PM2.5 and NO2 is associated with premature mortality and cardiorespiratory disease [3–5], and road traffic noise with sleep disturbance, stress and cardiovascular and cerebrovascular outcomes [6,7]. Reducing traffic in specific areas lowers air pollution [8], pedestrian-oriented design promotes walking and cycling [9,10], and proximity to green space is associated with better cardiovascular and mental health [11,12]. Such interventions may also have unintended consequences, notably green gentrification and unequal access to their benefits [13].

Urban design does not affect all groups equally. Women are more likely to walk and use public transport, whereas men more often use private vehicles [14]; low-income residents may be more vulnerable to gentrification but may also gain more from pedestrianization [5]; and spaces that facilitate social interaction are especially relevant for the health of older people [15].

Barcelona, a compact city with high traffic levels and little green space, has been a European reference in integrating public space and health. In 2016 the City Council approved the *"Omplim de vida els carrers"* (*"Let's fill the streets with life"*) plan, whose first phase created several Superblocks: 3 × 3 street grids whose interior streets were closed to through-traffic and redesigned as meeting places [16,17]. The model was subsequently replaced by the Green Corridors (Eixos Verds), in which one street in three, rather than two in three, is pacified, and large squares are created where pacified streets meet; the full plan foresees 21 connected corridors in the Eixample district, with 33 km of pacified streets and 6.6 ha of new green space [18,19]. The first phase, implemented in 2022, transformed Consell de Cent street (20 blocks along a 2.8 km linear axis) and three perpendicular streets (Rocafort, Comte Borrell and Girona), creating four new squares in an area of around 90,000 m² where over 30,000 people live. The design introduced a single-level platform without kerbs, pedestrian priority with access restricted to residents' and service vehicles at 10 km/h, replacement of asphalt with granite and cobblestones, an 85% increase in pedestrian space, a 12% average increase in green cover (68% more trees), almost 800 new benches, 48 tables, 47 children's play areas and drinking fountains [19].

Health impact assessments estimate that scaling the Green Corridor plan citywide would yield substantial benefits for mortality, mental health and children's development [20,21], but empirical evaluations of Superblock-type interventions remain scarce [22]. Evaluations of the earlier Barcelona Superblocks reported perceived improvements in well-being, tranquillity and sleep, some reduction in noise and pollution, and increases in social interaction and walkability [23,24], although one Superblock showed reduced physical activity and use of public space among older and adolescent residents one year after implementation [25]. A recent quasi-experimental evaluation of the first phase of the Green Corridors, conducted in the same streets and period as the present study, found significant improvements in all dimensions of public space quality assessed—largest for natural areas, maintenance and cleanliness, architectonic characteristics and safety—but little change in the observed use of space or in play areas [19]. Objective quality is, however, only a precondition: the health benefits of public space depend on how residents actually perceive and use it [19], and previous evaluations have rarely examined how effects differ across axes of inequality, particularly age and gender, nor which contextual factors limit the impact of the intervention.

This qualitative study complements that quantitative evaluation. Its aim was to explore the perceptions, interpretations and expectations of residents and users of the Green Corridors regarding the effects of the intervention on their well-being and its intermediate determinants, according to gender and age.

METHODS

Study design

We conducted an exploratory, interpretative qualitative study based on a spontaneous (*"guerrilla"*) ethnographic approach, which combines participant observation—rapid, direct immersion in the social context under study—with brief individual or group intercept interviews guided by an ad hoc semi-

structured script. This approach obtains contextualised, first-person accounts directly within the intervened space.

Sampling

Theoretical sampling was used, segmenting participants according to whether they (1) lived in or near a Green Corridor, (2) worked in one, or (3) were regular users of the intervened areas without living or working there. Within each segment a maximum-variability criterion was applied to include diverse profiles, particularly by gender and age, in order to explore potential social inequalities. Participants were approached spontaneously during fieldwork.

Data collection

A team composed of an interviewer and one or two observers conducted four 5-hour sessions in the Green Corridors and adjacent streets in March 2024, on weekdays and holidays and in morning and afternoon–evening slots, to capture diverse uses and dynamics of the space. Observers recorded all observed interactions (e.g., adults talking, children playing, care of older people, group sports). Interviews explored participants' perceptions of the changes introduced, how these had affected them, how their use of the space had evolved, and how the transformation had influenced their physical and mental health, covering both positive and negative aspects. Interviews were audio-recorded, transcribed verbatim and anonymised. The interview guide is provided in Supplementary Annex A.

Data analysis

A thematic content analysis was conducted following Colaizzi's descriptive method [26]: familiarisation with the data, extraction of relevant statements, coding, grouping of codes into themes, and analytical interpretation of participants' experiences to build an explanatory framework. Two researchers triangulated the analysis to minimise bias and increase consistency. The study was approved by the Ethics Committee of Parc de Salut Mar (ref. 2024/11522/I).

RESULTS

Sixty-four people aged 21 to 95 years participated in the intercept interviews: 34 women and 30 men, with a median age of around 45 years in both groups; 45 lived in the area (Table 1). Overall satisfaction with the intervention was high, with scores between 7 and 10 on a 0–10 scale.

Eight themes were identified through which the Green Corridors affect residents' and users' well-being and its intermediate determinants: pollution, noise, green spaces, mobility, uses of the built environment, socioeconomic fabric, social interaction, and well-being and quality of life. The main positive and negative aspects within each theme are summarised in Table 2; the full coding structure is provided in Supplementary Annex B and additional verbatim quotations in Supplementary Table S1.

Theme 1. Pollution

Some participants reported a perceived improvement in air quality, including less dust and dirt in homes near the intervened area, a perception expressed across genders and ages: *"we are in the most polluted area of Barcelona, so it's a really big deal"* (young woman). Others perceived no meaningful change, which they attributed to the limited scope of the intervention or to traffic being displaced to adjacent streets and requiring more turns to reach the same destination: *"it should be much wider to have an impact"* (middle-aged man).

Theme 2. Noise

A reduction in noise, attributed to less vehicle traffic, was widely recognised regardless of age or gender. *"In that aspect we have gained in noise, now it is much quieter"* (mother of two). Some residents, particularly older women, nevertheless expressed concern about noise generated by nightlife, especially in summer: *"there's people here, they speak too loudly, I've heard it from my home"* (older woman).

Theme 3. Green spaces

The increase in greenery was valued as pleasant and inviting to walk and stay, especially by older people and those caring for children: *"Having all these green spaces makes me want to get out of the house more often and just relax"* (middle-aged resident). At the same time, there was a widespread perception that the vegetation had been poorly planned and maintained, with low plant diversity: *"as far as the landscaping is concerned, they have done it badly"* (man, 63).

Theme 4. Mobility

More space for pedestrians was perceived to improve walkability and access to leisure, particularly for older adults and children, and the street was increasingly chosen for new walking and cycling routes for both leisure and transport. These perceptions were most prevalent among people caring for children, mainly women: *"We now have a safe environment for bicycles; before it was impossible"* (father, 43); *"My parents go out more often now. They sit and walk"* (man, 50); *"I finally have my space to be able to walk quietly"* (young woman with visual impairment). Vehicle owners, by contrast, complained about increased traffic on adjacent streets and greater difficulty reaching parking and taxis: *"Before it cost me 7 euros in a cab and now it costs me 10"* (older woman).

Theme 5. Uses of the built environment

Participants, and especially older women, reported a notable increase in the use of the space: more physical activity, use of benches and multi-use platforms, more usable space for children and older people, and more people walking dogs or exercising: *"When I was born here, in '42, you could go down to the street and play… And now here you are with the family. Sitting on the benches, the kids play"* (woman, 81); *"It's great for us to be able to ride a bike and walk to daycare. It's a privilege"* (young mother). The main negative aspect was that pedestrian space continued to be shared with cars, vans, bicycles and scooters, generating a sense of insecurity—particularly among children and older adults, owing to the risk of falls and traffic injuries—that undermined the tranquillity the space could offer: *"They're a little*

scary because you leave the house and suddenly, wham, you must look" (woman, 81). Vans parking on the platform, dirt from litter and dog excrement, and lack of civility more generally were also reported: *"They do clean up, but here the problem is the people, the dogs, the little awareness that the dog owners have"* (shopkeeper).

Theme 6. Socioeconomic fabric

Businesses gained visibility as more people walked past shop windows, and homeowners of all ages and genders were satisfied with the rising value of their properties: *"as homeowners we are delighted because the price of housing is better"* (female owner). Concerns were also raised: some shopkeepers feared losing customers who used to arrive by car; tenants worried about rising rents driven by the revaluation of the area; and older, lifelong residents expressed concern about tourism-driven gentrification and its effect on the neighbourhood's social fabric: *"A lot of tourist apartments. A lot, a lot"* (woman, 71).

Theme 7. Social interaction

Participants described more social relations, more neighbourhood life and more *"places to be"*, with rituals becoming established and the lost neighbourhood fabric being regenerated, even through conversations between strangers. This was most evident among families using nearby schools or extracurricular activities and among older neighbours, who regained contact with each other: *"We see more of each other neighbours than we have for a long time"* (woman, 81); *"We are all having dinner together [on a street bench] after a school activity. Before we would have gone to someone's house or we wouldn't have met"* (group of parents). Some reticence, especially among older women, was expressed towards outsiders and tourists who do not contribute to the neighbourhood fabric.

Theme 8. Well-being and quality of life

Participants reported a greater sense of safety with fewer cars, more tranquillity, cleaner air, a friendlier and more accessible space, and thermal comfort. Women in particular described the space as safe; older people reported going out more, enjoying contact with nature and having more places to sit, which they considered essential for walking; and parents described greater autonomy and active leisure for children: *"if I go for a walk, I choose these lanes more; this summer I noticed the change in temperature"* (young woman); *"we have gone super comfortable with the children, quiet, there are not so many cars"* (mother of two). The main concern, expressed above all by parents and older people—and most strongly by older women—was a feeling of unease and false security when sharing the space with vehicles: *"It generates a false sense of security because you have to always be alert"* (middle-aged neighbour); *"Cars go by and stop where you are sitting, it's very dangerous. I prefer a road where they don't come up to you at the same height as the sidewalk"* (older neighbour).

DISCUSSION

This study identified eight themes through which the Green Corridors affect the well-being of residents and users. Participants perceived improvements in well-being, air quality, traffic noise, walkability, greenery, business visibility and neighbourhood social relations, while concerns persisted about traffic displacement, nightlife noise, poorly maintained vegetation, the shared use of pedestrian space by vehicles, and gentrification. Most opinions were positive, as previously observed in the polygonal Superblocks [23]. Read alongside the quantitative evaluation of the same streets in the same period [19], our findings corroborate the measured improvements in public space quality and, more importantly, help explain several of its null or unexpected results.

Physical environment

There was little consensus on changes in air quality and noise, and several participants believed traffic had simply been displaced to adjacent streets. The objective evaluation, however, found a modest but significant improvement in environmental characteristics in the intervened streets (air pollution and noise subdimensions improved by 2.0 and 1.5 points on a 10-point scale) and no deterioration—indeed a slight improvement—in the comparison street two blocks away [19]. This is consistent with the *"traffic evaporation"* documented after tactical urbanism interventions in Barcelona and low-traffic neighbourhoods in London, where traffic on boundary roads is similar to, or rises far less than it falls on, intervened streets [27,28]. The divergence between perceived and measured displacement is itself a relevant finding: perceptions of air quality are shaped by age, gender, socioeconomic position and salient cues such as visible traffic and detours [29], and the small scale of the intervention within a district still dominated by motorised traffic [30] may make gains hard to notice. For noise, participants distinguished between reduced traffic noise during the day and nightlife noise at night, a dichotomy also described in previous Superblock studies [23,31,32] and one that observational tools applied in daytime slots cannot capture [19]. Reduced daytime traffic noise remains beneficial for sleep, mental and cardiovascular health [6,33].

Natural areas was the dimension with the largest measured improvement (4.94-point difference-in-differences) [19], and it was also the change most consistently praised by participants. Proximity to green space has consistent positive effects on physical and mental health [5,11,34] and promotes physical activity [12,35], especially in childhood. Interestingly, maintenance and cleanliness also improved significantly in the objective assessment [19], whereas participants complained about poorly planned and poorly tended vegetation, litter and dog waste. This apparent contradiction may reflect rising expectations once a space is upgraded; the distinction between street cleaning, captured by the tool, and horticultural care and plant diversity, which are not; and the weight of episodic incivilities in memory relative to average conditions.

Mobility, uses of space and safety

The quantitative evaluation found significant improvements in walkability, space for pedestrians, rest areas and usability, but no significant change in the *"use of space"* subdimension, which counts people walking or cycling through the space, nor in play areas [19]. Our findings help explain this. What

participants described was not so much more people passing through as more people staying: sitting on benches, eating together after school activities, children playing around informal elements, and new routes chosen for their pleasantness rather than their speed. Use as *"staying"* and time spent are precisely what pedestrian counts miss, and spontaneous play around furniture and ground painting is not registered as a formal play area. This is consistent with evidence that green space increases time outdoors and social interaction more reliably than measured physical activity [19,35], and with findings from earlier Superblocks on new walking routes and access to leisure [24]. Older adults and families with children reported walking more often and further and making more trips on foot, which may also foster children's autonomy; increased physical activity linked to traffic calming and greening has well-documented cardiovascular and mental health benefits [4,10,17]. The low presence of adolescents, who may not perceive these spaces as their own, has also been observed in other Superblocks [24,25].

Safety showed one of the largest measured improvements (road safety +2.3 and civilian security +4.0 points) [19], consistent with lower speeds and fewer vehicles. Yet a key finding of our study is the *"false sense of security"* reported by parents and older adults in the face of the continued presence of cars, vans, bicycles and scooters in areas designated for pedestrians, a concern less frequently reported in previous evaluations [16,24]. This is not a contradiction: objective road safety can improve while perceived safety among vulnerable users does not, and the literature on shared-space and single-level designs explains why. although removing kerbs and level differences aims to reduce modal segregation and lower speeds, the absence of physical cues delineating the space increases ambiguity about right of way and heightens perceived risk among vulnerable users—older adults, families with children and people with disabilities—whose comfort varies with age, mobility and prior exposure to traffic [36,37]. Designs combining speed reduction with physical cues and management measures (e.g., movable bollards, tactile strips, clearly bounded waiting areas) could preserve accessibility gains without increasing anxiety.

A related issue is the geometry of the intervention. Whereas polygonal Superblocks contain traffic within a group of blocks, long linear axes channel pedestrian flows—encouraging active mobility as well as *"being there"*—but impose detours on drivers reaching destinations along the axis, which participants experienced as longer trips and higher taxi fares even though net traffic on adjacent streets did not increase [19]. Local effects therefore depend on both the scale and the topology of the intervention [16,38].

Social and economic fabric

Participants described how the new urban furniture (benches, tables, platforms) facilitated care-related tasks. This was particularly relevant for women, who remain most often responsible for these tasks and who also gained opportunities for socialisation while caregiving—an issue rarely addressed in previous evaluations [16,39,40]. Shopkeepers' fears of losing customers arriving by car are not supported by the available evidence, which shows neutral or positive effects of pedestrianisation on local business [41]; concerns about housing costs are better founded. Fear of green gentrification, already documented in

other Superblocks [16], was a source of rejection of the project and of a weakened sense of belonging [13,42]. The increased neighbourhood life, socialisation and creation of *"rituals"* are consistent with earlier Superblock studies [24,32,40]; stronger social relationships foster a sense of community and are associated with better mental health in the short term and better general health in the long term, and may buffer other risk factors such as older age or lower socioeconomic status [15,43].

Health, well-being and inequalities

The benefits most frequently reported were improved mental health and a greater sense of tranquillity, together with thermal comfort, more opportunities for socialisation and leisure among older people, greater peace of mind for families and autonomy for children, and a greater sense of safety among women. The mental health benefits appear larger than those observed in earlier Superblocks [24], consistent with evidence linking greener and kinder urban environments to lower risk of mental illness, dementia and antidepressant use [12,20,44,45]. The perceived thermal comfort is also consistent with health impact assessments of urban greening [17,46].

Regarding inequalities, older adults and children (through their parents) reported the most benefits, yet they were also the most susceptible to adverse effects—residual traffic in both cases, and erosion of the neighbourhood fabric among older adults—which may explain why older adults also appeared to be the group most opposed to the change. Among adults, women, particularly those with caregiving responsibilities, appreciated the intervention most: for them the space acts as a facilitator of care tasks and, at the same time, as a setting for social contact during those tasks. These patterns suggest that the same intervention can simultaneously reduce and reproduce inequalities depending on whether design and management respond to the needs of its most vulnerable users, and they support the value of evaluating urban interventions through an equity lens rather than on average effects alone [40].

Finally, several negative perceptions—litter, poor maintenance of vegetation, nightlife noise—stem less from the urban design than from municipal management and regulatory compliance. The health benefits of green infrastructure depend critically on ongoing maintenance and local governance [47,48]; without a conservation plan and enforcement of civility rules (littering, dog waste, illegal parking, nightlife), the positive effects on well-being may erode over time.

Limitations and strengths

The ethnographic approach, with time-constrained interviews, may have limited the depth with which some themes could be explored, although it allowed a greater diversity of profiles and opinions to be captured. Adolescents could not be reached, and the limited number and length of sessions may not have captured all uses of the space. The study did not examine axes of inequality beyond gender and age, such as ethnicity or socioeconomic position, which may also shape perceptions of urban interventions. Its strengths include the exploration of both benefits and drawbacks through the perceptions of residents and users, interpreted by age and gender, its focus on intermediate determinants, which contributes to explaining the pathways between urban environment and health, and

the availability of a quantitative evaluation of the same streets in the same period [19], which allowed perceived and measured changes to be triangulated.

CONCLUSIONS AND RECOMMENDATIONS

Green Corridor interventions offer clear perceived benefits—greater walkability, more green space, stronger social cohesion and improved mental well-being—with the largest gains among older adults, children and caregiving women. Concerns about residual traffic, nightlife noise, maintenance and gentrification are also evident. These benefits are neither automatic nor permanent: they are conditioned by the geometric and operational configuration of the design (linear single-platform axes pose specific challenges for traffic flow and perceived safety among vulnerable groups) and by the day-to-day management of public space. Read together with the quantitative evaluation of the same intervention [19], the measured improvements in public space quality do translate into perceived benefits for well-being, but the mismatches between measured and perceived traffic displacement, maintenance and safety show why qualitative evidence on how residents experience and use these spaces is needed to guide their scaling up across the city.

For urban authorities, we recommend stronger traffic restrictions and enforcement of parking, loading and speed rules; clearer signage and management of scooter and bicycle flows to reduce conflicts; explicit long-term maintenance plans for vegetation and furniture; measures to prevent excessive rent increases and to regulate tourist apartments; and more ambitious interventions developed through genuinely participatory processes. For research, future evaluations should incorporate adolescents' perspectives and additional axes of inequality, so that investment in green infrastructure translates into sustained and equitable health benefits.

Declarations

Acknowledgements

[To be completed: fieldwork team, GESOP, participants.] This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors declare no conflicts of interest.

Author contributions

González-Calleja M: conceptualisation, methodology, formal analysis, investigation, writing – original draft, writing – review and editing. Sánchez-Ledesma E: conceptualisation, methodology, formal analysis, investigation, supervision, writing – review and editing. López-Medina MJ: methodology, investigation, supervision, writing – review and editing. Continente X: methodology, investigation, supervision, writing – review and editing. Pérez K: conceptualisation, methodology, investigation, supervision, project administration, resources, writing – review and editing.

Ethics approval and consent

The study was approved by the Ethics Committee of Parc de Salut Mar (ref. 2024/11522/I). All participants gave verbal informed consent before the interview, which was audio-recorded, transcribed and anonymised.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest

The authors declare no conflicts of interest.

Data availability

Anonymised interview transcripts are available from the corresponding author on reasonable request, subject to ethical approval.

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Tables

Table 1 Sociodemographic characteristics of the interviewed people

	Men (n=30)	Women (n=34)	Total (n=64)
Age (years)			
21–35	5	9	14
36–50	11	9	20
51–65	4	6	10
65+	10	10	20
Lives in the area			
Yes	22	23	45
No	8	11	19

Table 2 Positive and negative aspects identified within each theme

Theme	Positive aspects	Negative aspects
Pollution	Feeling of improvement in air quality; less dust and dirt in homes	No significant change perceived owing to the limited scope; traffic perceived as displaced to adjacent streets
Noise	Decrease in traffic noise	Nightlife noise
Green spaces	Increase in green areas; very pleasant; inviting to walk and stay	Vegetation and spaces not well planned or adequately maintained
Mobility	Improved walkability; easier access to leisure; the street is increasingly chosen for diverse uses	Increased traffic perceived on adjacent streets; difficulty accessing parking and taxis
Uses of the built environment	Notable increase in use of the space; more physical activity; use of urban furniture; more usable space for children and older people; more people walking dogs or exercising	Pedestrian space still shared with all types of vehicles; feeling of insecurity; lack of civility; dirt
Socioeconomic fabric	Greater visibility of businesses; more potential customers on foot; homeowners satisfied with property revaluation	Fear of losing customers arriving by car; concern about rising rents; tourism-driven gentrification
Social interaction	Increase in social relations; more neighbourhood life; new rituals; regeneration of the neighbourhood fabric	Greater presence of outsiders and tourists who do not contribute to the social fabric
Well-being and quality of life	Greater sense of safety; tranquillity; friendly space; more accessibility; more pleasant to stay; thermal comfort	Perception of false security and unease when sharing space with vehicles; thefts reported during construction

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