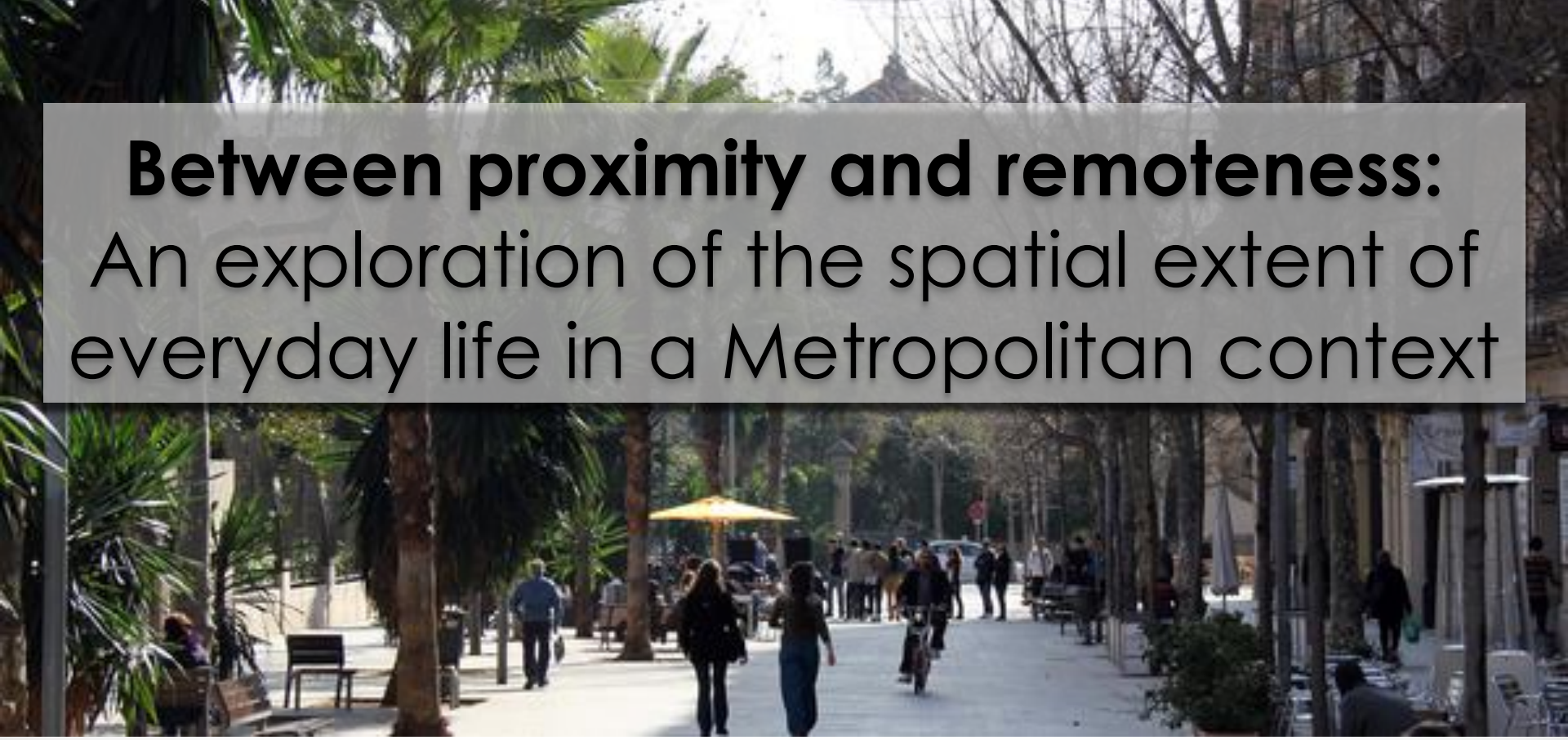

Between proximity and remoteness: An exploration of the spatial extent of everyday life in a Metropolitan context

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@llemvich

GEMOTT
GRUP D'ESTUDIS DE MOBILITAT, TRANSPORT I TERRITORI

Departament de Geografia

UAB
Universitat Autònoma de Barcelona

About me

- Based in **Barcelona**
- Background in **Sociology**
- **Masters Degree** in **Glasgow** (Sustainable development) and **Barcelona** (Geography and Urban Planning)
- Interest in daily mobility and urban planning.
- **Member of GEMOTT** – Research Group on Mobility, Transport and Territory
- Department of Geography, **Universitat Autònoma de Barcelona**
- **3rd year** of my PhD: work in progress...

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2. Context
3. Methods
4. Case study 1:

What determine the spatial extent of daily life?

5. Case study 2:

How we perceive the extent of daily life?

6. Case study 3:

How is walking affected by long commutes?

7. Case study 4:

How green are our walks?

8. Current work:

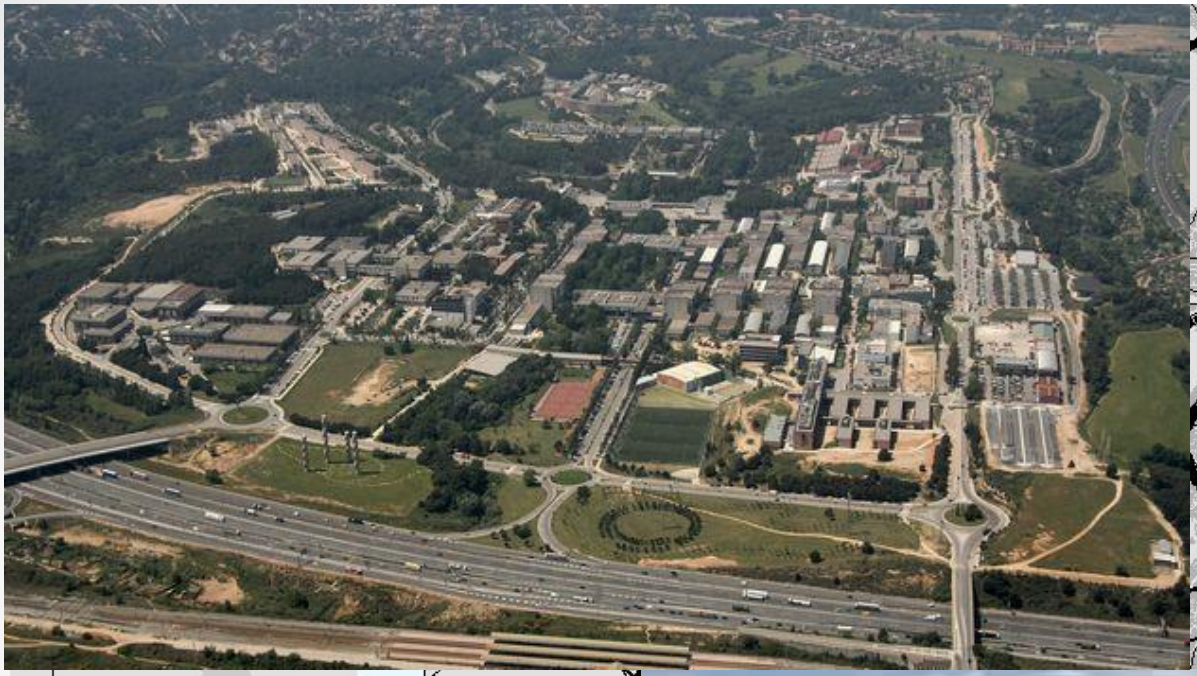
Link between greenness and physical activity

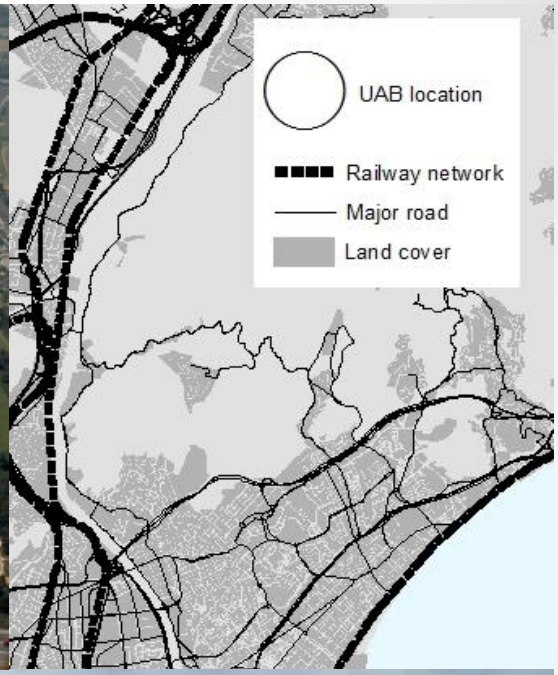
9. Future prospects.

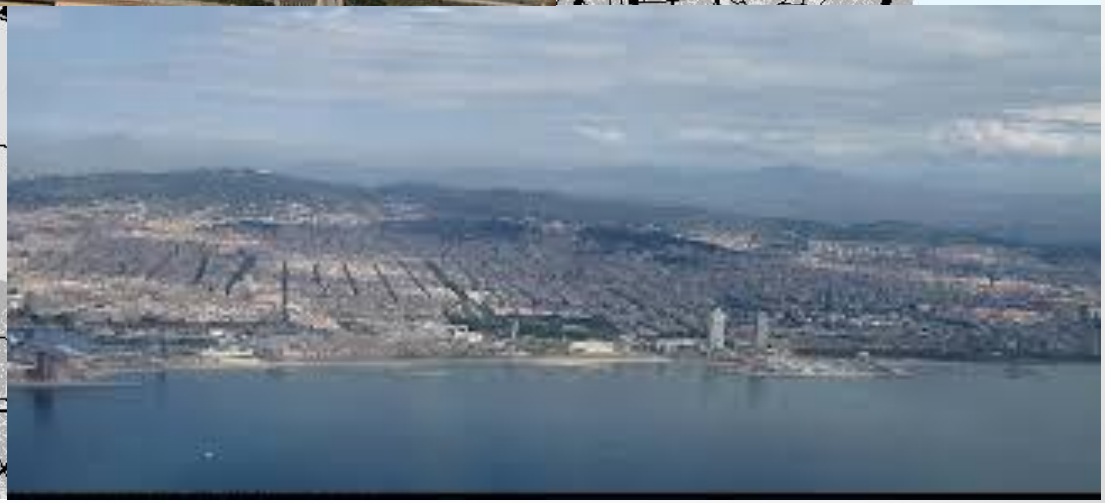
Objectives

- Spatial dimension of everyday life.
- Daily mobility and its (environmental) factors.
- Different factors for different urban dynamics: metropolitan vs proximity.
- The possibilities of new information sources such as tracking data.

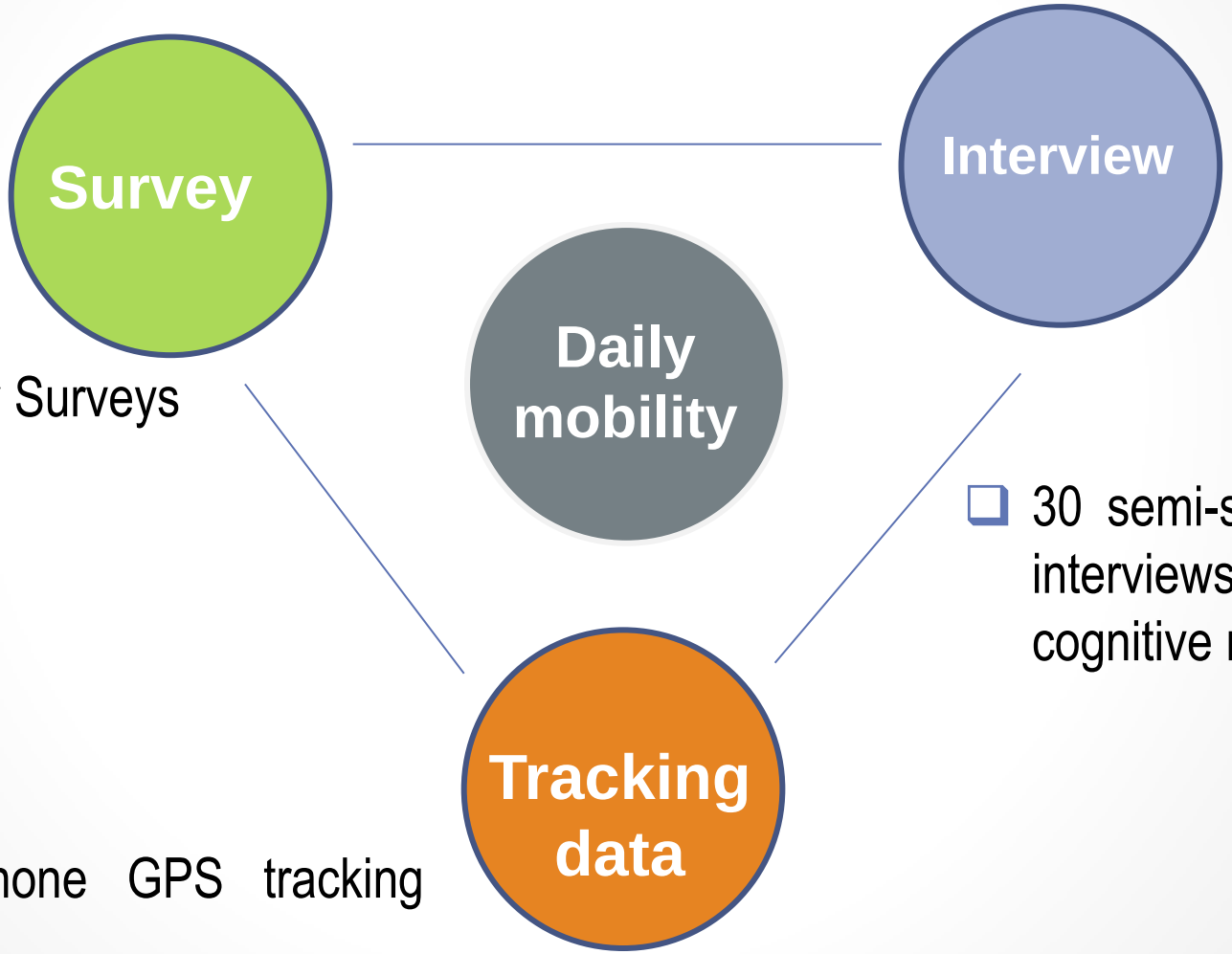
Context







Methodology



- Mobility Surveys
- 30 semi-structured interviews + cognitive maps.
- Smartphone GPS tracking data

Case study 1

- **What factors determine the spatial extent of everyday mobility?**
- Suburban commuters.
- Metropolitan scale.
- Smartphone tracking data.

GJ The Geographical Journal

Royal Geographical Society with IBG

The Geographical Journal, Vol. **183**, No. 4, December 2017, pp. 426–439, doi: 10.1111/geoj.12220

JCR 2016: Q1

Suburban commuting and activity spaces: using smartphone tracking data to understand the spatial extent of travel behaviour

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This paper was accepted for publication in May 2017

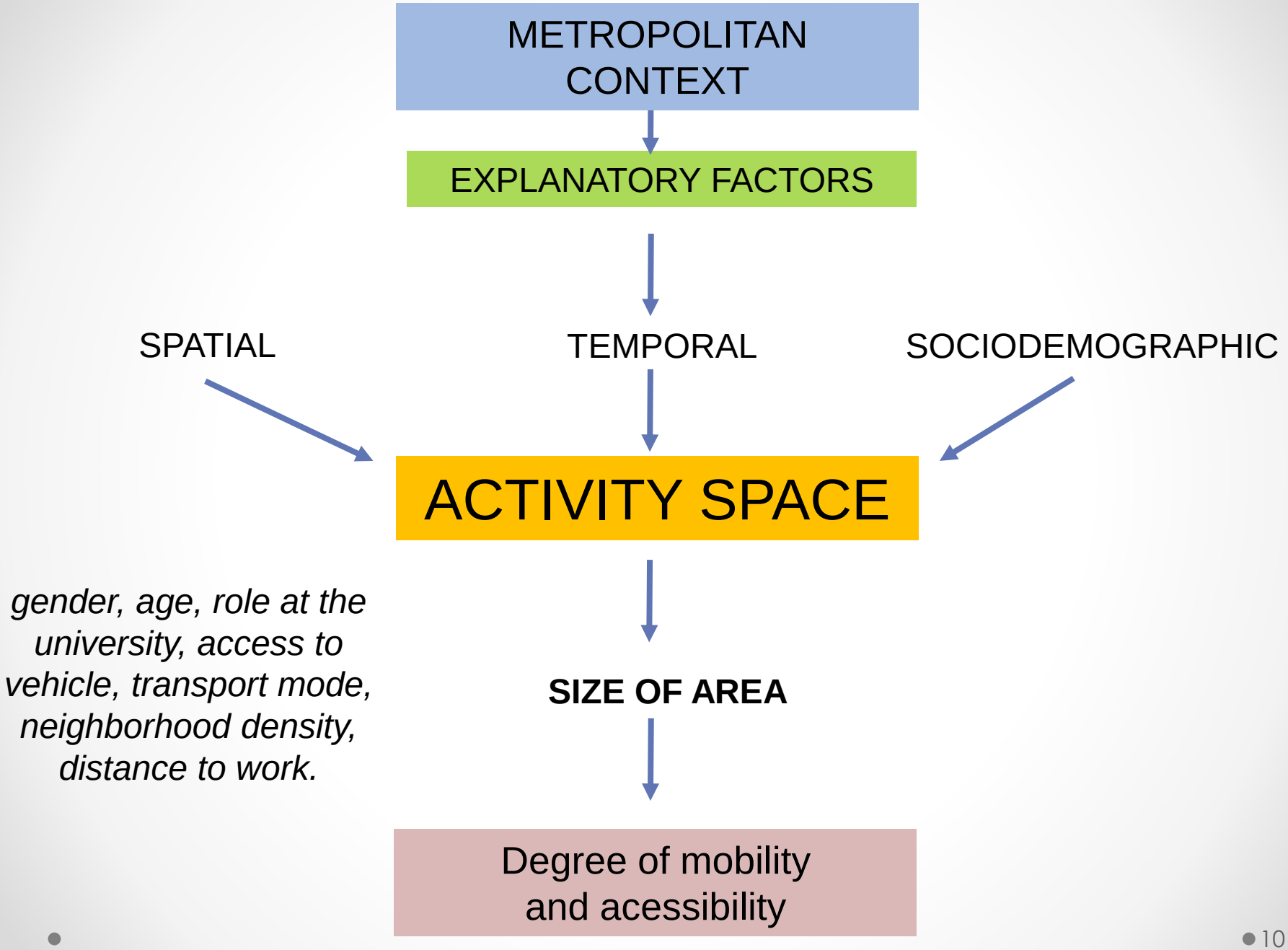
Background

- **Functional segregation** and **sprawling patterns** of land development determining **mobility** (Banister 2008).

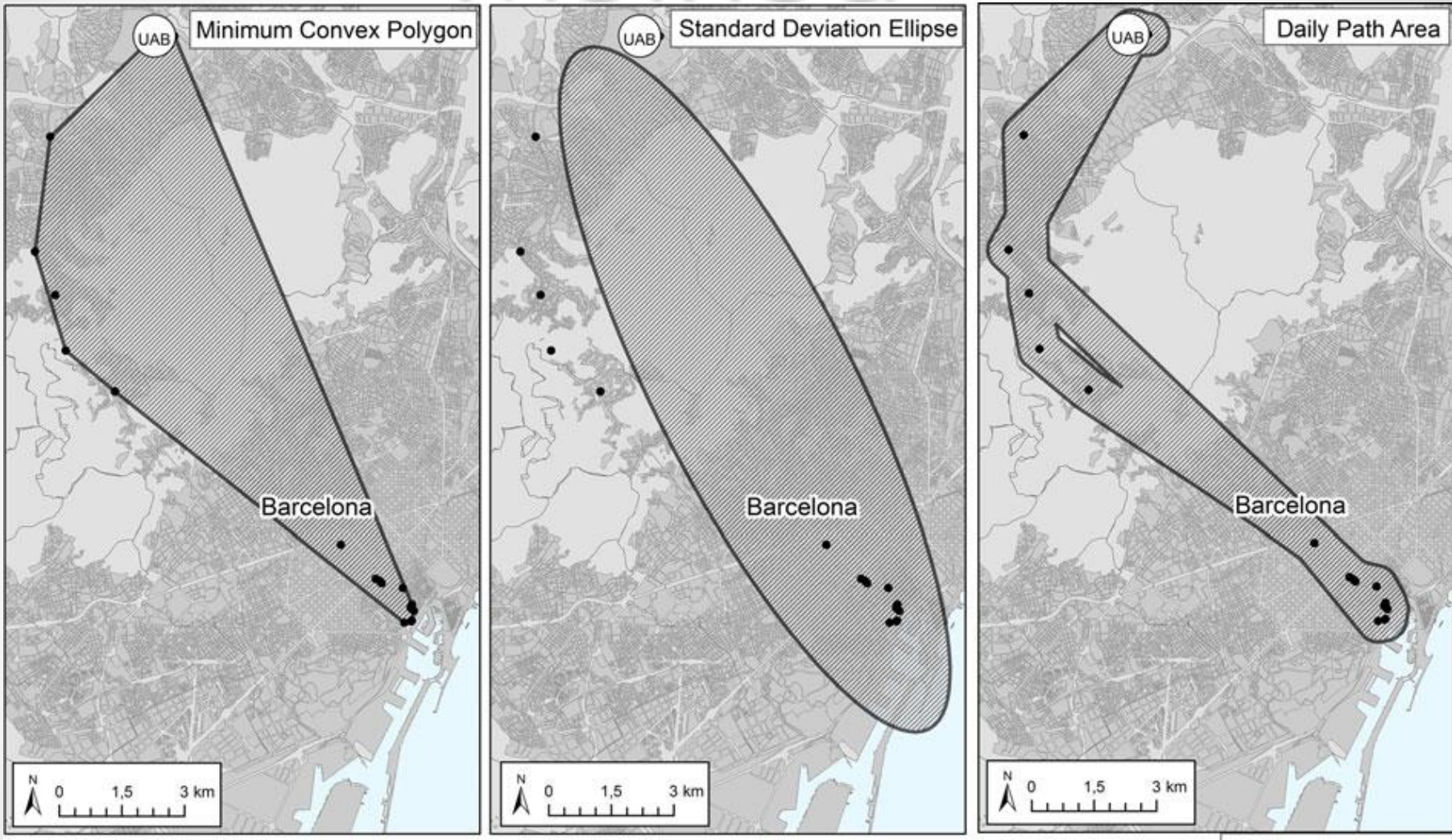
- **ACTIVITY SPACE** (Horton and Reynolds 1971) as degree of mobility of people (Gesler and Meade 1988).

- **Spatial components** of travel behaviour **priority** for transport and urban **policies** (Buliung and Kanaroglou 2006).

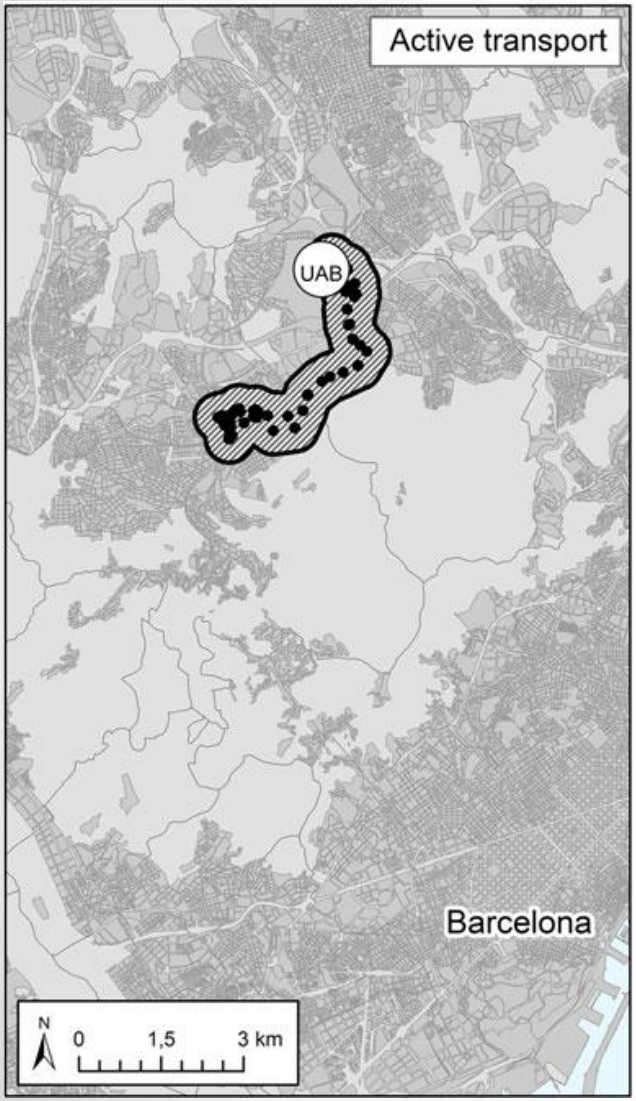
- **New methods** and **data sources.**

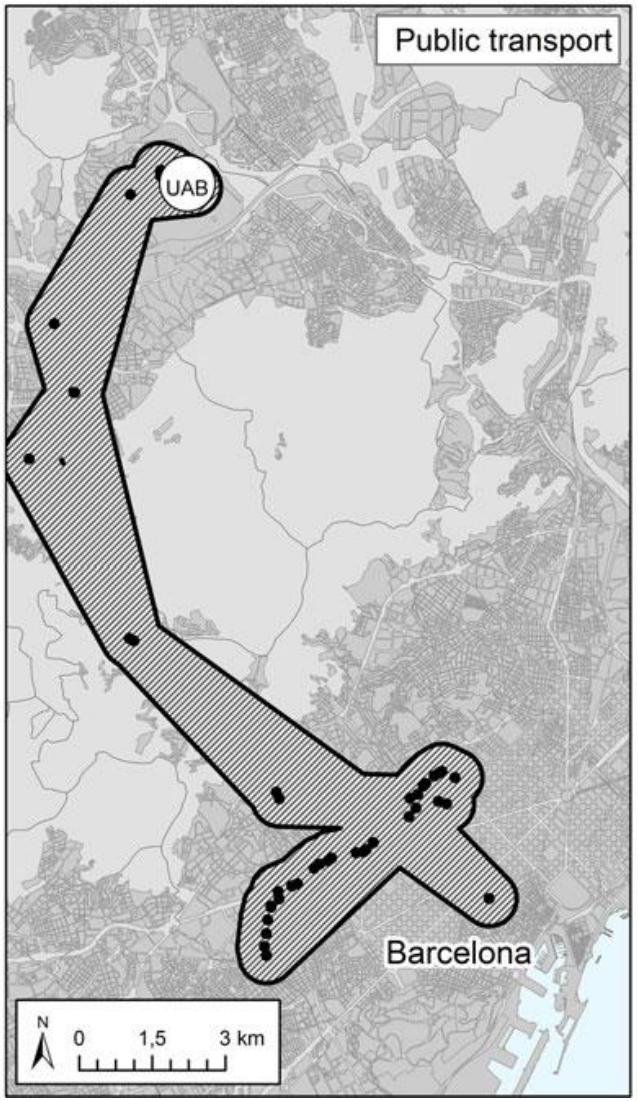

METROPOLITAN CONTEXT
EXPLANATORY FACTORS
SPATIAL
TEMPORAL
SOCIODEMOGRAPHIC
ACTIVITY SPACE
gender, age, role at the university, access to vehicle, transport mode, neighborhood density, distance to work.
SIZE OF AREA
Degree of mobility and acessibility

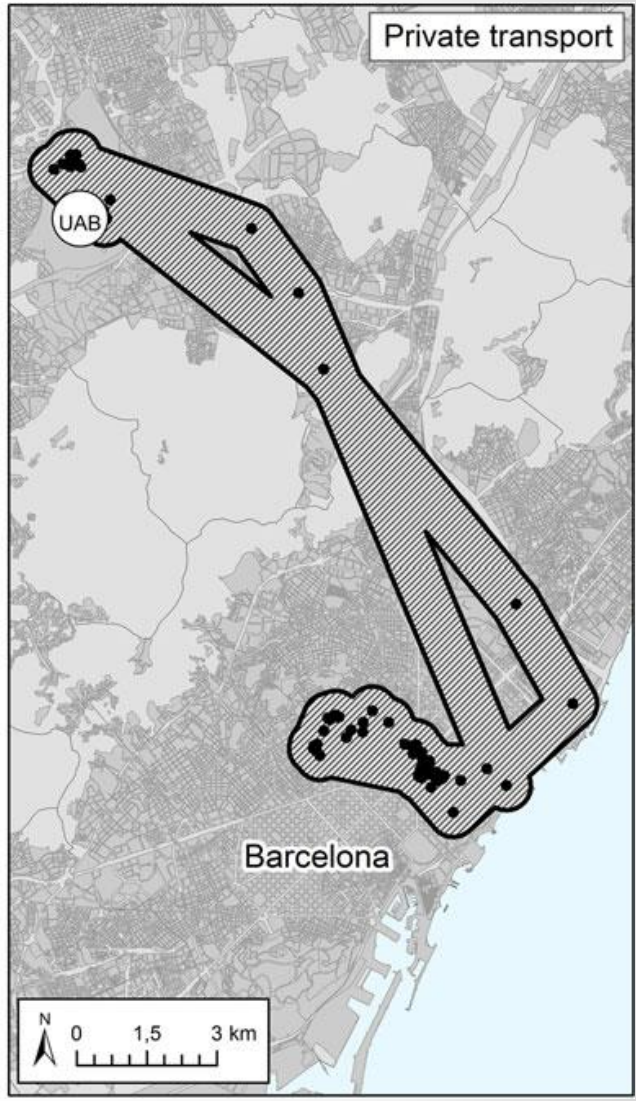
Method


UAB
Minimum Convex Polygon
Barcelona
N
0
1,5
3 km
UAB
Standard Deviation Ellipse
Barcelona
N
0
1,5
3 km
UAB
Daily Path Area
Barcelona
N
0
1,5
3 km
UAB location
GPS geolocation
Activity space
Land cover
Administrative limit

Results

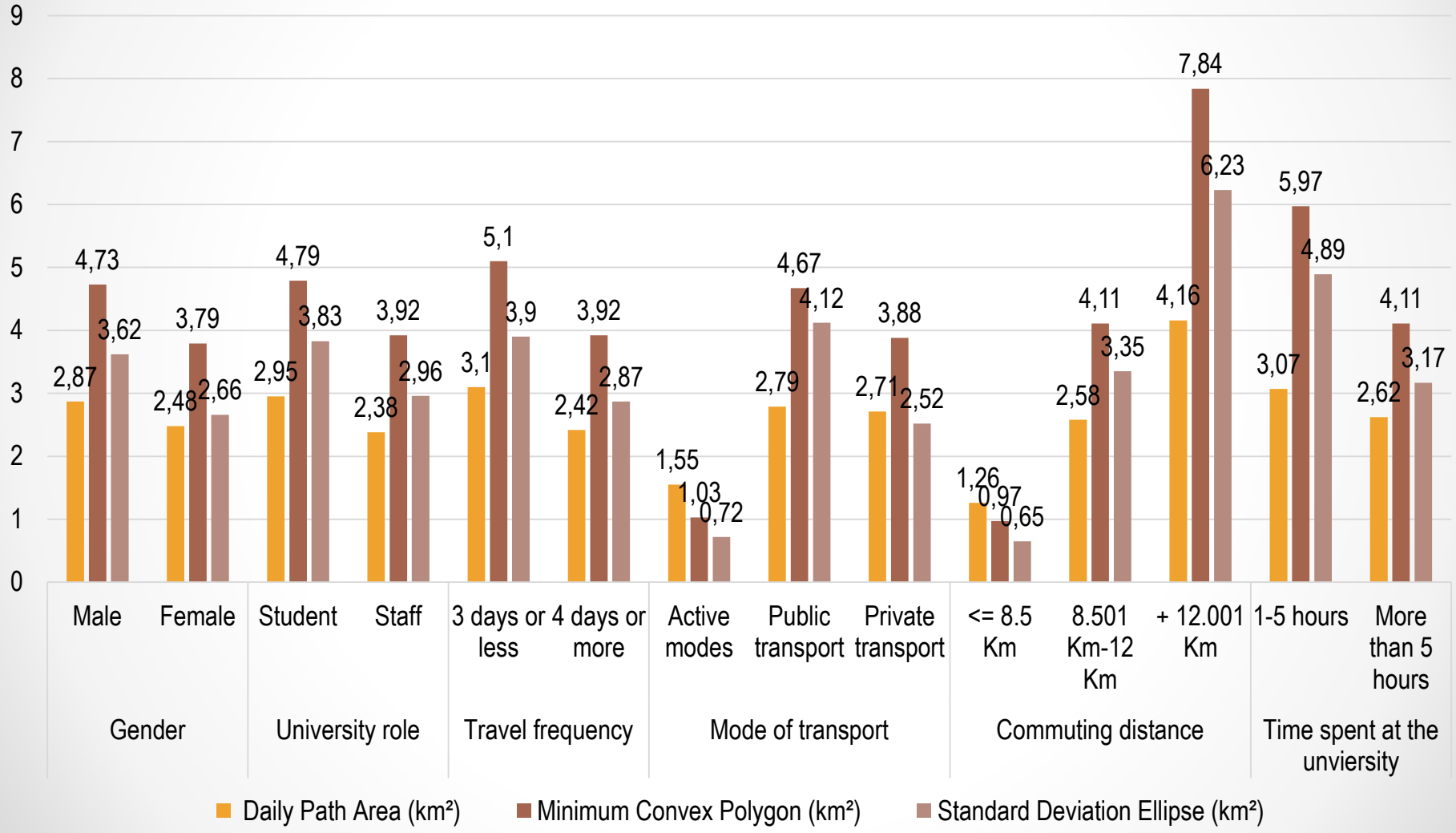

Active transport
UAB
Barcelona
N
0
1,5
3 km


Public transport
UAB
Barcelona
N
0
1,5
3 km


Private transport
UAB
Barcelona
N
0
1,5
3 km

Results

Figure 2. Area of AS registered by university members (UAB), by factors, 2015 (km2).



Results

Table 4 Association analysis of daily path area and predicting factors of motorised transport users of Campus Mobility

Models 2 and 3: daily path area		Model 2: public transport users					Model 3: private transport users				
		n	Coefficient estimate	St. error	*t*	Sig.	*n*	Coefficient estimate	St. error	*t*	Sig.
Constant	Activity space area (km²)	212		0.109	31.555	0.000*	170		0.204	18.573	0.000*
Control variable	Residence location	212	0.723	0.000	14.431	0.000*	170	0.559	0.000	8.267	0.000*
Predictive variables	Gender										
	Dummy female	212	–0.094	0.030	–1.869	0.063	170	–0.119	0.044	–1.853	0.066
	University role										
	Dummy staff	212	–0.214	0.031	–4.172	0.000*	170	0.084	0.055	1.154	0.250
	Trip frequency										
	Days/week (continuous)	202	0.071	0.015	1.449	0.149	170	–0.135	0.038	–2.151	0.064
	Time spent										
	Hours/day (continuous)	202	–0.061	0.005	–1.246	0.214	170	–0.151	0.014	–1.862	0.033*
Models 2 and 3 Independent variables			Significance (ANOVA)			0.000*		Significance (ANOVA)			0.000*
				Sig. *F* change		0.000*			Sig. *F* change		0.030*
				R^2		0.57			R^2		0.37
				Adjusted R^2		0.56			Adjusted R^2		0.35

*Significant *p*-value.

Conclusions

- Importance of **space** (commuting distance), **time** (time spent at uni) and **transport system** (staff public transport users) on spatial extent.
- Variability of association is according to method > ***uncertain geographic context problem*** (Kwan, 2012).
- The use of smartphone GPS data provides **highly accessible** and **accurate information**.

Case study 2

- **How we perceive the extent of daily life?**
- The role of different spatial dynamics in the extent of everyday life.
- Metropolitan vs Local scale.
- Interviews + Cognitive maps.

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journal homepage: www.elsevier.com

JCR 2016: Q2

The scales of the metropolis: Exploring cognitive maps using a qualitative approach based on SoftGIS software

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ARTICLE INFO

Keywords:
Environmental perception
Spatial scales
Activity spaces
Cognitive maps
Metropolitan regions
Barcelona

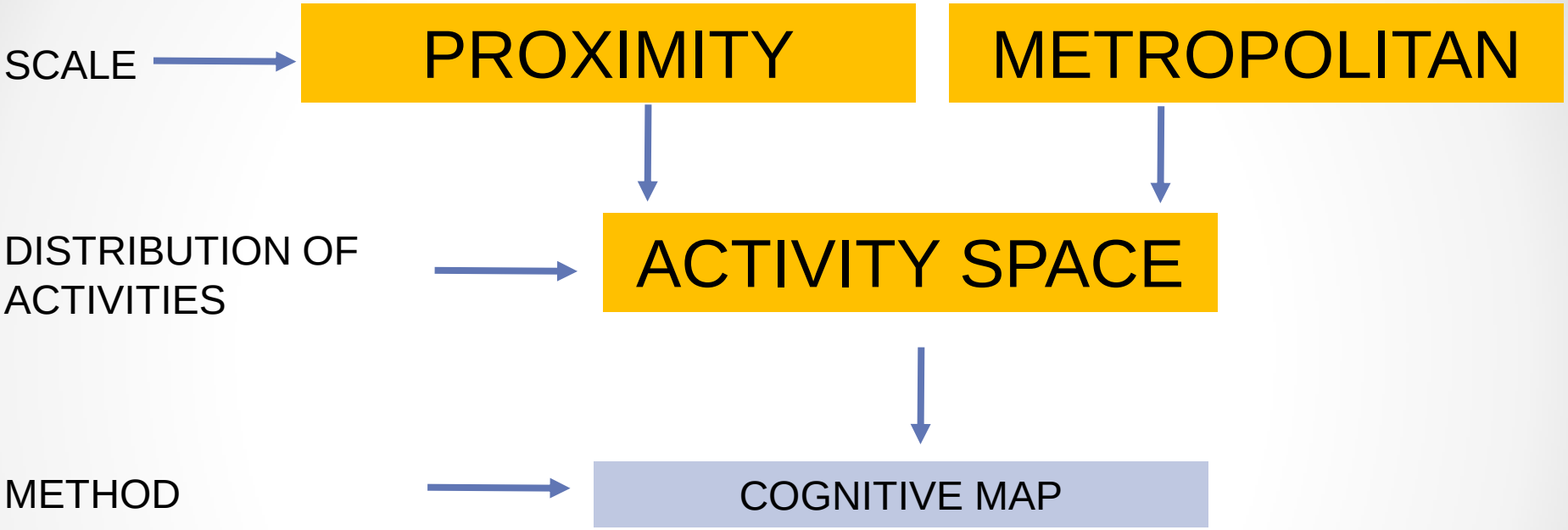
ABSTRACT

The spatial dimension of daily mobility depends on where people choose to perform their daily activities in urban environments. This study explores the influence of multiple geographical scales, characterising metropolitan regions on the cognitive images of individuals, whose daily mobility is restricted by an interurban daily commute to a university campus in the Metropolitan Region of Barcelona.

To do so, a sample of 28 adults from the Barcelona Metropolitan Region (RMB) were asked to describe perceived activity spaces using a combination of SoftGIS technology and interviews. Results have shown that different individuals can perceive the same geographic context in several manners, differentiating their utilised space between spatial continuums, fragmented territories or overlaid territories. Furthermore, factors such as the different spatial scales that affect a territory, the morphological characteristics of residential areas or the transport infrastructures, have proven to influence cognitive maps of individuals. Finally, different methods utilised for the exploration of cognitive maps have provided variations in the resulting cognitive images of participants.

Background

- The **spatial externalities of daily life** and externalities in the environment (Ewing et al., 2016).
- Factors that influence the scale key for urban policies (Buliung and Kanaroglou, 2006):
  - **Physical environment,**
  - **Sociodemographic characteristics,**
  - **Cognitive image of the real world (Lynch, 1960).**
- CI delimits the **external borders of activity spaces** of people in mind (Greenberg Raanan and Shoval, 2014), influence spatial choices (Downs and Stea, 2011).
- Spatial decisions and their **consequences for the territory.**

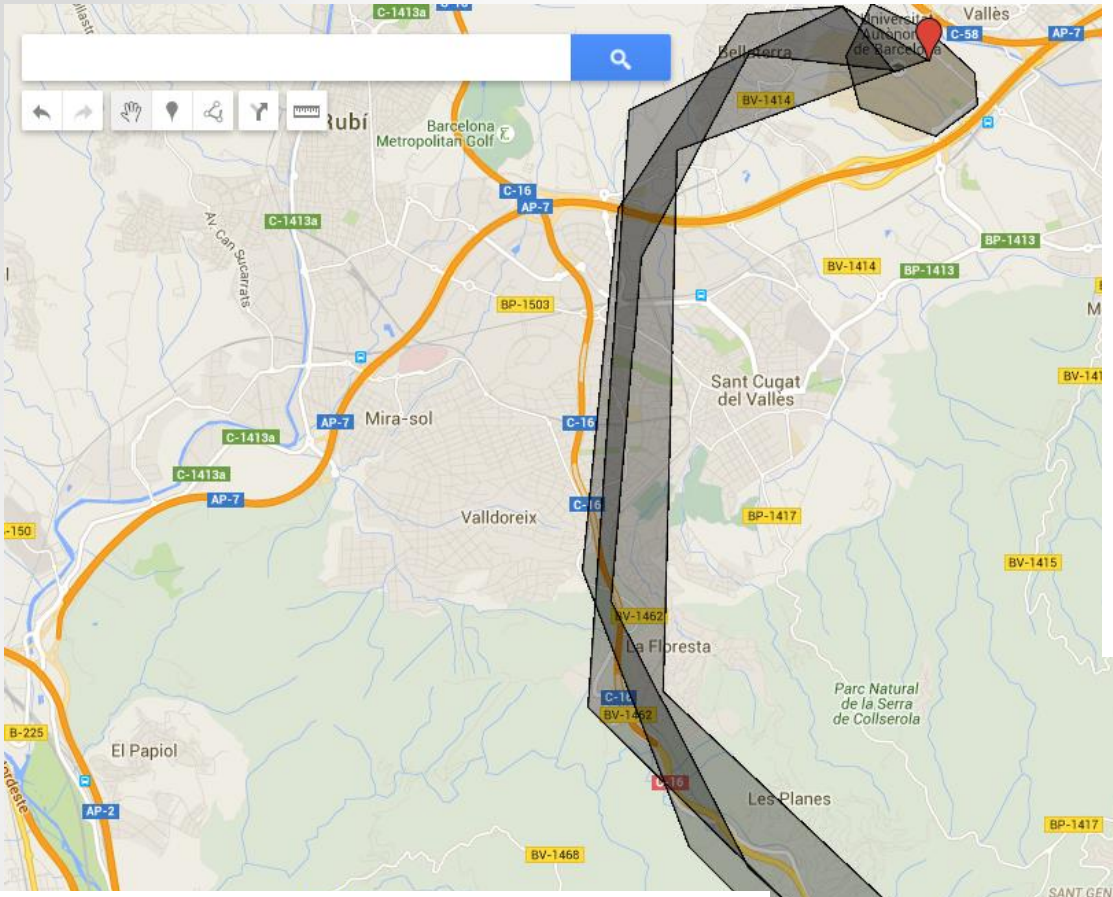

SCALE
PROXIMITY
METROPOLITAN
DISTRIBUTION OF ACTIVITIES
ACTIVITY SPACE
METHOD
COGNITIVE MAP

Method

- 28 people (UAB Mobility Survey).
- Intentional sampling:
  - Reside in the RMB,
  - Commute of the UAB,
  - Motorised transport commuter.
- Sociodemographic and mobility profile from survey.
- Characteristics of residential area from interviews.

Semi-structured interviews (30-45 min):

1. Cognitive map drawing in Google Maps
2. Location of activities in Google Maps
3. Questions about perception of space.

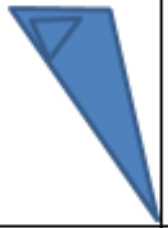


Google Maps facilitates:

- Search for places and routes,
- Delimitation of areas,
- Flexible scaling,
- Minimises memory problems
- Precision,
- Standardise drawing skills.

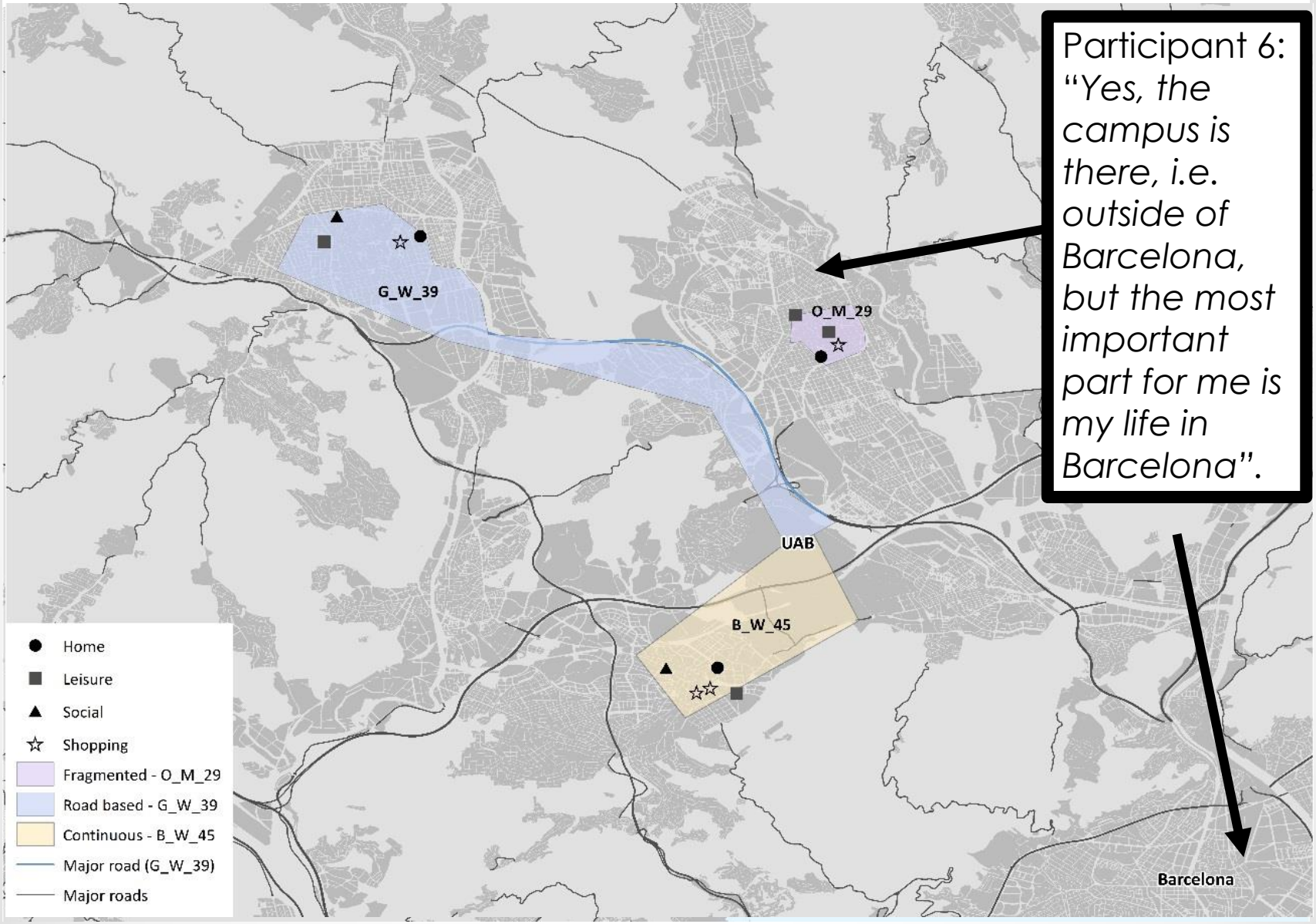
Results

Table 2. Different perceived scales and shapes of activity spaces, across three cognitive map methods

Results	*Scale*	**Metropolitan**		**Metropolitan + Neighbourhood**	
	Shape	**Unit**	**Fragmented**	**Overlaid**	
Method	*Sketch map*				
	Activities map				
	Oral map				
Explanatory factor of cognitive differences		**Transport mode** / **Land use mix**	**Distance between functions**	**Transport mode** / **Land use mix**	**Distance between functions**

Source: Own production.

Figure 3. Perceived activity space at two different scales.



Conclusions

- Spatial scales **not** understood as **nested hierarchies,** but rather as **extensions in space (and time)** connecting many **discontinuous sites** in different networks (Healey, 2004; Massey, 1994).
- **Regionalisation of territories**. Social relationships shaped in **spatial 'wraps' and 'folds'** (Amin and Thrift, 2002) or **'bits'** (Mitchell, 1995).
- The **same metropolitan context perceived differently** due to the acquired cognitive image, which can **modify the actual use of it** (Marquet and Miralles-Guasch, 2014, Matthews and Yang, 2013) >> influence on externalities derived from everyday transport.
- **Territory as a unit** >> accessible space traversed with motorized modes of transport.
- **Territory as separate areas** >> restrictive spatial organization or, on the contrary, successful mixed used local environments.
- The importance of utilising different methods.

Case study 3

"Using smartphone tracking data to explore the active mobility patterns of long distance travellers".

- **How is walking affected by long commutes?**
- Walking patterns >> physical activity.
- Metropolitan vs Local scale.
- Smartphone tracking data.

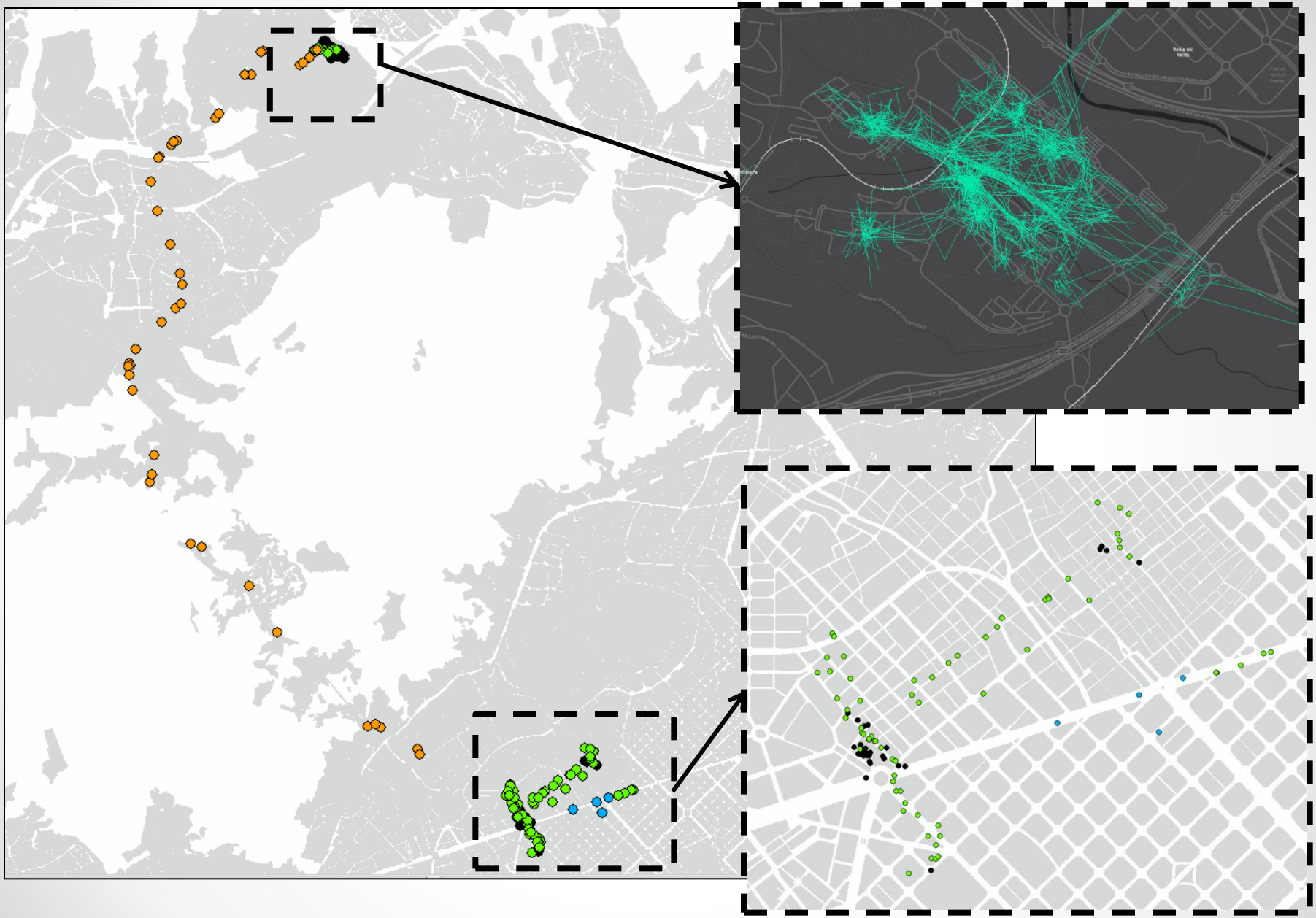
UNDER REVIEW: Transportation Research Part A

Background

- Unhealthy living behaviors affecting daily life in urban areas.
- Temporal constraint of increased distance between activities. Such as walking.
- Smartphone tracking data allow spatio-temporal information with potential use in health and urban planning research.

Method

- GSMA + GPS tracking data from APP.
- Participants from RMB (n = 95).
- Participation 12h/day + 4 days = 347 participation days.
- Outcome = Total walking time
- Factors = *gender, age, uni r mode, commuting distance density*.



Results

Table 3. Linear regression of daily time walked for public and private transport commuters separately

Models 2 and 3:		**Model 2. Public transport commuters (n=196)**				**Model 3. Private transport commuters (n=151)**			
		Coef. Estim.	*St. error*	*t*	*Sig.*	*Coef. Estim.*	*St. error*	*t*	*Sig.*
Constant	*Daily time walked*[a]		0.160	20.721	0.000		0.231	14.512	0.000
Ind. Variables	*Dummy gender (male)*	-0.159	0.062	2.185	0.030*	-0.094	0.087	-1.128	0.261
	Dummy status (employed)	-0.104	0.065	-1.416	0.158	-0.032	0.095	-0.382	0.703
	Commuting distance	-0.232	0.000	-3.121	0.002*	-0.003	0.000	-0.031	0.975
	Residential density	-0.129	0.000	-1.703	0.090	0.058	0.000	0.691	0.491
				*Sig. (ANOVA) = 0.000***				*Sig. (ANOVA)*= 0.697	

**Significant p-value.*

[a] *This model is based on the log-transformed dependant variable: Daily time walked.*

Conclusions

- Proves Time-budget theories of constraining distance commuting on time for other activities such as walking (Ahmed and Stopher, 2014; Mokhtarian and Chen, 2004).
- Association between female public commuters with increased walking patterns >> women's higher use of this public transport (Polk, 2003) and active modes of transport (Miralles-Guasch et al., 2016).
- Smartphone tracking data prove to be useful data source.

Case study 3

"Greenness exposure of walking routes and residential areas using smartphone tracking data and GIS in a Mediterranean city".

- Greenness in residential areas vs walking routes.
- In a Mediterranean urban area.
- Smartphone tracking data.
- Local scale.

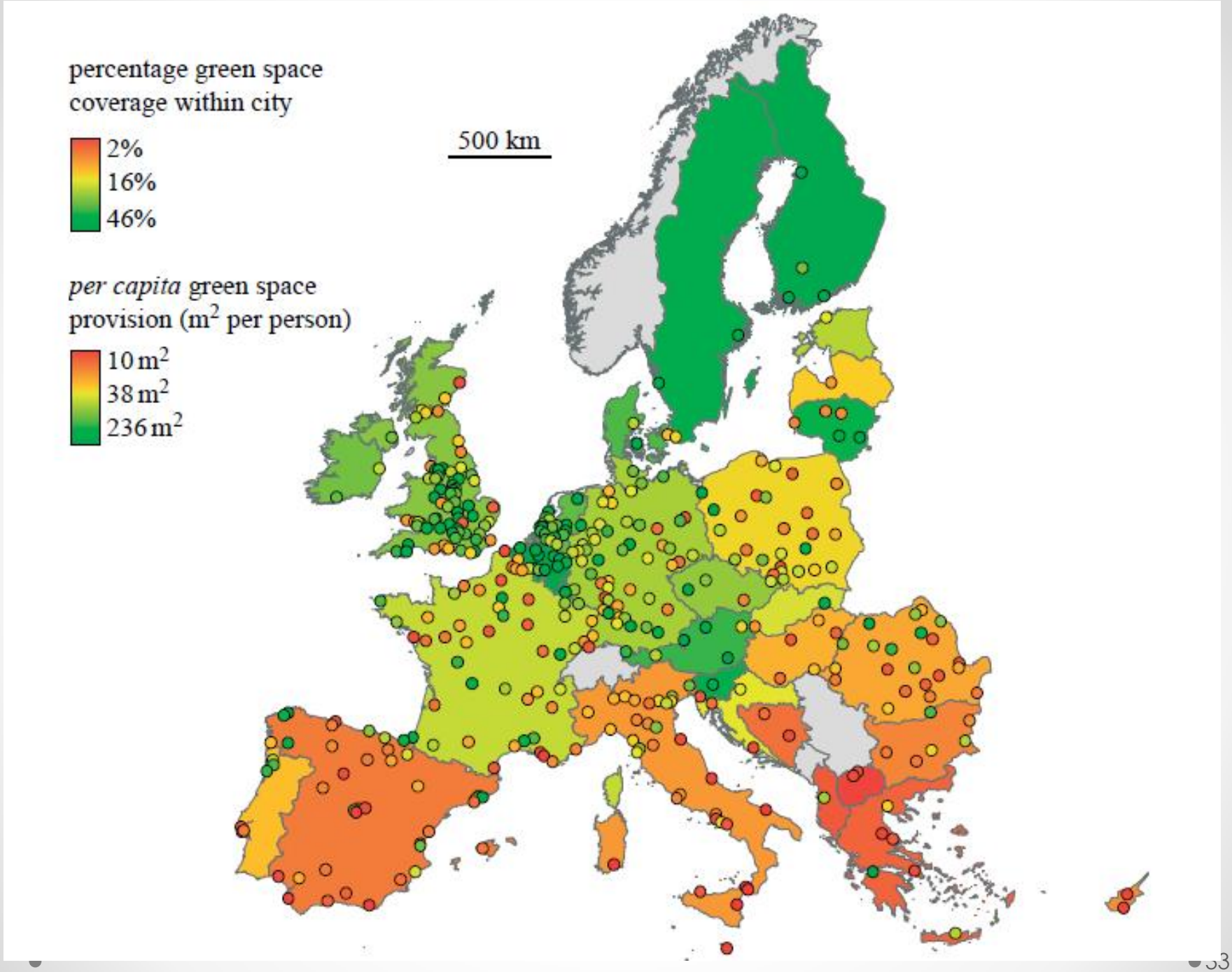
UNDER REVIEW: Landscape and Urban Planning

Background

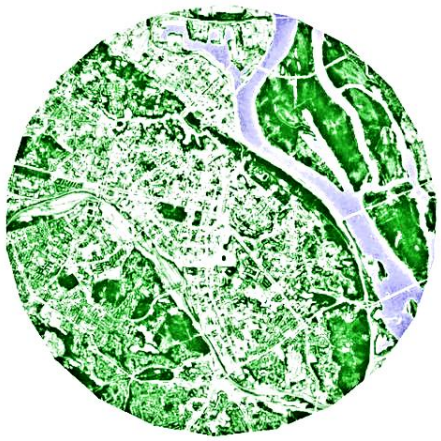
- Exposure to **green spaces** >> environmental, social and psychological benefits and positive effects on physical and mental health.

- Literature mainly focuses on similar urban contexts. What happens in urban areas lacking green areas ?

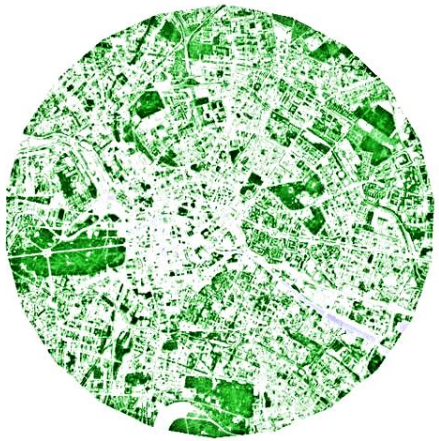
- Methodologies have generally been based on residential proximity measures to green spaces.



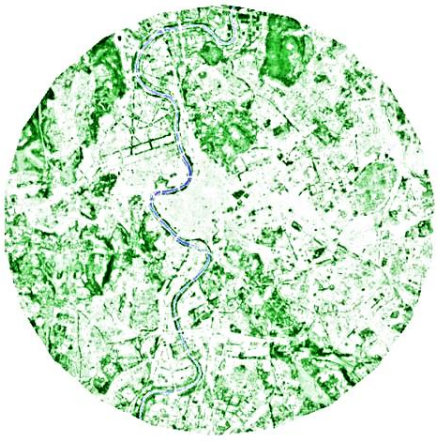
Source: Fuller and Gaston, 2009.



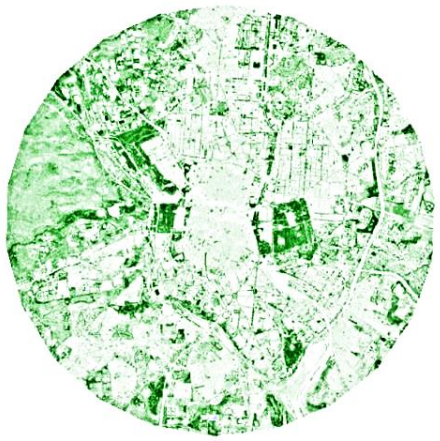
Kiev / Ukraine (NDVI 0.389)



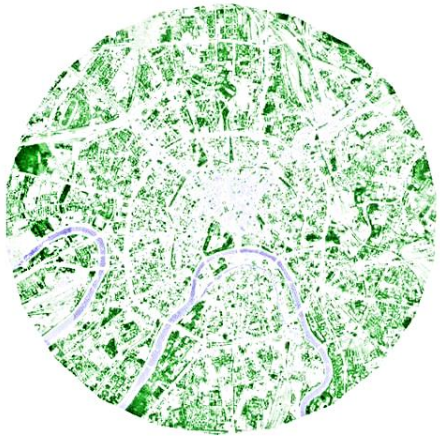
Berlin / Germany (NDVI 0.246)



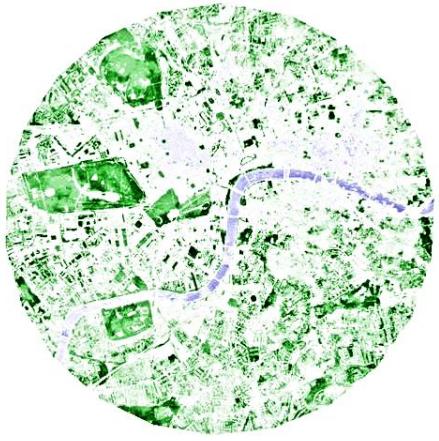
Rome / Italy (NDVI 0.17)



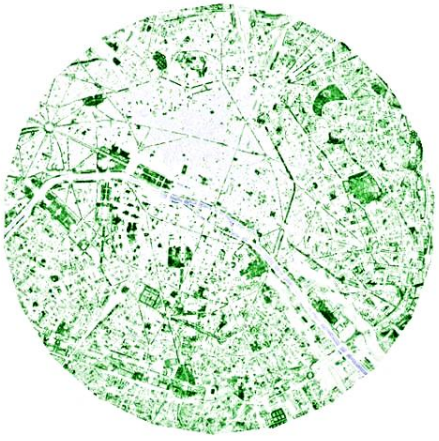
Madrid / Spain (NDVI 0.154)



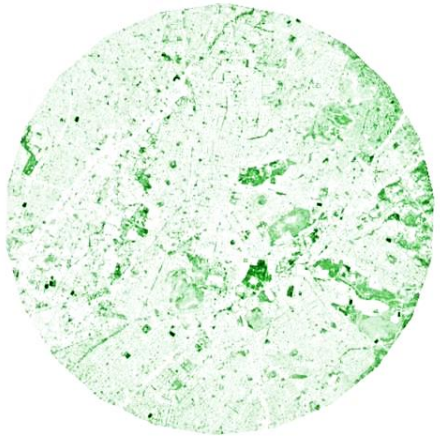
Moscow / Russia (NDVI 0.143)



London / United Kingdom (NDVI 0.135)



Paris / France (NDVI 0.119)



Athens / Greece (NDVI 0.088)

- Source: https://philippgaertner.github.io/2017/10/european-capital-greenness-evaluation/

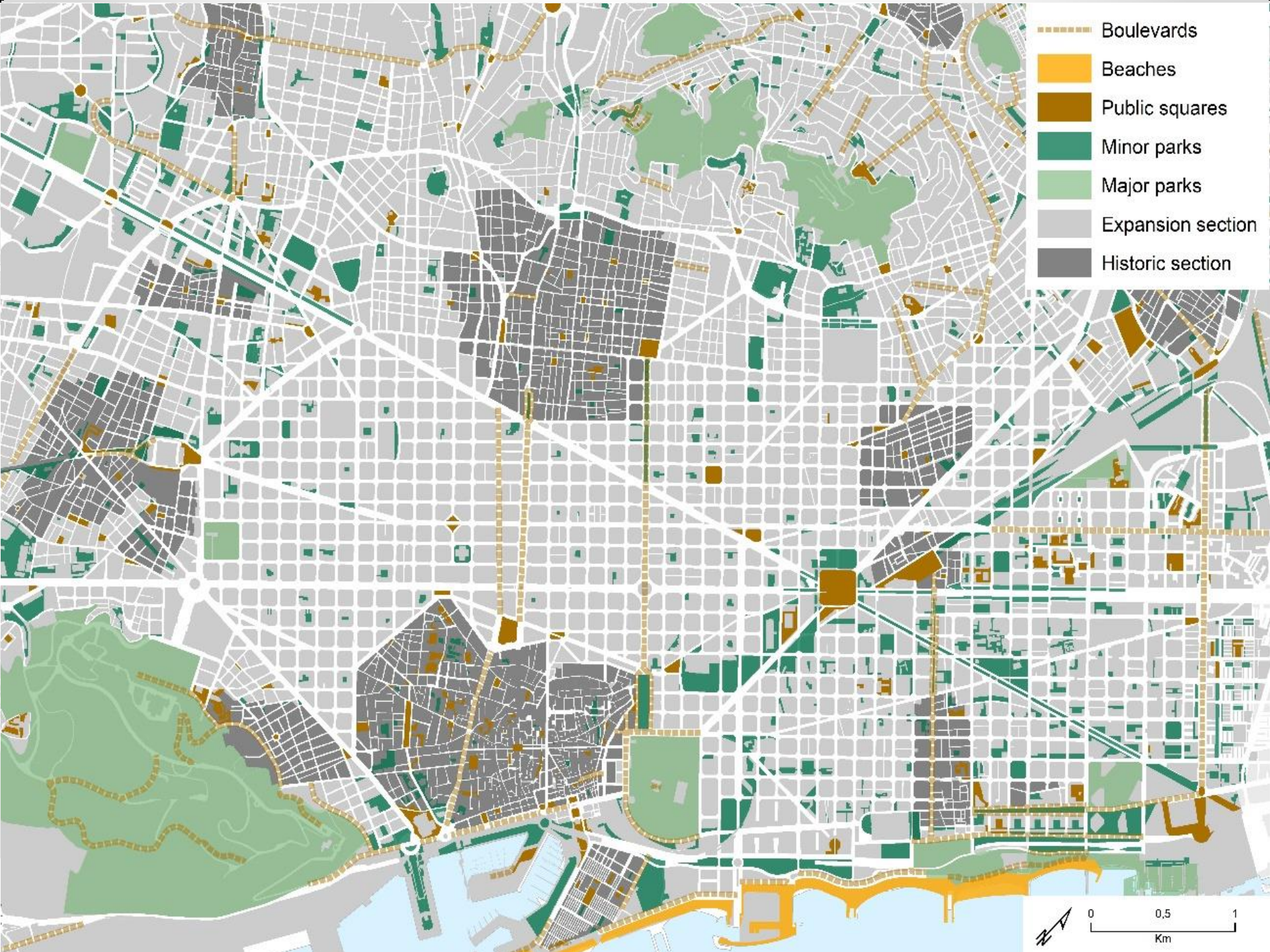
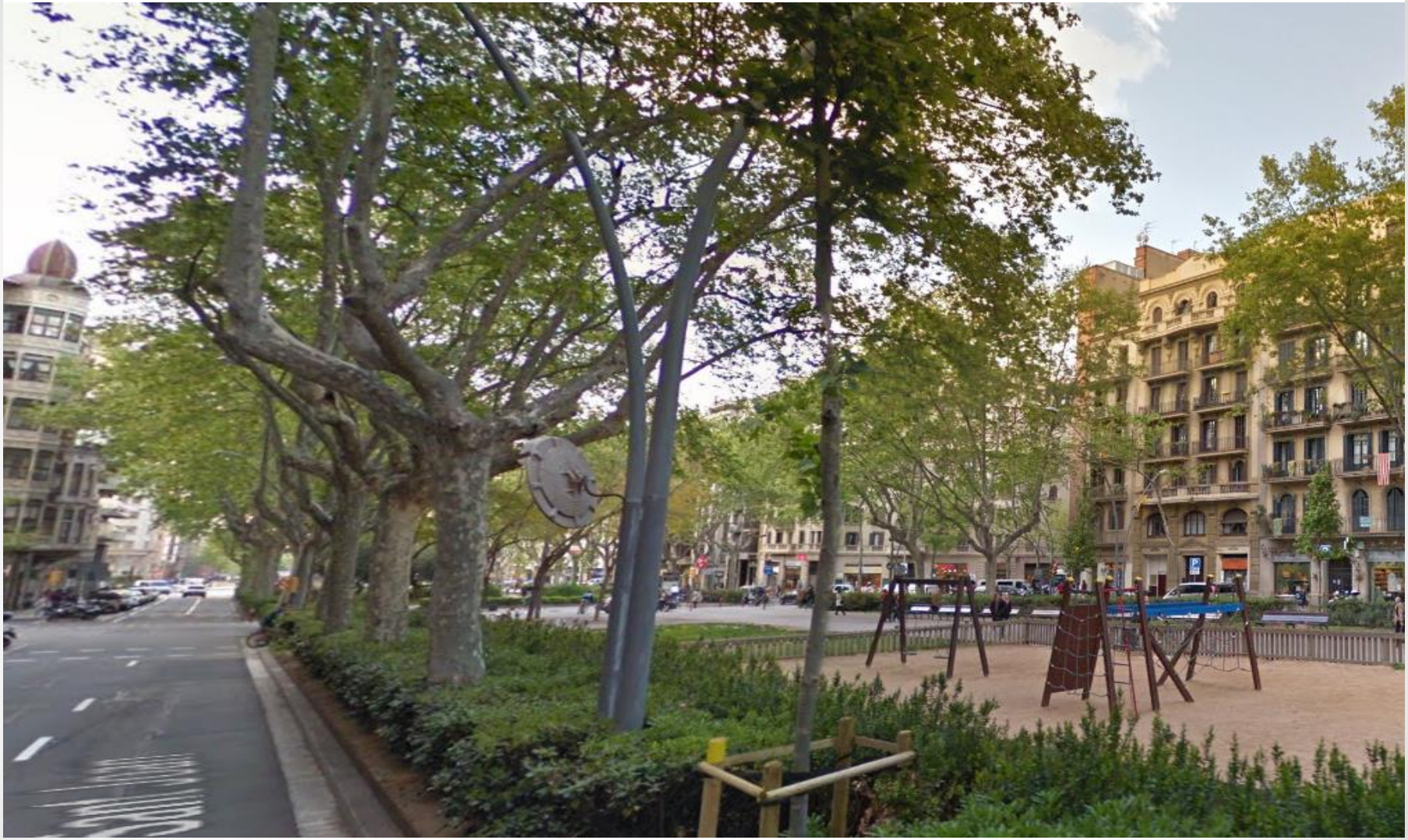

Boulevards
Beaches
Public squares
Minor parks
Major parks
Expansion section
Historic section
0
0,5
1
Km

Figure 5. Example of boulevard



Source: Google Street View

Figure 5. Example of public square or *plaza*

Source: Google Street View

Figure 3. Example of street from historic quarters

- Source: Google Street View

Figure 4. Example of a street from expansion quarters.

Source: Google Street View

Metho

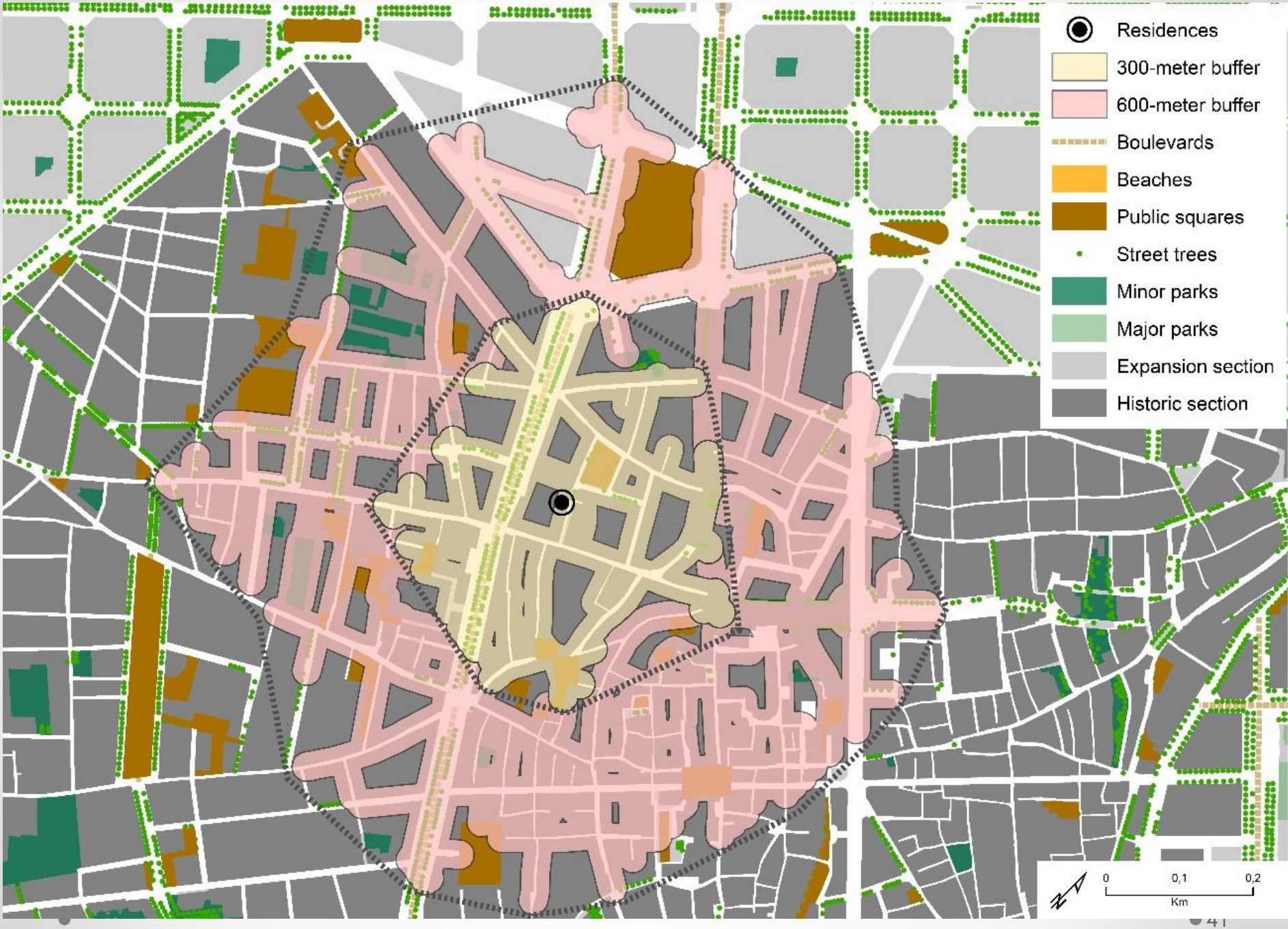
- Parks, squares, boule… …ache… available GIS data

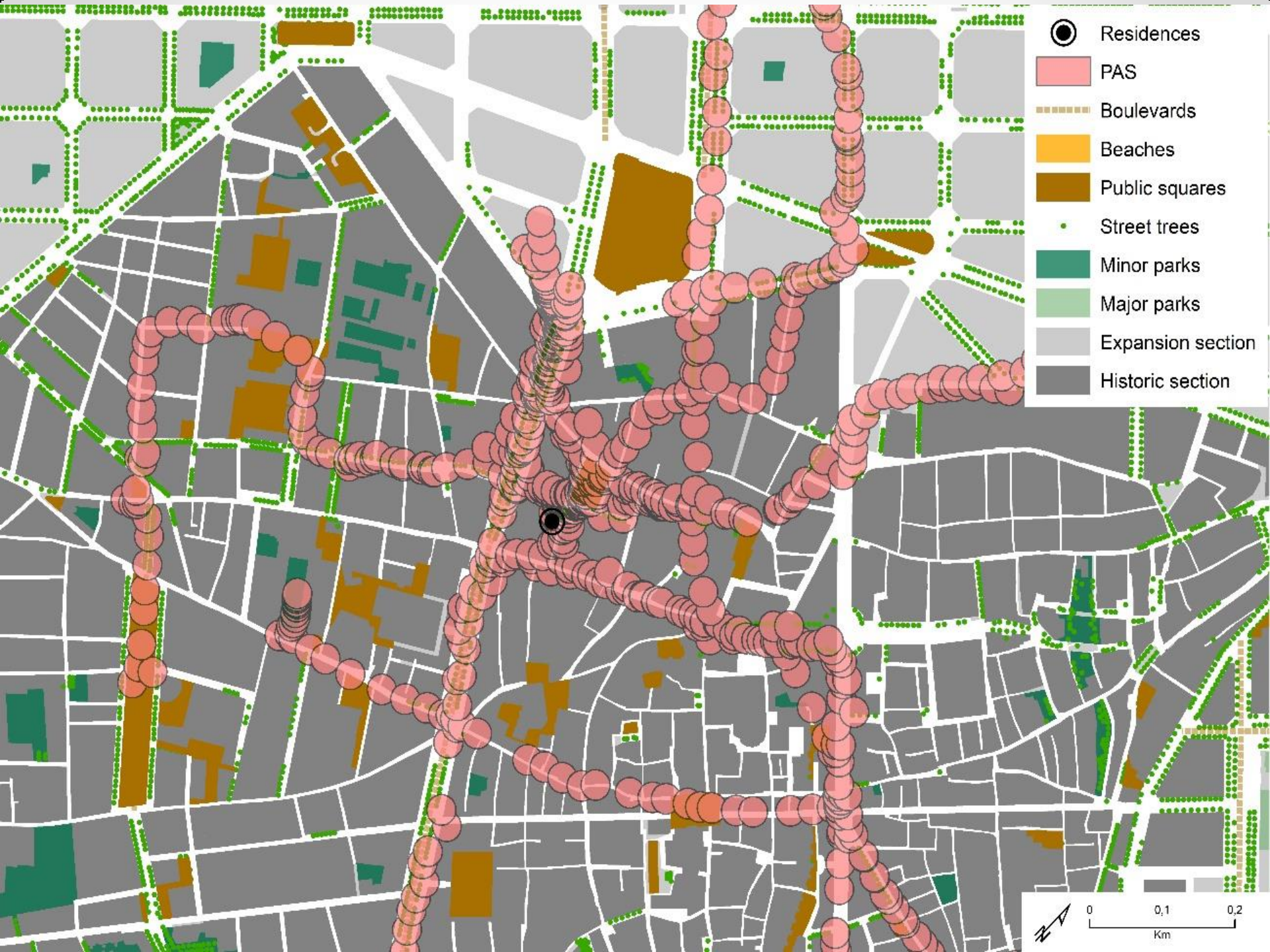
- Network buffers (300… …d 6… **exposure**.

- GPS walking tracks from MOVES a… … from Barcelona and 787 participated days (6,1 participated days per person) to obtain **pedestrian activity spaces**, buffering 20 meters around each track.

- Each participant was categorised as resident from "Historic" and "Expansion".

- The amount of greenness elements in each buffer (counts) and density (counts/km²) for each type of buffer (Hirsch et al., 2015).


Residences
300-meter buffer
600-meter buffer
Boulevards
Beaches
Public squares
Street trees
Minor parks
Major parks
Expansion section
Historic section
0
0,1
0,2
Km


Residences
PAS
Boulevards
Beaches
Public squares
Street trees
Minor parks
Major parks
Expansion section
Historic section
0
0,1
0,2
Km

Results

Table 2. Difference between types of measures of exposure to urban greenness

	Historic quarters			Expansion quarters		
	RB (300 m)	**PAS (20 m)**	**Diff. (%)**	**RB (300 m)**	**PAS (20 m)**	**Diff. (%)**
Street trees	2,895.86	3,267.52	-12.83	4,403.72	3,681.07	16.41
Squares	22.22	78.13	-251.62	8.56	17.4	-103.27
Boulevards	6.71	0.00	100.00	0.00	0.00	-
Minor parks	19.99	29.45	-47.32	39.32	68.12	-73.25
Major parks	-	0.00	-	0.00	0.00	-
Beaches	-	0.00	-	-	0.00	-

Conclusions

- Smartphone data-based measures obtained exposure to green spaces and other opens spaces traditional methods were not able to detect.
- The lack of exposure to large parks in the city of Barcelona was compensated with exposure to the greenery in streets, boulevards and public squares and gardens.
- Different urban morphologies within the city provided different greenness exposure levels.

Thank you for your attention!

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