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The impact of the built environment on the decision to walk for short trips: Evidence from two Spanish cities

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ABSTRACT

In this study, we use a qualitative methodology to identify and compare factors of the built environment influencing the decision to walk for short trips in two different Spanish cities: Valencia and Granada. Three focus groups were held in Valencia and two in Granada with participants who undertook, at least once a week, one short non-shopping trip in any travel mode (were "short trip" is defined as less than 30–45 min walking distance). A thematic analysis of the data using the software QSR NVivo was performed after the transcription of the video recordings. Results show that participants perceive more facilitators to walking in Granada than in Valencia, explained by the smaller size of the former city and the driving restriction policy in the city centre of Granada for private cars. The main common barriers to walking in the two cities were: insecurity from crime (absence of people, a poor street lighting or walking along a conflictive area), a high density of traffic lights and walking along large avenues. In the city of Valencia, crossing multi-lane avenues and large-diameter roundabouts are deterrents to walking. In Granada, very steep streets motivate the use of alternative travel modes.

1. Introduction

Promoting sustainable travel behavior is among the objectives of the European Union to reduce CO_2 emissions from transportation (EC, 2011). Walking has attracted increasing attention in urban mobility studies in the last decades as one of the alternatives to motorized transportation. Some studies indicate that modal shift from car use to walking for short trips would reduce fuel consumption (Higgins, 2005) and CO_2 emissions (Davis et al., 2007). Additionally, active transportation is also related to health, increasing physical activity (Rabl and De Nazelle, 2012) and the prevention of chronic diseases (Woodcock et al., 2007).

Many studies have provided evidence of the association between neighborhood design and active transportation. Some reviews identify how researchers in transportation and urban planning (Hodgson et al., 2004; Hof, 2010; Saelens et al., 2003; Saelens and Handy, 2008) and in population health (Owen at al, 2004) are examining potential environmental determinants of transport-related walking.

Many of the initial studies from the transportation field found that land use factors have a pervasive influence on mobility. For example, Cervero and Kockelman (1997) found that density, land-use diversity and pedestrian-oriented designs reduce automobile trip rates and encourage non-auto travel modes. Greenwald and Boarnet (2001) results suggest that regardless of the effects that land use has on individual non-work walking trips, the impacts take place at the neighborhood level. andJoo,2004 found that the presence of sloping terrain decreases the attractiveness of walking and cycling. In addition to meso-scale (or neighborhood scale) built environmental factors such as residential density, land use mix or street connectivity, special attention should be given to micro-scale (or street level) built environment characteristics, such as the presence of trees, the width of the sidewalks, and the quality of the streets, as the roles of micro-scale elements are not well understood due to limited data availability (Lee et al., 2013; Kim et al., 2014). The current study examines macro and micro factors of the built environment determining the decision to walk for transportation.

2. Walking for transportation and the built environment

2.1. Definitions

Some studies have pointed out the importance of distinguishing between travel for utilitarian purposes (e.g. walking to work, etc.) and travel for recreation (e.g., go to the gym, to a park, to the beach, strolling, etc.) as the factors of the built environment that influence these two categories of travelling differ significantly (Cao et al., 2006; Giles-Corti and Donovan, 2002; Saelens and Handy, 2008; among others). However, in our study we are interested in built environmental

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factors influencing walking to reach a destination, also defined as walking for transportation, thus, all trips (utilitarian or for recreation) except strolling are considered as walking for transportation.

Davison and Lawson (2006) defined the built or physical environment as objective and perceived characteristics of the physical context in which people spend their time (e.g., home, neighborhood, school) including aspects of urban design (e.g., presence and structure of sidewalks), traffic density and speed, distance to and design of venues for physical activity (e.g., playgrounds, parks and school yards), crime, safety and weather conditions.

2.2. Quantitative and qualitative approaches

The relationship between walking among adults and the built environment has been observed by means of quantitative and qualitative approaches.

Quantitative methodologies use objective and perceived measures of the factors of interest to examine the link with walking for transportation. Objective measures of the built environment have been studied to explain their influence on physical activity and non-motorized travel (Cervero and Kockelman, 1997; Badland and Schofield, 2005; Handy and Clifton, 2001; Rodríguez and Joo, 2004). Some studies use objective measures of the built environment characteristics at a micro-level or larger scale around individuals' residence (Cao et al., 2009; Clark et al., 2014; Greenwald and Boarnet, 2001; Frank et al., 2007; Lovasi et al., 2013; Saelens and Handy, 2008; Shriver, 1997; Van Dyck et al., 2010). Findings by Shriver (1997) suggest that walking-activity patterns are influenced by street connectivity, mixed use areas, and outdoor seating. Cao et al. (2009) show that mixed land uses, the availability of walking infrastructures, aesthetics quality and social context are associated with walking for transportation.

Other studies examine the relationship between walking and perceptions of attributes of the local neighborhood (Craig et al., 2002; Panter et al., 2014). Craig et al. (2002) modeled the relationship between walking to work and an environment score based on 18 neighborhood characteristics, and found that with the exception of visual interest and aesthetics, each neighborhood characteristic was correlated with walking (e.g., safety from crime, traffic, etc.). Panter et al. (2014) found that the proportion of car trips increased for commuters who reported that the route became less pleasant to walk or more dangerous to cross the road.

Some studies have focused on the understanding of factors influencing the walkability of the pedestrian environment (Ewing and Handy, 2009; Kelly et al., 2011; Leslie et al., 2005; Van Dyck et al., 2010). Kelly et al. (2011) found that pedestrians consider important both traffic volume and the priority of vehicles to pedestrians. In addition, they also identified some of the factors improving pedestrian quality, such as clean pavements, connectivity and a perception of safety.

Different qualitative research techniques have been used to study how built environmental factors are related to walking for transportation. For example, Van Cauwenberg et al. (2012) used walk-along interviews with 57 adults (over 65) to find out the perceived environmental factor influencing walking for transportation. Some studies used focus groups to research on neighborhood factors and active aging (Grant et al., 2010; Michael et al., 2006; Nathan et al., 2013). Other studies using focus groups are linked to children (Loitz and Spencer-Cavaliere, 2013), or young people and older adolescents (Lake and Townshend, 2013; Simons et al., 2013).

In a qualitative exploratory study, Lockett et al. (2005) used focus-groups and a photo-voice technique to examine environmental barriers and facilitators related to walking in 13 seniors citizens in Ottawa (Canada). Photo-voice is a technique in which photographs taken by community members are used to facilitate discussion between community members (Lockett et al., 2005; Wang and Burris, 1997). Similarly, Gallagher et al. (2010) used focus-groups and a photo-voice methodology to identify the most important factors of the neighborhood environment that encourage or discourage walking in older, urban African Americans.

Recently, Ferrer et al. (2015) used focus groups in the city of Valencia (Spain) to identify built environmental factors influencing short walking distances for transportation among adults, with special attention to micro-scale attributes. This paper broadens previous research by Ferrer et al. (2015) with the aim to compare built environmental factors influencing walking short distances for transportation in two cities in Spain: Valencia and Granada. We use a qualitative approach based on focus groups because this methodology can generate large amounts of data in a relatively short time span, and the findings may be used to precede quantitative procedures (Rabiee, 2004; Onwuegbuzie et al., 2009). In addition, the uniqueness of a focus group is its ability to generate data based on the synergy of the group interaction, thus the type and range of data generated through the social interaction of the group are often deeper and richer than those obtained from one-to-one interviews (Thomas et al., 1995; Onwuegbuzie et al., 2009).

Section 2 describes the qualitative methodology; Section 3 describes the main results and Section 4 presents the conclusions of the study.

3. Methodology

3.1. The areas of study: Valencia and Granada

The two cities present very different characteristics. Valencia is the third largest city in Spain with 0.79 million inhabitants and a population in the metropolitan area of 1.8 million (INE, 2014). In the case of Granada, a medium-sized city in Spain, it has a population of 0.24 million and 0.49 million within its metropolitan area (INE, 2014). The population density of the cities is 5.864 inhabitants/km^2 in the city of Valencia and 2.699 in Granada (Monzón et al., 2016).

In terms of mobility within the cities (trips with origin and destination in the city), the modal split is shown in Table 1:

According to the Sustainable Urban Mobility Plan for Granada (2012), around 80% of walking trips are shorter than 20 min and almost 50% are beyond 10 min.

The City of Granada experimented dramatically changes in its transport system during the 1980s. Traffic is restricted in the city centre except for residents and public transport. The areas of the city with car use restrictions are shown in Fig. 1.

In terms of the public transport services, Granada has regular operation of transit buses and Valencia has also metro and tram.

Concerning the motorization rates of the cities in 2014, when focus groups were held, Valencia had a car rate of 446 per 1000 inhabitants, and a motorcycle rate of 105 per inhabitants, compared to the slightly higher rates in the city of Granada of 460 cars and 179 motorcycles (including mopeds) per 1000 inhabitants, making Granada the city with the highest motorcycle rates in Spain together with Bahía de Cadiz (Monzón et al., 2016).

3.2. Recruitment

The recruitment process of participants was carried out similarly in Valencia and Granada. Potential focus groups' participants were

Table 1
Modal split of internal mobility in the cities.
Source: Sustainable Urban Mobility Plan of Granada (2012) and Valencia (2013).

City	Walking (%)	Car (%)	Transit (%)	Other (%)
Valencia	48	24	23	5
Granada	54	19	20	7