



## The Walkable city and the importance of the proximity environments for Barcelona's everyday mobility



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### ABSTRACT

To evaluate the importance of walkable environments and neighborhood's vitality in people's everyday life, this paper analyzes proximity travel in Barcelona. Data were taken from one of the major mobility surveys in Spain, which offers the depth required to identify short walking journeys that take place within the neighborhood scale. By analyzing people's mobility patterns, we get a more accurate approach to proximity and inner-neighborhood dynamics. The analysis focuses on the frequency and purpose of these short walking trips, along with the urban settings that foster them. The study also evaluates how proximity trips are unequally distributed throughout the city and how income and population density levels can effectively promote this kind of traveling behavior.

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### Introduction

Urban proximity has been a predominant theme in the contemporary urban discourses in recent years. Within the complexity of trying to define a more sustainable urban form, and also in the context of the “mobilities turn”, the distance traveled to access urban uses and services has been found to be a key factor. Proximity dynamics have a wide array of positive outcomes from vehicle emissions to energetic consumption or the wellbeing of citizens (de Nazelle, Morton, Jerrett, & Crawford-Brown, 2010; OECD, 2012).

Despite this positive assessment of compactness and small-scale dynamics, few academic studies have addressed proximity from the people's perspective. To address this gap, this study explores how citizens of a compact Mediterranean city like Barcelona are using their most-near urban scale, and it does so through the analysis of their daily mobility, bringing a more accurate approach to this proximity dynamics.

### Compact city and urban mobility

In recent years, the Walkable city along with the compact city concepts have gained wide acceptance among academics and urban planners as sustainable urban forms for the future, capable of dealing with negative externalities of both the urban and transport models (Dempsey & Jenks, 2010; Næss, 2005; Næss, 2013). The relationship between urban form and mobility has been analyzed through three main vectors: environmental issues, the social significance of walkability, and the use of time. Variables such as high densities, a public transport supply, and mixed-use development are usually found to be key elements for improving access to local services and to promote fairer transport models (Banister 2008; Banister & Hickman, 2006; Dempsey, Brown, & Bramley, 2012; OECD, 2012).

Environmental considerations have always been at the center of the debate (IPCC, 2007; Loo & Chow, 2006; Muñiz & García-López, 2013) ever since Newman and Kenworthy (1989) stated that the built environment could effectively modify fuel and energy consumption for mobility purposes. Empirical studies have attempted to define the exact effects of urban form on transportation behaviors and modal choice (TRB, 2005, 2009; Miralles-Guasch, Martínez Melo, & Marquet Sarda, 2014).

The recovery of the pedestrian as one of the main urban actors in the city's public space has been another of the most prolific lines of research and has been addressed from different scientific

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disciplines (Alshalalfah & Shalaby, 2007). Under the new sustainability paradigm both walking and cycling for transport gain merits, as they are energy efficient and low pollutant, while also being the most democratic means of transport (Boer, Zheng, Overton, Ridgeway, & Cohen, 2007; Delbosch & Currie, 2011). Walking grants almost universal accessibility – understood as people's capacity to reach a certain place with an affordable effort (Ureta, 2008) – as everyone can be a pedestrian regardless of income, skill, gender or ethnicity (Hanson, 2010). On recent years some works on public health have also taken an interest in the compact urban form as a generator of active mobility patterns that increase people's physical activity (Koohsari, Badland, & Giles-Corti, 2013; Sung, Go, & Choi, 2013).

Finally, some authors (Miralles-Guasch, 2008; Mückenberger, 2008; Robert, 1992) have explored the impact on travel times of increased distances between everyday activities. Within a limited time budget of 24 h, increasing some travel times requires a reduction in others. The paradox is that as the functional city expands in size there has been a parallel emergence (or resurgence) of small-scale dynamics (Méndez et al., 2009). For example, as individuals travel farther to a place of employment, they are likely to seek shorter travel times to complete other activities (everyday shopping, leisure) (Gimenez-Nadal & Sevilla-Sanz, 2011). This shorter travel time results in intensified use of neighborhoods (Timmermans et al., 2002).

#### *Proximity and the compact urban form*

The near location of the diverse urban functions – residence, work, leisure, commerce, services and equipments-intensifies the use of the neighborhood. According to Banister (2008) this increases people's accessibility and improves their living environment, as the aim of mobility is not just traveling from one place to another but also arriving to the right place at the right time, with affordable costs for anyone (Peters, Kloppenburg, & Wyatt, 2010). Urban studies and public policies are also rediscovering this urban scale and with it, the pioneering work of Jane Jacobs (1961) (Jensen 2009).

But how do we study proximity? Many investigators have approached it at the territorial level, using different methodologies to measure densities and built environments (Boyko & Cooper, 2011; Brownstone & Golob, 2009). They have tried to determine how dense the city must be to have a beneficial impact on transportation patterns, or how mixed the land uses must be to achieve the diversity needed to generate proximity travel (Cera, 2003; Ewing et al. 2011; Geurs & Van Wee, 2004). In most cases, they have analyzed existing urban settlements and attempted to estimate the effects that a particular change in those urban spaces would have on people's mobility.

While this territorial aspect of proximity is undeniable, we need to go beyond topological distance to incorporate more contextual aspects, such as travel time or the built environment where these mobilities take place (Brennan & Martin, 2012). Journeys and accessibility can be treated as a temporal attribute defined by travel times, as time is as inherent to proximity as space (Banister, 2011). In other words, proximity dynamics only appear in those places that gather both nearness between origins and destinations with affordable forms of accessibility for the local population. Because of that, proximity must be understood as a combination of specific spatial and temporal attributes, a double condition that can be observed through mobility analysis.

Despite being long considered a desirable characteristic of future cities (Banister, 2011; Boyko & Cooper, 2011; Ewing, Rolf, & Don 2002; Kaido & Kwon, 2008; Kockelman, 1997; OECD 2012) urban proximity has seldom been defined or analyzed from the citizen's point of view. The present paper intends to fill this gap by

taking a different route: the study of daily journeys to determine the uses that residents make of their most immediate neighborhood.

#### *Time and space, the defining elements of proximity*

One of the difficulties of analyzing proximity from the mobility point of view lies in the lack of a linear relationship between space and travel time due to the different speed of each type of transport (Rodrigue, Comtois, & Brian, 2006). Therefore, modal choice must also be considered, in addition to travel time. To do so it is necessary to establish a definition of the brief travels. Ryley (2008) identified them as those travels that took 10 min or less to be completed, but to also estimate the covered distance on that same trip modal choice must be taken into account. In this regard, the transport means that are more related to proximity are the non motorized ones, especially walking, due to its regular speed not faster than 4.5 km/h (Rietveld, 2000). The combination of brief trips with slow speeds results in a journey that is certainly located in the neighborhood scale of the city (Fig. 1).

#### **Methodology**

Proximity analysis based on mobility patterns requires several sequential stages. We first studied how brief trips (taking no more than 10 min) are used in the city, setting out a general view of activities for which people tend to use very little travel time. Next, we focused on brief trips involving not only little time, but also being made by walking which entails covering short distances. These are the trips that have been defined as proximity trips and once they are isolated, it is possible to examine their frequency, the purposes they serve, and how they are distributed across the city. Finally, the study changes its scale to the neighborhood level, comparing the spatial distribution of proximity trips and searching potential explanatory factors.

#### *Description of Barcelona*

The area studied was the city of Barcelona, capital of the Autonomous Community of Catalonia (northeast Spain). In 2006, 1.6 million inhabitants were distributed across 10 administrative districts and 73 “*barris*”, or small neighborhoods (IDESCAT). Nearly 90% of the city's 102.2 sq km had been urbanized by 2005 and its population density has not significantly changed over the last years (Martori Cañas, 2010). Busquets (2004) described the city's morphological characteristics as dominated by a continuous, compact urban area with buildings generally not exceeding 8 or 9 floors and mixed land uses, including a commercial structure marked by small retail business. Average family income was about 17,900 Euros in 2006 with some significant differences on its distribution. Another characteristic of the compact city that is met in Barcelona is a wide-ranging system of public transport: metro, train, tram, and bus lines.

Finally, the optimal design of street patterns, which is also a significant aspect for active transport and sustainable development, is clearly fulfilled by Cerda's *Eixample*, an urban planning development with a worldwide reputation (Dura-Guimera 2003; Pallares-Barbera, Badia, & Duch 2011).

#### *Main data sources*

The main data source was the Everyday Mobility Inquiry, a wide-ranging mobility survey taken in 2006 (hereafter EMQ06) as a joint initiative of the Department of Territorial Policy and Public Works of the Generalitat of Catalonia and the Metropolitan Transport Authority of Barcelona (Autoritat de Transport

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