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A gender analysis of everyday mobility in urban and rural territories: from challenges to sustainability

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Gender differences in mobility patterns between women and men have long been acknowledged. This study analyses how these differences are reproduced in different urban and rural contexts. Using mobility data from a large travel survey taken in 2006 in Spain, we examine the differences between gender mobility through age, modal split and trip purposes. Special attention is paid to how territory shapes mobility and how these territorial settings differently affect gendered mobilities. The use of this data source allows the comparison of all trips made by the total population, including all means of transport. By taking a global view on mobility, the uneven relationships that men and women have with different means of transport become more visible. After disaggregating data by age and territorial settings, results show that women are using sustainable transport modes more often than men, and travelling for more diverse reasons. Gender is thus a fundamental variable in understanding modal split and, by extension, transport sustainability, in terms of energy consumption and the emission of greenhouse gases. From this point of view, we consider women's mobility knowledge and practices – typically related to the most sustainable means of transport – as factors with rising value that could effectively guide public policy in its way to promote more sustainable mobility patterns.

Keywords: daily mobility; transport; gender; sustainable; urban; rural

Introduction

During the 1970s, transport planners in the USA began to recognize that the demand forecasts could not continue to treat the population as a monolithic block; it was necessary to differentiate various population subgroups, and then address their specific transport needs and demands. From this initial idea came the first studies that analysed women's and men's mobility patterns differently. However, these studies remained at the margins of conventional transport planning and research until the concept of daily mobility became well established (Law 1999). With this conceptual change, people became the subject of mobility analysis, and the means of transport were considered the instruments that allow a choice of different speeds of movement (Miralles-Guasch 2002). Furthermore, not only mechanical transport was considered: for the first time, but walking also became a recognized transport category in itself (Bettini 1998). Likewise, the mobility phenomenon expanded beyond the individual to the collective dimension (Ciuffini 1993) to the extent that it characterizes the living conditions of different social groups.

Recently, the concept of daily mobility has been placed squarely within the coordinates of sustainability, giving rise to the notion of sustainable mobility (Whitelegg

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1993; Polk 2004). This analytical axis is gaining in importance for two major reasons: climate change and accessibility issues. In the environmental context, the transport sector contributes greatly to the greenhouse gas (GHG) emissions to the atmosphere (Fulford 1996; OECD 2010). The sector also determines the level of access a population has to activities that shape the patterns of daily living, which is closely related to issues of social inclusion/exclusion (Hodgson and Turner 2003; Lucas 2012). In addition, territorial characteristics are of critical importance in considering these environmental and social dimensions.

In this analytical context, as Hanson (2010) and Conlon (2011) point out, the field of gender studies acquires a central role with respect to daily mobility. Gender analysis is no longer limited to differences between the mobility patterns of women and men, but it also assesses their relationship with the new values associated with sustainability (Miralles-Guasch 1998). These values identify some mobility patterns as more appropriate than others because some means of transport are clearly more sustainable than others, and gender is directly related to the modal split in a population.

The following section provides a theoretical perspective on the new mobility variables that are emerging from the sustainability perspective, and focus on recent studies that have addressed gendered mobilities. The third section offers a brief explanation of the main data sources and the study area, and details the data treatment methodology. The fourth section comprises the main analysis of gender mobility differences in distinct territorial settings in Catalonia. Finally, in the last section we discuss our results in the context of related literature and raise some potential directions for future research.

New variables in mobility analysis from the sustainability perspective

The twenty-first century will be defined by the sustainability paradigm, and that will influence the approach used for most territorial analyses. Sustainability must include environmental, economic and social dimensions, as clearly laid out in the Brundtland Report (WCED 1987). In this context, mobility and transport behaviours cannot be ignored in our efforts to understand territory, either on its urban or rural context.

Climate change is one of the key environmental issues. It is well known that most of the carbon dioxide (CO₂) emissions in today's world are generated by housing and transport (IPPC 2008). Among the GHGs covered by the United Nations Framework Convention on Climate Change, CO₂ is the most important; in 2004, it constituted 77.0% of total anthropogenic GHG emissions, of which 56.6% is generated by fossil fuel use (Rogner 2007). In 2009, the transport sector was responsible for 28.2% of equivalent CO₂ emissions in Catalonia (OCCC 2012a), a 38% increase in GHG emissions since 1990 (OCCC 2012b).

The more important information in these data is the inequality in the CO₂ emissions from different modes of transport. According to the European Environmental Agency (2007), road transport was responsible for 71.4% of total CO₂ emissions by the European Union transport sector in 2007. Any strategy promoting sustainable growth and attempting to reduce the impacts of atmospheric pollution must focus on the modal split (Miralles-Guasch 2002).

In this specific environmental matter, territory also plays a major role. Some areas facilitate the use of less contaminating transports, such as walking or cycling, thanks to their population density, distribution of public spaces or location of business activities, facilities and services. In contrast, other areas prioritize the use of a private vehicle (Gaines

and Jaeger 2009). As a result, some spaces are more or less sustainable than others, and contribute to climate change to a different extent (Whitelegg 1997; Seguí Pons et al. 2004).

In this context, the new way of approaching the study of territory, which emphasizes proximity and views the neighbourhood as a unit of daily life (Atkinson, Dowling, and McGuirk 2009), has been labelled as *New Urbanism* in the USA or *Compact City* in Europe (Maat and Timmermans 2009). This new set of urban views promotes mixed uses, compact cities and high-quality urban spaces that allow people to socialize. Its founding text and principles, *Charter of the New Urbanism* (Congress for the New Urbanism 1996), calls for a city that differs substantially from the precepts of Modern Architecture at the beginning of the twentieth century, and attempts to pave a new way for sustainable urban planning that is quite distinct from the functionalism of the Athens Charter (Young 1995). In this new urban model, walking, bicycle and public transport are the reference means of transport, in contrast with the old model that established the car as the great icon of the modern world (Rodríguez and García Palomares 2012).

The social dimension is also defining the new paradigm of sustainability. Related to daily mobility, it defines levels of social exclusion, which is in turn related to accessibility). Social exclusion is related not only to a lack of opportunities but also to a lack of access to the places where these opportunities are located (Preston and Rajé 2007). A specific place cannot be labelled as more or less accessible without taking into account the characteristics of the population that uses it – or would use it (Farrington 2007). The characteristics of each area play an important role in the accessibility of goods and services, and disadvantaged social groups are often relegated to particular residential areas (Sanz 1999; Allain 2000). This is even more important in those places where a car is essential to guarantee access to daily needs than in those where owning a private vehicle is optional or even inconvenient (Lucas, Grosvenor, and Simpson 2001). Investigating on population and land characteristics also introduces what Sheller and Urry (2006) define as *New Mobilities*, understanding mobility as far more than just carrying people. Indeed, seeing mobility as not just a means of providing access to workplaces and amenities, but also providing opportunities and constraints, freedom and limitation, justice and inequality – over time and across space (Hannam, Sheller, and Urry 2006)

The mobility models of each urban/rural area determine the degree to which citizens can participate in social and professional opportunities (Bramley et al. 2009), which is directly related to social sustainability. Within the paradigm of sustainability, and specifically its environmental and social dimensions, it is essential to analyse mobility models in different territories, stressing the use of different transport modes. Modal split has become a fundamental variable within these parameters; it is deeply unequal and the differences depend heavily on the population groups and urban/rural territories analysed.

Women's everyday mobility, knowledge and practices

Various studies conducted in very different places have shown that the characteristic features of women's daily mobility patterns differ from those of their male counterparts, due to their gender roles in the social structure (Dickinson et al. 2003; Hanson 2010). Women are more likely to use public transport and non-motorized transport, particularly walking. These characteristic features span a range of cultures and geographical locations, which underlines the structural value of these gender differences (Blumen 1994; Diaz 1995; Coutras 1996; Murakami and Young 1997; Miralles-Guasch 1998; Root 2000; Polk 2004; Rosenbloom 2006; Vance and Iovanna 2007).

There is a body of literature on mobility and gender that considers these differences to be decreasing as women increasingly use motorized private transport, travel at faster speeds and commute longer distances (Golob, Kim, and Ren 1996; Paz and Salomon 1996; Dobbs 2005; Priya and Uteng 2009). Some of this literature assesses these changes in positive terms, based on the assumption that these new mobility patterns guarantee more individual freedom, better job opportunities and greater social inclusion, thus in part redressing the marginalization and exclusion that women have experienced (Blum 2004). All in all, this positive evaluation implies that the male model (faster travel, longer commutes and more cars) is the optimum mobility model that must, therefore, be imitated. However, this assessment contradicts the fact that the less polluting means of transport, those that consume less energy and offer higher levels of accessibility and social inclusion, are precisely the non-motorized and public modes.

However, in the end most of the studies on gender and mobility have been focused on the relation between women and private transport (Law 1999). Therefore, the majority of the analyses that include time-specific knowledge and practices (Hanson 2010, 8) do so from the perspective of the automobile. One such example is the work of Siren and Hakamies-Blomqvist (2005), who define the practices and the experience quality of using and driving the car. If the sustainability concept places public and non-motorized transport at the centre of the debate, women's knowledge and practices with these modes of transport becomes increasingly important (Hamilton and Jenkins 2000).

In order to evaluate gender-based mobility models in greater depth, we need to address the question of why people need to travel and why greater speed is needed at an individual level. If the purpose of travel is to get to places to carry out daily activities, then mobility is not an end in itself. It is the means to gain access (accessibility) to those activities, and therefore the objective of public policies ranging from transport services to urban planning is to make resources available, distribute land uses, and determine equality of access to opportunities. The objective of individual-level, subjective strategies is likewise to increase individual accessibility and to avoid segregation and exclusion. This objective is not related to travelling at greater speeds, to private means of transport, or to distance, but rather to arriving at a particular place at a certain time with reasonable effort (Banister 2011).

The main purpose of this article is to illustrate the differences between men and women's mobility patterns in Catalonia, one of Spain's autonomous communities. This is a necessary starting point to be able to appreciate the various alternatives selected by both genders on a daily basis in equal contexts. The purpose of this analysis is to determine whether gender differences are reproduced across both urban and rural areas, whether the gender factor differs by age group, and whether, given the same urban conditions, young people and adults continue to reproduce gender differences.

Sources and methodology

Starting from the idea that in order to understand how gender determines journeys it is most important to treat all types of daily trips in the same way, information sources are needed that count journeys homogeneously, such as the daily travel surveys used in the present study. The reasons for choosing specific population and territorial variables for analysis are also described below.

The main source: daily travel survey

Most information sources in the social sciences now include gender as a structural variable. Therefore, quantitative mobility data that record gender (often intended only as a

variable for sampling control) can be used for a descriptive and potentially explicative assessment of mobility patterns.

In Catalonia, there is a long history of studying habitual population mobility patterns. A questionnaire on mobility was first included in the Catalan census in 1970, and was repeated during the 1981 and 2001 censuses, although only the first outbound journey of the day to work or place of study was recorded. The main data source for the present study was the Everyday Mobility Inquiry questionnaire, a wide-ranging 2006 survey (hereafter, EMQ06). The aim of the EMQ06 survey, an initiative of the Catalan government (Generalitat de Catalunya) and the Metropolitan Transport Authority (ATM & GC 2006), was to describe the mobility of the resident population of Catalonia during workdays and weekends.

The EMQ06 characterized mobility according to the reasons for any displacement (trip motivation), the means of transport used in each case, time and spatial distribution, and average time expenditure. A wide range of indicators were included, allowing a comprehensive analysis that links mobility with factors ranging from the territorial setting of each journey to specific characteristics of the individual(s) making the trip, by population segment (age, sex, socio-economic data). The territorial scope was the entire Autonomous Community of Catalonia, and 106,091 computer-assisted telephone interviews (CATI) were performed (ATM & GC 2006). The broad scope of the EMQ06 allows analysis by municipality, county and other functional or administrative units of the General Territorial Plan of Catalonia. The EMQ06 structures its data into 856 transport zones for the whole of the Catalan territory.¹

Data treatment by territory and population age

The present study takes place in Catalonia, an administrative unit located of northeast Spain. The region is divided into 947 municipalities, which are characterized as rural or urban based on a threshold of 10,000 inhabitants. There are 826 rural municipalities labelled as rural (<10,000 inhabitants), comprising 19% of the total population and 23 large cities, each with more than 50,000 inhabitants, where 54% of Catalonia's total population lives. The most common urban morphology, both for rural and urban areas, is compact development. This historical pattern has only been slightly altered since the 1970s, with the emergence of some dispersed urbanization around the major cities. Additionally, the intensive land use mix, together with a small retail tradition and the maintenance of high-quality public spaces, shape the Mediterranean urban landscape (Garcia-Ramon, Ortiz, and Prats 2004; Casellas et al. 2013; Marquet and Miralles-Guasch 2015).

These urban conditions have granted an important presence of non-motorized mobility. In 2006, 50% of total trips in the 23 large cities were made by walking, compared with 35% in rural municipalities. Alongside the size of the municipality, the offer of urban public transport is also a key factor at determining everyday mobility patterns of the resident population. Based on this premise, the Catalan Municipal Act of 2003 established urban transport to be mandatory only in municipalities with more than 50,000 residents.

Because of that, the territories selected for the study were rural municipalities (<10,000 inhabitants, with no legal obligation to provide public transport services), and those urban municipalities required by law to provide public transport (>50,000 inhabitants). Intermediate-sized municipalities (population >10,000 and <50,000) were excluded from analysis. These criteria allowed the study of two types of territorial setting with well-defined differences in mobility offerings, and to assess the role of gender as an

independent variable in the mobility patterns reported in each setting. The total population sample was 3,677,335 individuals.

Data analysis was focused exclusively on weekday travel by the active population, the social group that is most likely to be engaged with the labour sphere and therefore also has more motivations to travel. In the present analysis we have only taken into account people aged between 16 and 64 years, thereby avoiding the distortions of populations more likely to be outside the labour market. Due to the breadth and internal diversity of the age range, it was divided into three subgroups: young adults (16–29 years old), middle-aged adults (30–44) and older adults (45–64). These population subgroups correspond to the three main vital stages of the working-age population with respect to family obligations. In Catalonia, women are now having their first child at the age of 30 years (IDESCAT 2014); therefore, the young adults subgroup corresponds with the stage prior to having children, middle age with responsibility for dependent children and the older adults subgroup with decreased family responsibilities. These two factors, working age and family responsibilities, have the greatest impact on determining everyday mobility (Díaz and Jiménez 2003).

Gender mobility in rural and urban areas in Catalonia

The analysis is presented below from three key perspectives on the mobility patterns of the study population: mobility versus immobility, gender differences in mobility and trip characteristics, categorized by mode and motivation. Daily mobility was analysed to determine utilization of the various means of transport, one of the variables that most influences environmental impact, and the motivations that generated the trips, assessed by gender; these motivations reflect the various daily tasks involved, which in turn reflect gender roles.

Immobility and mobility of rural and urban populations in Catalonia

The EMQ06 data show diverse reasons for a lack of daily mobility: illnesses, working from home, being on vacation or simply not travelling every day. Of the total sample of 3,677,335 people aged 16–64 years, approximately 190,000 (5.2%) reported no displacements on a normal workday. In rural environments, this proportion was slightly higher (6.7%) than in urban municipalities (4.6%), and reached 7.7% among rural women. In either setting, the differences between men and women were noteworthy. Even within the active population, age was an important variable. Overall, the rate of non-mobility was 4.2% in the younger population, 7.2% for people older than 45 years and reached its highest point, 12.1%, among rural women older than 45 years of age (Table 1).

Having described the non-mobile population, the analysis focused on people aged 16–64 years who declared some displacement as part of everyday life in any of the rural and urban municipalities selected. On a standard business day, this population performed some 13 million trips, which account for 56% of the total trips made in Catalonia in a single day. The territorial distribution of these trips, both in urban and in rural areas, was similar to the population distribution itself – 75% of journeys and residents in the urban areas, the remaining 25% rural – and the average of 3.7 trips per day and per person was the same regardless of territorial type (Table 2).

However, analysis of trips by gender shows that women had a higher average number of trips than men in all age groups and in both types of territory. The most notable difference was in the 30- to 44-year age group: 4.2 trips by women versus 3.5 trips by men

Table 1. Percentage of non-mobile population by gender, age and municipality type.

Municipality type	Age group	Gender (%)		
		Men	Women	Total
Urban (>50,000 population, including City of Barcelona)	Young adults (16–29 years)	3.6	3.6	3.6
	Middle-aged adults (30–44 years)	3.6	4.0	3.8
	Older adults (45–64 years)	5.3*	7.2**	6.3
	Total	4.2*	5.0**	4.6
Rural (<10,000 population)	Young adults (16–29 years)	4.8	5.0	4.9
	Middle-aged adults (30–44 years)	5.0	5.4	5.2
	Older adults (45–64 years)	7.6*	12.1**	9.8
	Total	5.8*	7.7**	6.7
Total	Young adults (16–29 years)	3.9	3.9	3.9
	Middle-aged adults (30–44 years)	4.0	4.4	4.2
	Older adults (45–64 years)	6.0*	8.4**	7.2
	Total	4.6*	5.7**	5.2
<i>Population</i>		<i>1,880,772</i>	<i>1,796,563</i>	<i>3,677,335</i>

Source: Own elaboration from EMQ06.

Notes: Test: χ^2 sig = .000 all categories; adjusted residuals test, corrected.

*Significantly lower values.

**Significantly higher values.

in urban areas and 4.3 versus 3.6 in rural women and men, respectively. These data indicate that, although a higher proportion of women than men are non-mobile, among the mobile population they were the most frequent travellers, especially middle-aged women. At that age, double shifts of employment and family activities increased the number of tasks and trips. This confirms the relationship pointed out by other studies between the life cycle and gender differences in mobility patterns (Díaz and Jiménez 2003) and reaffirms the idea that territorial characteristics are not the only factors determining mobility

Table 2. Number of trips on weekdays, by gender, age and municipality type.

Municipality type	Age group	Gender (%)		
		Men	Women	Total
Urban (>50,000 population, including City of Barcelona)	Young adults (16–29 years)	3.7	3.8	3.7
	Middle-aged adults (30–44 years)	3.5	4.2	3.9
	Older adults (45–64 years)	3.5	3.5	3.5
	Total	3.6	3.8	3.7
Rural (<10,000 population)	Young adults (16–29 years)	3.6	3.6	3.6
	Middle-aged adults (30–44 years)	3.6	4.3	3.9
	Older adults (45–64 years)	3.4	3.5	3.4
	Total	3.5	3.8	3.7
Total	Young adults (16–29 years)	3.7	3.7	3.7
	Middle-aged adults (30–44 years)	3.6	4.2	3.9
	Older adults (45–64 years)	3.5	3.5	3.5
	Total	3.6	3.8	3.7
<i>Population</i>		<i>1,880,772</i>	<i>1,796,563</i>	<i>3,677,335</i>

Source: Own elaboration from EMQ06.

patterns. Daily chores, errands and activities, and with them the gender-related differences in lifecycle play a major role (Lee and McNally 2003).

Gender differences in the choice of modes of transport

Most of the studies conducted in very different locations around the world that analyse mobility from a gender perspective report that one of the major asymmetries between men and women is the mode of transport utilized for daily trips (Little 1994; Diaz 1995; Coutras 1996; Law 1999; ; Lee and McDonald 2003; Cristaldi 2005; Rosenbloom 2006). In the present population, 44.7% of journeys were made in private transport, 37.6% on foot and 17.7% by public transport². However, the overall patterns differed by gender. Women completed 44.4% of their total trips on foot, compared to 30.8% for men, 20.5% by public transport versus 14.9% for men, and just 35.1% by private vehicles, while men chose this mode in most (54.4%) cases (Table 3).

Within this general framework, there were significant differences in the modal split in urban and rural communities. In rural areas, almost 70% of displacements were made by private transport, compared to 36.4% in the urban municipalities. Walking was used for 26.3% and 41.5% of trips, respectively, and finally, public transport for just 5.1% of rural trips versus 22% in urban spaces. These differences reflect the inequality in the availability of public transport between smaller rural communities and the urban municipalities that are required to provide some kind of public service. The results were also affected by the greater difficulty of driving and parking private cars in larger, congested cities, which in many cases discourages their use. Taken together, these two factors establish a modal split (public transport and walking were more frequently used than private vehicles) favouring sustainability in urban areas. It is also true that in absolute numbers, rather than percentages, rural communities have less total population and individuals make fewer trips.

It can be said that the modal split has different proportions by gender and territory, allowing an assessment of differences between men and women in local contexts with very

Table 3. Modal choice, by gender and municipality type.

Municipality type	Mode of transport	Gender (%)		
		Men	Women	Total
Urban (> 50,000 population, including City of Barcelona)	Walking	34.4*	48.3**	41.5
	Public transport	18.6*	25.4**	22.0
	Private transport	47.0**	26.3*	36.4
	Total	100.0	100.0	100.0
Rural (< 10,000 population)	Walk	20.6*	32.3**	26.3
	Public transport	4.7*	5.6**	5.1
	Private transport	74.7**	62.1*	68.6
	Total	100.0	100.0	100.0
Total	Walk	30.8*	44.4**	37.6
	Public transport	14.9*	20.5**	17.7
	Private transport	54.4**	35.1*	44.7
	Total	100.0	100.0	100.0
Population		1,880,772	1,796,563	3,677,335

Source: Own elaboration from EMQ06.

Notes: Test: χ^2 sig = 000 all categories; adjusted residuals test, corrected.

*Significantly lower values.

**Significantly higher values.

different starting positions, such as rural and urban cores. These differences in mobility patterns were not fully explained by the differences in availability of public transport or type of municipality, because men and women chose different modes of transport regardless of the environment studied (Table 3).

In both urban and rural areas, women made greater use of more sustainable (walking and public) transport than men. In urban municipalities, 48.3% of women's trips were walking trips and 25.4% used public transport, compared to 34.4% and 18.6% of men's trips, respectively. In contrast, the rates for private transport were 26.3% versus 47%, respectively. In rural areas, women also walked more (32.3% vs. 20.6%) and used less private transport (62.1% and 74.7%), respectively; differences in the use of public transport were minimal because the availability is anecdotal in settings where it is not required by law. By gender, the mobility model in urban and rural areas is located on an axis drawn through the means of single-use transport: walking and private vehicles, with urban women located on one end, representing the greatest utilization of walking for daily mobility. Rural men are at the other end of the spectrum, with the highest use of private modes.

Might these differences of modal split by gender be a matter of age? This question was addressed by adding the study's three age groups to the analysis. Adults older than 45 years were notable because they walked on 45.1% of their trips, while middle-aged adults, aged 30 to 44 years, predominantly (51.4%) used private transport. In contrast, young adults, aged 16–29 years, made 42.7% of their trips by public transport. Walking and use of public transport was much less prevalent in rural than in urban areas: middle-aged adults travelled by private vehicle for 74% of all movements (Table 4).

Furthermore, these differences in the use of private transport are not just a matter of rurality or age, as mobility patterns of men and women were different in all age groups and in both types of municipalities. Even at the age when private vehicles are used the most, between 30 and 44 years, urban men used the car in 56.7% of all trips, compared to only 30.9% for women. In rural areas, the proportions were 80.1% for men and 68.8% for women. Thus, in middle age, when childcare and household responsibilities require higher levels of personal commitment, women more frequently used private transport, a mode that in many cases is perceived as a way of saving time. Nonetheless, women in this age group still did not equal men's usage levels.

The data indicate that not just the life cycle and type of municipality affect the differences in mobility patterns. The modal asymmetry between women and men is structural, more related to masculinity with respect to private transport and this is expressed in relation to the activities that each gender performs in everyday life. In mobility surveys, activities are expressed in terms of the reasons that motivate displacement, and gender differences are related to the reasons for movement (Sabaté, Rodríguez, and Díaz 1995; Miralles-Guasch 1998; Díaz and Jiménez 2003). Understanding these reasons support the idea that gender explains differences in mobility patterns, beyond the territorial differences and age structure.

Reasons to move, a factor in explaining gender asymmetries

According to the methodology used in many surveys of daily mobility, displacements are identified by the reasons that generate them. The EMQ06 survey classifies the various motivations into three groups, according to the daily activities that generate the movement. If we focus the analysis on the first two groups, occupational and personal reasons, the distribution by gender is very similar: 48.3% for women and 51.7% for men (Table 5).

Table 4. Modal choice, by gender, age and municipality type.

Municipality type	Age group	Mode of transport	Gender (%)		
			Men	Women	Total
Urban (> 50,000 population, including City of Barcelona)	Young adults (16–29 years)	Walk	35.3*	38.7**	37.0
		Public transport	24.1*	33.0**	28.5
		Private transport	40.6**	28.3*	34.6
	Middle-aged adults (30–44 years)	Walk	27.8*	48.6**	38.7
		Public transport	15.5*	20.5**	18.1
		Private transport	56.7**	30.9*	43.2
	Older adults (45–64 years)	Walk	41.4*	56.0**	48.9
		Public transport	17.0*	25.0**	21.1
		Private transport	41.6**	19.0*	30.0
Rural (< 10,000 population)	Young adults (16–29 years)	Walk	19.7*	24.6**	22.0
		Public transport	9.4*	12.5**	10.8
		Private transport	70.9**	63.0*	67.2
	Middle-aged adults (30–44 years)	Walk	17.4*	28.5**	23.1
		Public transport	2.6	2.6	2.6
		Private transport	80.1**	68.8*	74.3
	Older adults (45–64 years)	Walk	25.2*	43.9**	34.1
		Public transport	3.0*	4.1**	3.5
		Private transport	71.7**	52.0*	62.4
Total	Young adults (16–29 years)	Walk	31.3*	35.4**	33.2
		Public transport	20.3*	28.1**	24.1
		Private transport	48.4**	36.5*	42.7
	Middle-aged adults (30–44 years)	Walk	25.0*	43.4**	34.6
		Public transport	12.0*	15.9**	14.0
		Private transport	63.0**	40.7*	51.4
	Older adults (45–64 years)	Walk	37.1*	53.1**	45.1
		Public transport	13.3*	20.1**	16.7
		Private transport	49.6**	26.8*	38.2

Source: Own elaboration from EMQ06.

Notes: Test: χ^2 sig = 000 all categories; adjusted residuals test, corrected.

*Significantly lower values.

**Significantly higher values.

Table 5. Purpose of the trip upon gender and type of municipality. % distribution.

Municipality type	Motivation	Gender (%)		
		Men	Women	Total
Urban (> 50,000 population, including City of Barcelona)	Occupational	56.2**	39.5**	47.7
	Personal	43.8*	60.5*	52.3
	Total	100.0	100.0	100.0
Rural (< 10,000 population)	Occupational	61.2**	38.3*	50.1
	Personal	38.8*	61.7**	49.9
	Total	100.0	100.0	100.0
Total	Occupational	57.5**	39.2*	48.3
	Personal	42.5*	60.8**	51.7
	Total	100.0	100.0	100.0
Population		1,880,772	1,796,563	3,677,335

Source: Own elaboration from EMQ06.

Notes: Test: χ^2 sig = 000 all categories; adjusted residuals test, corrected.

*Significantly lower values.

**Significantly higher values.

It is known that motivations for displacement clearly differ by gender. Among men in our study, 57% of journeys were occupational (work or study); this percentage was reduced to 39% among women. Trips that were grouped into the personal category motivated 61% of women's journeys, compared to 43% for men. Furthermore, these differences were not territory-specific. Thus, in urban areas, 57.5% of journeys made by men were occupational, but only 39.2% of women's; in rural areas, the rates were 61.2% and 38.3%, respectively. These percentages indicate that the male population is involved to a lesser extent in those activities that are not work-related.

However, what is most interesting about this analysis is not only the confirmation that men and women move for different reasons but also to wonder whether they choose different ways to move when they have the same reason for movement. Indeed, only 41.3% of women chose private transport when they travelled to work; this percentage was 63.9% for men (Table 6).

The male trend to use private transport could be attributed to inevitable factors, such as the need to travel farther or to reach activities in areas less accessible by public transport, as the industrial estates usually are. However, if this were so, in the private sphere one would expect men to opt for collective and non-motorized modes, more like women's patterns. However, in our study 42.5% of men's personal journeys were made by private vehicle, compared to just 30.8% for women.

This difference occurred in both rural and urban areas, which again confirms that differences in municipalities and the availability of public transport may affect but do not eliminate the impact of gender on modal choices. Women in urban areas who

Table 6. Purpose of the trip, upon gender, municipality type and modal choice.

Municipality type	Motivation	Principal mode	Gender (%)		
			Men	Women	Total
Urban (> 50,000 population, including City of Barcelona)	Occupational	Walk	20.2*	28.5**	23.7
		Public transport	22.6*	38.8**	29.4
		Private transport	57.3**	32.7*	46.9
	Personal	Walk	51.9*	61.2**	57.4
		Public transport	12.8*	16.9**	15.2
		Private transport	35.4**	21.9*	27.4
Rural (< 10,000 population)	Occupational	Walk	13.5*	21.9**	16.6
		Public transport	5.5*	9.3**	6.9
		Private transport	81.0**	68.8*	76.5
	Personal	Walk	31.5*	38.7**	35.8
		Public transport	3.4	3.3	3.3
		Private transport	65.1**	58.0*	60.8
Total	Occupational	Walk	18.3*	26.9**	21.8
		Public transport	17.8*	31.8**	23.5
		Private transport	63.9**	41.3*	54.7
	Personal	Walk	47.0*	55.7**	52.1
		Public transport	10.5*	13.5**	12.3
		Private transport	42.5**	30.8*	35.6
<i>Population</i>			1,880,772	1,796,563	3,677,335

Source: Own elaboration from EMQ06.

Notes: Test: χ^2 sig = 000 all categories; adjusted residuals test, corrected.

*Significantly lower values.

**Significantly higher values.

moved for occupational reasons chose private transport in 32.7% of cases, roughly half as often as men (57.3%). In the case of personal mobility, women chose private transport less often (21.9%) than men did (35.4%). In rural areas, where public transport options are equally limited for both men and women, a high percentage (68.8%) of women used some kind of private transport for trips to work or studies, but again men exceeded that rate (81%). Within the personal mobility category, the gap between men and women was less but still statistically significant. This supports the hypothesis that men and women in the same circumstances, with the same reasons for displacement, make different choices.

Finally, age could be a factor that determines the observed differences. Therefore, it is necessary to isolate the age factor and corroborate or rule out gender differences.

The gender effect was again confirmed within different age groups, even with equal displacement motivations. When younger people, aged 16–29 years, travelled to study and work, 50.7% of men's travel was by private transport, compared with only 36.7% of journeys made by women. This deviation was repeated for personal mobility, with 46.2% of male journeys by private transport versus 35% of women's. In adulthood, 30–44 years, the difference was more intense: 71.7% of men's occupational displacements were made by private transport, compared to only 48.4% of women; rates for personal mobility were 42.9% and 35.9%, respectively. In the older adults in our study, the same gender pattern was observed (65.5% vs. 36.6% use of private transport for occupational trips and 33.5% versus 22.4% for personal travel (Table 7). Finally, these differences in age and gender were repeated in both rural and urban settings. While private transport was more often used in rural areas, gender differences persisted at all ages.

Table 7. Trips by modal choice, age and gender.

Age	Motivation	Mode of transport	Gender (%)		
			Men	Women	Total
Young adults (16–29 years)	Occupational	Walking	24.0*	25.6**	24.8
		Public	25.2*	37.6**	31.0
		Private	50.7**	36.7*	44.2
	Personal	Walking	40.5*	46.9**	43.7
		Public	13.3*	18.1**	15.7
		Private	46.2**	35.0*	40.6
Middle-aged adults (30–44 years)	Occupational	Walking	14.4*	25.3**	18.7
		Public	13.9*	26.3**	18.8
		Private	71.7**	48.4*	62.5
	Personal	Walking	42.5*	54.2**	50.1
		Public	8.3*	9.8**	9.3
		Private	49.2**	35.9*	40.6
Older adults (45–64 years)	Occupational	Walking	18.4*	31.4**	23.1
		Public	16.1*	32.0**	21.9
		Private	65.5**	36.6*	54.9
	Personal	Walking	56.1*	62.2**	59.7
		Public	10.3*	15.4**	13.3
		Private	33.5**	22.4*	27.0

Source: Own elaboration from EMQ06.

Notes: Test: χ^2 sig = 000 all categories; adjusted residuals test, corrected.

*Significantly lower values.

**Significantly higher values.

Discussion

Despite the different territorial realities, gender explains mobility patterns much better than other variables such as age or geographical factors. It is not only a matter of differences in the number of trips that women and men take, nor the variety of reasons for displacement. The substantial difference was in the modal choices made, even when external conditions were similar. The reasons for gender differences go much deeper, are more structural and generate the following three reflections.

First, the information used for the analysis affects our capacity to address the question raised by Hanson (2010): how does gender shape mobility? In this study, the daily mobility survey (EMQ06) includes all trips made using any means of transport and for all reasons. This feature overcomes the methodological bias of studies that only consider a single reason, usually going to work, and one type of transport, usually the personal car (Polk 2004; Best and Lanzendorf 2005). Such studies measure a type of everyday commuting in which men have a greater presence, and women are a secondary consideration (Madden 1981; Singell and Lillydahl 1986; Best and Lanzendorf 2005). The results may hide methodological weaknesses because only a part of everyday life is reflected. Therefore, the first observation from our study is that to understand how gender shapes mobility, in all its complexity, all trips must be included in the analysis. This is especially necessary in areas where walking and public transport trips are as frequent as the use of private vehicles.

The data indicated that more women fall into the group of people who are not mobile (5.7% compared to 4.6% of men), a difference that increases with age and is greater in rural areas, where 12.1% of women older than 45 years are not mobile. However, within the groups that report daily mobility, and when all the trips are counted, we cannot say that women are less mobile than men. On the contrary, the average number of daily trips by women is higher than that of men in all age groups. More specifically, women aged between 30 and 44 years perform 4.2 daily trips in urban areas, compared with 3.5 trips by men; the rates are 4.3 and 3.6, respectively, in rural areas. These results are a consequence of the multiple tasks and chores assumed by women in both the domestic and employment spheres. This situation has been analysed for Catalonia, but the results are similar to those obtained in a study of the Madrid Autonomous Community (Rodríguez and García Palomares 2012).

Many academic papers stress that a major difference in mobility patterns between men and women is in modal choice, which some authors call asymmetric modal split (Law 1999; Polk 2003; 2004; Giddings and Hovorka 2010). This situation also occurs in urban and rural areas in Catalonia: women use more sustainable means of transport, including walking and public transport. For women, 44.4% of all trips are made by walking, 35.1% by private transport and 20.5% by public transport. For men, these percentages are 30.8%, 54.4% and 14.9%, respectively. The differences are higher in urban areas, where the wide availability of public transport makes women further reduce the use of private transport in favour of the public option. Firm roots connect these differences with cultural and social factors and are manifest in the uneven relationships of men and women with private transport. Holding a driver license or having everyday access to a car also differs by gender. According to EMQ06, 68%, 92% and 91% of men aged 16–29, 30–44 and 45–64 years, respectively, have a driver license. For women those same percentages are 58%, 79% and 59%. Furthermore, if we ask those who have a driver license if they have everyday access to a car, the percentages for men are 68%, 92% and 89% whereas for women they are 55%, 77% and 54%. Hence, modal split also

reflects women's low engagement in private transport or the high engagement that men have.

Nonetheless, the most meaningful information provided by these data is not in their objective differences. It can only be assessed from the perspective of the new sustainability paradigm, within which transport modes are evaluated in relation to both environmental and social costs. These costs give value and meaning to the date on the use of certain modal transports and the resulting split.

As mentioned in the theoretical discussion, transport patterns are directly related with CO₂ emissions and the use of non-renewable energy. A second reflection that emerges from our study is that a transport system based solely on the car also contributes to social exclusion by limiting accessibility for certain population groups. In this context, walking and public transport are valued as more democratic because of more universal use by the population.

Within the sustainable paradigm, the debate does not lie in whether individual freedom is related to the use of private transport or the distance travelled (Miralles-Guasch and Martínez Melo 2012). This new paradigm is related to social habits, a key factor in modal choice (Eriksson, Garvill, and Nordlund 2008), and also with overcoming the analysis of individual trips by approaching complex mobility patterns (Shove 2010) that are located in a specific place and time (Watson 2012). Only when we understand the social, cultural and economic factors that produce mobility at a given place will it be possible to make advances in the modal changes required by the use of different means of transport. And only in this context will practices be at the centre stage, particularly women's practices related to the most sustainable means of transport and men's practices related to private transport. It is thus not a matter of examining the individual trips but how patterns and practices change everyday activities.

The third point of debate focuses on the motives that generate movements, as we observed major differences between men and women. Many of the reasons that women leave home are within the category of personal activities (60.8%); for men, the main reason is labour-related (57.5%). These differences are more pronounced in rural areas. By age, the largest differences were observed in the age range of 30–44 years, when housework and childcare are more prevalent in our study population. These differences indicate that women not have only more reasons to travel, but that these are more diverse. This is an additional element that increases the amount of displacement and the difference in the means used, compared to their male counterparts. Together with double shifts at work, these situations require that women optimize travel times, taking shorter trips with greater proximity (Marquet and Miralles-Guasch 2014).

However, the value of the trip is not related to distance or the use of private or public means of transport. From this new perspective, the value is whether these trips allow each individual to perform needed activities at reasonable cost, whether in terms of time, personal effort, monetary outlay or sustainability.

The analysis of mobility from the gender perspective, such as the relationship of women with private transport, or the labour sphere is overcoming old arguments in which men's mobility patterns set the tone. Nowadays, from the perspective of sustainability challenges, the analysis is being focused on how women's practices can be established as mobility patterns that are less harmful for the environment. Future research has a large ground to cover, as it may take several directions. One of these could possibly be to analyse gendered everyday mobility using Watson's (2012) proposals, framed on the *Theories of practice*, and to explore how they can help us understand the economic, social and cultural factors that explain gendered uses of transport. From there, qualitative methodology may shed some light on user's perceptions and hidden reasons.

Conclusion

The analysis of daily mobility in this study focused on the active population aged between 16 and 64 years and isolated two types of municipalities: small/rural (<10,000 inhabitants) and urban (>50,000). This methodological decision helped us understand the gender factor within an age range that has certain similar features because this population must combine work and personal activities in their daily lives. Our aim was to explore how gender shaped mobility in different territorial settings.

The overall volume of trips made by a population on a given working day is a reflection of their daily tasks. Mobility surveys identify a trip by the motivation that generates it, and one motive is always an activity performed outside the home. These data show how mobile women travel more and make more intensive use of the different means of transport, especially in the middle range of the 16–64 age group. Women also make use of more sustainable means of transport, including walking and public transport, the differences being higher in urban areas. In terms of the motives that generate the movements, women show a larger and more diverse number of reasons to travel.

There is a double observation to be made regarding female mobility patterns in Catalonia. The first one attains to the necessity of improving the location of services so that they can be accessible by a social group less possibilities of moving by car. This necessity is greater in rural areas, where women's smaller access to private transport should be compensated either by locating basic services on a proximity basis or by providing some kind of public transport access to them.

On the other hand, however, female mobility patterns should in no way be regarded as *handicapped* in relation to that of men's. In fact, their greater use of non-motorized modes of transport proves that it is possible to undertake everyday mobility in more sustainable ways and thus, should encourage policy measures attempting to reduce car use. Women's mobility patterns may be the answer to those who claim that private transport use is a necessity in everyday life in Catalonia, but they have to be properly complemented with adequate policy measures to exploit all of their potential.

In that sense, if the target of public policy is to promote trips made with less polluting means of transport using less energy, and providing better accessibility (walking, cycling and public transport) – the most socially and environmentally sustainable means of transport, then women's mobility should continue to be specifically assessed, recognizing that women have accumulated the knowledge needed to develop a model of sustainable mobility patterns for the future.

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Notes

1. <http://www.iermb.uab.es/htm/mobilitat/cat/emq.asp>
2. Bicycle is a rarely used transport and was neglected from the analysis due to having only a 1% usage. Non-motorized transport is thus identified exclusively with walking.

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ABSTRACT TRANSLATIONS

Análisis de género de la movilidad cotidiana en territorios urbanos y rurales: de los desafíos a la sostenibilidad

Las diferencias de género en los patrones de movilidad entre mujeres y hombres son conocidas ya desde hace tiempo. Este estudio analiza cómo estas diferencias son reproducidas en distintos contextos urbanos y rurales. Utilizando datos de movilidad provenientes de una gran encuesta de movilidad realizada en 2006 en España, examinamos las diferencias entre la movilidad de género a través de la edad, la elección modal y los propósitos de viaje. Se presta especial atención a como el territorio da forma a la movilidad y cómo estos contextos territoriales afectan diferentemente a la movilidad de género. El uso de esta fuente de datos permite la comparación de todos los viajes llevados a cabo por la población, incluyendo todos los medios de transporte. Tomando una mirada global sobre la movilidad, las relaciones desiguales que hombres y mujeres tienen con los diferentes medios de transporte se vuelven más visibles. Después de desagregar los datos por edad y contexto territorial, los resultados muestran que las mujeres utilizan medios de transporte sostenibles con más frecuencia que los hombres, y que viajan por motivos más

diversos. El género es por lo tanto una variable fundamental para entender la división modal y, por extensión, la sostenibilidad del transporte, en términos de consumo de energía y emisión de gases de efecto invernadero. Desde este punto de vista, consideramos el conocimiento y las prácticas de movilidad de las mujeres -típicamente relacionadas con los medios de transporte más sostenibles- como factores con creciente valor que podrían guiar efectivamente las políticas públicas en su camino a promover patrones de movilidad más sostenibles.

Palabras claves: movilidad cotidiana; transporte; género; sustentable; urbano; rural

城市与乡村领域中，日常生活能动性的性别分析：从挑战到可持续发展

男性与女性在能动性模式中的性别差异，早已受到认定。本研究分析这些差异如何在不同的城市与乡村脉络中再生产。我们运用2006年在西班牙进行的大型旅运调查所得到的能动性数据，藉由年龄、形态划分与旅程目的，检视性别能动性的差异。我们将特别关注领域如何形塑能动性，以及这些领域安排如何不一而足地影响性别化的能动性。使用此一数据来源，让总体人口进行的全部旅程得以进行比较，包括所有的运输方式。透过采取能动性的全球视角，伴随着男性与女性拥有不同交通工具而来的不均关系，则变得更加清晰可见。我们以年龄和领域安排分解数据后的结果显示，女性较男性更常使用可持续发展的运输模式，并为了更多元的原因进行移动。性别因此是理解形态划分的根本变因，更可推展至能源消耗与温室气体排放上的运输可持续性。就此观点而言，我们将女性的能动性知识与实践——特别是关乎最具可持续性的运输方式——考量作为影响因素，该因素拥有成长中的价值，能够有效引导公共政策、并以此提倡更可持续发展的能动性模式。

关键词：日常能动性；运输；性别；可持续发展；城市；乡村