Insecurity as a Determinant of Social Exclusion: Case Study of the City of Barcelona

La inseguridad como determinante de exclusión social: el caso de Barcelona

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Key words

Barcelona
• Neighbourhoods
• Social Exclusion
• Insecurity

Abstract

This study introduces the concept of insecurity as a theoretical resource for identifying structural factors that affect social exclusion in Barcelona. Using principal component analysis, a composite index referred to as the Social Insecurity Ranking (SIR) is constructed with the aim of studying the structure and volume of available resources in the 73 neighbourhoods of Spain's second largest city. The results suggest the need for an alternative measure of deprivation in contemporary cities that can address the relationship between social exclusion and insecurity. In particular, an analysis of the spatial distribution of the SIR in Barcelona indicates that both socially disfavoured and affluent neighbourhoods are geographically concentrated, respectively at the margins and in the north-west of the city.

Palabras clave

Barcelona
• Barrios
• Exclusión social
• Inseguridad

Resumen

La presente investigación introduce el concepto de inseguridad como recurso teórico para identificar los factores estructurales que afectan a la exclusión social en Barcelona. A raíz de un análisis de componentes principales, se calculó un índice compuesto denominado Ranking de Inseguridad Social (SIR), con el objetivo de estudiar la estructura y el volumen de los recursos disponibles en los 73 barrios de la segunda ciudad más grande de España. Los resultados dan soporte a una medida alternativa de la privación en las ciudades contemporáneas que pueda abordar la relación entre exclusión social e inseguridad. En particular, el análisis de la distribución espacial del SIR en Barcelona indica que tanto las áreas socialmente desfavorecidas como las áreas afluentes se encuentran geográficamente concentradas, respectivamente, al margen y en la zona norte-oeste de la ciudad.

Citation

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INTRODUCTION[1]

"Cities are both the main drivers of innovation and economic growth, as well as places where the biggest diversity and largest social inequalities can be found", claimed Tammaru *et al.* (2015: 5) in their recent book. The focus on cities as drivers of social exclusion is not new and goes back to the pioneering studies of the Chicago School (Park, 1915; Wirth, 1938). Recently, a renewed interest on this topic has emerged due to the sharp rise in income inequalities in urban areas across the world (Piketty, 2013). At the European level, Cassiers and Kesteloot (2012: 1910) ascribe this trend to the "drastic turn towards a predominantly market-led urban development", which has distorted the traditional urban model.

In recent decades new concepts have flourished in the literature attempting to explain the peculiarity of social exclusion in urban areas. Neil Smith (2012) dedicated his work to gentrification, conceived as a process of urban regeneration seeking to attract the arrival of new affluent residents in formerly deprived neighbourhoods. Atkinson and Blandy (2005) studied the emergence of so-called gated communities, a sort of voluntary segregation identifying residential areas characterized by controlled boundaries (often through the construction of walls under private surveillance) and inhabited by predominantly middle-class residents. For his part, Wacquant (2007) looked at ghettoization in the United States, arguing that contemporary Northern American cities are facing a process of "hyper-ghettoization" of poor Black communities. More generally, urban exclusion based on ethnicity is a particularly prominent field of study, as demonstrated by the works of Arbaci (2007) or Man-

ley and Maarten van Ham (2011). Other analyses are also worth mentioning, such as the works of Massey and Denton (1998), Kazepov (2005), Maloutas and Fujita (2012) on residential segregation, or the study of Galster and Booza (2007) on the advent of a "bipolar neighbourhood" in the United States, characterized by highly polarized demographic and socio-economic composition (i.e. predominance of very high and very low income families) with the subsequent exclusion of middle class residents.

Looking at the specific case of the city of Barcelona, scholars have also made a considerable effort to study the determinants of social exclusion in the Catalan capital. In a recent study, Rubiales *et al.* (2012) argued that Barcelona and the surrounding metropolitan area are increasingly characterised by voluntary residential segregation of the upper classes. Martori and Hoberg (2004) revealed how Pakistani, Chinese and Moroccan communities are increasingly affected by residential segregation. From a similar perspective, Bayona and Gil-Alonso (2012) studied the relationship between immigrant flows and segregation in Barcelona, while Monica Degen (2008) focused on the gentrification of the city centre.

Despite significant breakthroughs in the understanding of social exclusion in urban settings, the present study recognizes the need to fill a gap that affects current analysis, namely, the scarce attention paid to the role played by (actual and/or perceived) insecurity as a vector of urban inequality. Contemporary cities represent the concrete expression of various processes (urbanization, individualization, social and economic changes, new incoming residents, etc.), which are increasingly loaded with security issues. At the same time, recent analysis has also stressed how individuals' feelings of insecurity might depend on the precariousness of their material conditions in terms of health (Jackson and Stafford, 2009), economic status (Hummelsheim *et al.*, 2011; Wilkinson and Pickett,

2009), working conditions (Standing, 2011) and residential assets (Sampson, 2012). As such, social exclusion and insecurity appear to be strongly interlinked. Building further on this assumption, the analysis that follows is aimed at establishing the grounds for locating the concept of insecurity at the core of the debate on contemporary social exclusion by addressing the specific case of the city of Barcelona.

INSECURITY AS A THEORETICAL DEVICE TO ANALYSE SOCIAL EXCLUSION IN URBAN AREAS

The conceptualization of insecurity used in this paper evokes the work of Robert Castel (2006) and his notion of social insecurity defined as "an event that confines an individual's ability to care for his or her own social independence" (Castel, 2006: 35). The event(s) cited by Castel are heterogeneous even though they can be seen as the direct consequence of a dual process: a disconnection from the labour market and decreasing of social interactions. Rather than interpreting social exclusion as a process that separates an individual from a given society, Castel stresses the existence of three interrelated areas, namely: an area of social integration (characterized by stable work and strong relational ties, which often go together), an area of vulnerability (precarious work and relational fragility) and an area of marginality, which Castel calls "disaffiliation", considered as a combination of unemployment and social exclusion.

Therefore, in Castel's view vulnerability is a dynamic process (i.e. the prelude to marginality) that can be affected by the emergence of potential risks that citizens may face in their daily lives. Due to the structural changes that have altered the employment structure of contemporary societies, stable jobs are progressively disappearing and with them one of the pillars of social integration,

as conceived by Castel. From this perspective it can be argued that people are currently experiencing more insecurity with regard to their social position due to worsening labour and employment conditions and the weakening of social ties.

Other authors have pointed to the dynamism of the processes that may lead to social exclusion. Pierre Bourdieu, for instance, interprets the social class structure as a result of the actual volume and structure of capital (economic, cultural, social or symbolic) attributed to a group of persons sharing similar conditions of existence. The Bourdieusian concept of social class is particularly relevant here given its focus on the spatial dimension of social exclusion. In fact, Bourdieu (1999: 120) argues that "social space is enrolled simultaneously in spatial structures" or, put another way, he conceives urban areas as a *reified* social space where social agents are located and compete for scarce and desirable goods. According to this author, the study of social exclusion implies taking into account the structure and volume of capital that characterizes a given territory (a neighbourhood, for instance), which determines its position in the urban social space.

The work of Bourdieu has inspired a number of researchers in the field of urban sociology. Loïc Wacquant (2014: 12-13), for instance, has used the theoretical framework of his mentor to study the advent of advanced marginality, referred to as such "because it is not residual, cyclical or transitional but organically linked to the most advanced sectors of the contemporary political economy, and notably to the financialization of capital". The structural changes introduced by neo-liberalism led to an increased marginalization of social groups with fewer resources to cope with the loss of stable jobs and welfare provisions. The spatial concentration of these groups in deprived urban areas generates discontent, which may then lead to the emergence of violent forms of protest (as in French *banlieues* in 2005). In turn, the com-

bination of poverty and violence ends up characterizing these urban areas as no-go zones, highly stigmatized and perceived as unsafe places to live. Nevertheless, according to Wacquant (2007), a closer analysis signals how the patterns of deprivation that affect contemporary cities are not due to a rise in *criminal insecurity* (data show a decreasing trend in crime) but rather to the increasing *social insecurity* resulting from the contradictions of the neo-liberal model.

When it comes to addressing the dynamics of social exclusion in urban contexts, social insecurity encompasses the probability of exposure to risky situations that may potentially lead to a disadvantaged situation for a population in a given urban context. In turn, a negative perception of one's own living condition may lead to a process of disaffiliation and social discomfort. From this standpoint, social insecurity is a theory-driven notion that has the added value of identifying a process resulting from the accumulation of different factors of deprivation that make upward social mobility extremely difficult or, as Alguacil (2006: 161) argues, "it implies the perception of insecurity and fear of downward social mobility". In other words, social insecurity combines both objective and subjective factors: on the one hand, it depends on structural conditions that may lead to social exclusion and, on the other hand, it is also related to psycho-social factors associated with future-oriented anxieties.

OPERATIONALIZATION OF THE CONCEPT OF SOCIAL INSECURITY

The operational concept used for the purpose of the subsequent analysis was labelled "social insecurity" to reflect the overarching goal of the analysis, that is to say, exploring the relationship between social exclusion and insecurity. As such, social insecurity is understood here as a concept that allows us to address the social consequences of de-

prived living conditions on ontological security. What is more, the concept of social insecurity provides the following benefits:

- It makes a broader conceptualization of inequality possible, including contextual factors such as economic context or the demographic characteristics of the population while at the same time providing a theoretical framework encompassing a focus on the social phenomenon of insecurity and the way it is perceived (Jackson, 2006).

- It overcomes the dichotomy of inclusion/ exclusion since, in line with the research of Castel (1996), it is impossible to tackle social exclusion without including an explicit or implicit theory of citizenship as a whole.

- Lastly, according to Wacquant (2007) and his conceptualization of "advanced marginality", the notion of social insecurity encompasses factors related to new social problems arising from the economic crisis and restructuring.

Moreover, in the context of this work the concept of social insecurity should also be envisaged in its eminently urban nature. As shown by Maarten van Ham *et al.* (2012), the ecological features of places where people live influence their material conditions and perceptions. Therefore, the analysis of socio-geographic determinants of social insecurity was deemed crucial, especially in the context of current research focusing on the investigation of factors affecting social exclusion at the neighbourhood level.

The selection of variables operationalizing the construct of social insecurity was driven by two main criteria: on the one hand, the literature on social exclusion was reviewed to understand how it was defined in previous studies and to identify research that used a theoretical framework similar to the concept of social insecurity; and on the other hand, a review of both academic and institutional research on the determinants of social

exclusion in Barcelona was reviewed in order to address the specific characteristics of the context. The construct of social insecurity resulting from a desk-based analysis of the literature includes 7 different domains and 17 variables (see Table 1):

1. Demography: previous literature identifies demographic characteristics of neighbourhoods as factors that could (directly or indirectly) influence the socio-economic status of the residents and their degree of satisfaction regarding quality of life. In order to address the potential negative influence of demographic factors on social integration, two variables have been included within this domain, one identifying the percentage of foreign-born residents with the nationality of one country registering levels of income per capita below the poverty threshold (60% of the Spanish GDP per capita), and another focusing on the rate per 1,000 inhabitants that decided to move out of the neighbourhood during the previous year, either to another neighbourhood or outside the city, which could be conceived as an indicator of individuals' dissatisfaction (Sampson, 2012).

2. Socio-economic status: socio-economic inequality is among the most common fields of research in urban sociology (Nightingale, 2012). In this case, three variables have been considered: the average cost of rent per square meter, the unemployment rate expressed as the percentage of the unemployed from among the working-age population (16 to 64 years old), and the percentage of the population with no degree or professional qualification. It should be stressed that educational deficits play a particularly prominent role in relation to social exclusion as defined in the context of the present research, since they are seen as generating a number of spill-over effects, especially in combination with significant emotional phenomena such as insecurity, fear of crime or victimization. Moreover, according to Baudains *et al.* (2016), educational attainment is a consistent indicator of feelings of safety in the neighbourhood, which permits the introduction of an indirect measure of subjective elements related to social exclusion.

3. Socio-geographic deprivation: the household income index has been used as the proxy measure for socio-geographic deprivation, conceptualized as a measure of the effects of living in a particular area. Although the name of this index may be misleading, it is not in fact a household-based index but, according to the definition given by the Technical Programming Council of the Municipality of Barcelona (2014), it is rather a neighbourhood-based index combining measures from five different variables: (1) graduation rate (higher education); (2) unemployment rate; (3) car ownership rate; (4) power output of new cars acquired by residents; (5) market prices of real estate. The household income index is created from the combination of the above-mentioned variables and its value is calculated in relation to the mean for the city, fixed to 100.

4. Welfare: public spending and welfare allowance can mediate the negative effects of deprivation (Esping-Andersen, 1990; Vieno, Roccato and Russo, 2013). In the Catalan welfare system, non-contributory pensions are allocated to individuals that do not qualify for a state pension (non-contributory pensions for retirement) or who have been affected by severe disabilities that prevent them from enjoying equal opportunities in the labour market (non-contributory pensions for disability). As such, two variables have been selected to operationalize the welfare domain: the percentage of recipients among residents over 65 years old and percentage of recipients among residents from 18-65 years old.

TABLE 1. *List of domains and variables operationalizing the construct of "social insecurity"*

Domains	Variables	Year of reference	Mini-mum	Maxi-mum	Mean	SD
Demography	1. Foreign-born citizens (from countries with low GDP per capita)	2015	2.5	36.6	8.8	5.8
	2. Migration rate	2014	19.2	53.4	32.6	8.0
Socio-economic status	3. Monthly rental cost	2016	7.7	18.6	11.8	2.3
	4. Unemployment rate	2015	3.8	19.4	9.6	3.2
	5. No qualification	2015	1.7	8.7	5.0	2.0
Socio-geographic deprivation	6. Household income index	2014	34.7	251.7	91.3	43.9
Welfare	7. Non-contributory pensions (retirement)	2013	0.9	8.2	2.5	1.5
	8. Non-contributory pensions (disability)	2013	0.1	4.8	1.1	0.9
Health	9. Low birth weight rate	2014	2.4	15.6	6.9	1.9
	10. Tuberculosis rate	2014	0.0	118.2	20.7	16.8
	11. Adolescent fertility rate	2014	0.0	66.0	10.7	11.9
	12. Severe disabilities	2014	1.1	5.2	2.1	0.6
Crime	13. Crimes against a person's physical integrity	2014	0.2	10.5	1.8	1.7
	14. Street robbery	2014	0.7	31.5	4.8	5.0
	15. Domestic abuse	2014	0.0	13.4	1.3	1.6
	16. Gender-based violence	2014	0.8	25.6	6.0	4.6
Participation in deci-sion-making	17. Electoral abstention	2015	29.3	64.8	41.7	7.3

5. Health: personal well-being and good health are pre-conditions for the use and enjoyment of urban spaces. Accordingly, health has gained importance in studies on social exclusion (Auchincloss and Hadden, 2002; Ompad *et al.*, 2007; Sheard and Powers, 2000). In this case, following the recommendations of the World Health Organization (2010), four variables are addressed to operationalize this domain: low birth weight rate expressed as the rate of newborn infants with a weight of less than 2500 grams, the rate of new smear-positive TB cases diagnosed, the adolescent pregnancy rate among girls/women aged 15-19 and the percentage of persons affected by severe disabilities (i.e. degree of disability greater than 75%).

6. Crime: higher levels of crime are directly associated with the deterioration of urban and social environments (Ceccato, 2012; Espelt *et al.*, 2008; Graham and Chaparro, 2011). Although crime data are affected by the so-called "dark figure" (i.e. not all crimes that occur in a given area are reported to or recorded by the police, which implies that the data cannot be completely exhaustive), they are nevertheless the most reliable source available for research aiming at an analysis of differences in terms of victimization at the neighbour-

hood level in Barcelona. In fact, alternative sources such as the local victimization survey called the *Encuesta sobre Segure-tat Pública de Catalunya* does not permit a reliable statistical analysis at the sub-city level due to its limited sample. Previous research has shown that crimes against property and against people have a huge impact on an individual's well-being, thus justifying the inclusion of four typologies of crime within this domain: crimes against a person's physical integrity, including hom-icide/murder, attempted homicide/murder, threats, injuries and sexual assaults (rate per 1,000 inhabitants), robberies with vio-lence in public spaces (rate per 1,000 in-habitants), domestic abuse reported to the police (rate per 1000 inhabitants) and gen-der-based crimes (rate per 1,000 women over the age of 14). These statistics are produced by the police of the *Generalitat de Catalunya – Mossos d'Esquadra*.

7. Participation in the decision-making pro-cess: Sampson *et al.* (1997) consider that collective efficacy, conceived as neigh-bours' active involvement in public life, is an indicator of social cohesion. Even though the variable identifying the rate of electoral abstention does not give a com-prehensive picture of citizens' participa-tion, it has been used as a proxy meas-ure, as previously seen in a study coordinated by Subirats (2005).

OBJECTIVES

The overriding aim of the analysis was to ex-plore the relationship between social exclu-sion and insecurity in the specific context of the city of Barcelona. Building further on the theoretical conceptualization and operation-alization of social insecurity presented above, a statistical procedure has been implement-ed in order to generate an index, referred to as Social Insecurity Ranking (SIR), that es-tablishes a classification of the 73 neighbour-

hoods of Barcelona across the 7 domains considered in Table 1. Ultimately, the study represents an attempt to provide an alterna-tive measure of social exclusion in contem-porary urban areas that could encompass a focus on actual and/or perceived insecuri-ties.

Data and methods

Data for each of the 17 variables of interest were publicly available and retrieved from the website of the Department of Statistics of the Municipality of Barcelona (except for the in-formation on crime, gathered thanks to the collaboration of the Department of the Interi-or of the Autonomous Region of Catalonia). An Excel database was created to classify the information gathered. In some cases, ad-ditional calculation was needed in order to convert the original variables into variables expressed with common denominators (rates per 1,000 inhabitants/households or per-centages). Data cover the whole city, defined as the continuous built-up area administra-tively sub-divided into 10 districts and 73 neighbourhoods.

Two preliminary steps were taken before computing a single index allowing for the establishment of a ranking of neighbour-hoods according to their degree of social insecurity: *z*-scores and principal compo-nent analysis. The entire analysis was per-formed using the statistical software IBM SPSS Statistics 23.0.

The first step involved determining wheth-er a measure of one variable was either high or low in relation to the other neighbour-hoods. To do so, standardized scores for each neighbourhood were calculated follow-ing the formula below:

$$z = (x - mu) / sigma$$

where:

x is the variable of interest for a particular neighbourhood,

mu is the mean of the variable across all neighbourhoods in the same city, and

sigma is the standard deviation of the variable across all neighbourhoods in that city.

The standardized score indicates the number of standard deviations away from the mean each neighbourhood is in each dimension, making possible the establishment of a measure of comparison between the neighbourhoods. The sign of the value of *z* for a particular neighbourhood (i.e. positive or negative) determines whether that neighbourhood falls either above or below the mean value in the city for that particular dimension and, as such, whether it is "high" or "low" on each dimension. Considering that the *z*-scores could have been either positive or negative, a conversion was needed for the sake of clarity according to the "meaning" of the variable in relation to the theoretical framework. For example, this was the case for economic-related indicators given that relatively low values in the original variables (low family income or a low percentage of unemployment) could suggest opposite levels of social insecurity, higher levels in the former and lower levels in the latter. To sum up, *z*-scores with positive values identify higher levels of social insecurity for a given neighbourhood. Therefore, standardization was conceived as a first step before running a principal component analysis, which is in line with the suggestion of Bolch and Huang (1974).

The second step involved principal component analysis (hereinafter referred to as PCA), which was conducted with orthogonal rotation (varimax). The outputs of the PCA allowed for the identification of: (1) the factor loadings that were used as a measure of the variable weights within each factor and (2) the factor weights as a portion of the combined variation explained by each factor.

With this information, it was possible to calculate a combined score for each factor: the average of the variables included in the factor, weighted by the corresponding factor loading.

The composite index score, labelled Social Insecurity Ranking (SIR) was computed based on the weighted sum of the *z*-scores of the original variable included in the analysis composing each of the components detected through the implementation of the PCA.

RESULTS

Correlations between the standardized values of the 17 variables included in the analysis are shown in Table 2. The strongest correlation can be appreciated between the variables for household income index and monthly rental cost. The correlation is positive ($r = 0.941$; $p < 0.01$) suggesting that people living in areas where the monthly rental cost is higher compared to other neighbourhoods also register higher levels of household income. The household income index is strongly correlated with the other two variables associated with the socio-economic status of residents, namely: the unemployment rate ($r = 0.765$; $p < 0.01$) and the variable identifying the percentage of population with no degree or professional qualification ($r = 0.754$; $p < 0.01$). In line with initial expectations, the unemployment rate and the percentage of individuals with no qualifications show strong positive correlation ($r = 0.711$; $p < 0.01$).

The variable identifying crimes against a person's integrity strongly correlates with the variables referring to the other offences included in the analysis: street robbery ($r = 0.684$; $p < 0.01$), domestic abuse ($r = 0.656$; $p < 0.01$) and gender-based violence ($r = 0.790$; $p < 0.01$). Gender-based violence and domestic abuse are also strongly correlated ($r = 0.753$; $p < 0.01$).

Lastly, it was also observed that the variable labelled electoral abstention strongly correlates with several variables included in the analysis. Particularly remarkable are the correlations with socio-economic variables

such as the unemployment rate ($r = 0.720$; $p < 0.01$) and the household income index ($r = 0.635$; $p < 0.01$), and with health-related variables including the adolescent fertility rate ($r = 0.786$; $p < 0.01$) and incidence of severe disabilities ($r = 0.670$; $p < 0.01$), as well as the variable labelled foreign-born citizens ($r = 0.613$; $p < 0.01$).

PCA on the 17 variables of interest was run to observe the eigenvalues for each component in the data. Four components had eigenvalues over Kaiser's criterion of 1 and in combination explained 78.99% of the variance. At the same time, the scree plot was quite ambiguous and showed two potential points of inflection that would justify retaining either 3 or 4 factors. As such, using a graphic method, also known as Cattell's scree test (Cattell, 1966), the PCA was repeated requiring the SPSS software to extract only three factors, which seems to better reflect the interpretation of the scree plot. Recommendations could be found in the literature to retain all components in the descent before the first one on the line where it levels off (Stevens, 2002). The three factors extracted accounted for 72.63% of the total variance in the data. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.769, above the commonly recommended value of 0.6 (Kaiser and Rice, 1974), and Bartlett's test of sphericity was significant, x^2 (136) = 1278.30, $p < 0.01$, indicating that correlations between the variables were sufficiently high to conduct PCA.

For the first component, variables associated with socio-economic vulnerability (family income below the city average, high unemployment rates, low educational attainment), geographic deprivation (measured through the proxy variable of monthly rental prices), poor health (low birth rates, adolescent fertility rates and high percentages of persons affected by severe disability) and political disaffection (high percentage of electoral abstention during the municipal election in 2015) showed strong positive factor loadings (i.e. the variables share positive correlation with the latent component). The first component accounted for 31.68% of the total variance. For the second component, accounting for 22.29% of the total variance, variables associated with high levels of police recorded crimes (street robberies, crimes against a person's integrity, gender-based violence and domestic abuse) move together with welfare indicators (rate of welfare recipients of non-contributory pensions for retirement and disabilities). The six variables within this component all have strong positive loadings. For the third component, two demographic variables identifying the percentage of foreign-born residents coming from countries with low income per capita and the migration rate (rate of people that move out the neighbourhood) are associated with relatively higher rates of persons being diagnosed with tuberculosis. The third component accounted for 18.65% of the total variance.

A cut-off value of 0.5 was sought when deciding upon the number of variables to be retained within each component. As illustrated in Table 3, the variable named "Non-contributory pensions (disability)" showed factor loading values above the cut-off point in both components 1 and 2. Cronbach's α coefficient was calculated in order to decide whether this variable was more correlated with component 1 or 2. Cronbach's α suggested that the variable identifying the rate of the population receiving public assistance for disability forms a more meaningful latent factor together with the variables included in component 2. More generally, Cronbach's α value was 0.922 for component 1, 0.870 for component 2 and 0.846 for component 3. According to many analysts (Bland and Altman, 1997; DeVellis, 2003), a value of 0.70 or higher is needed to accept the set of items as being related to a single latent factor. This threshold was satisfied for all the components suggesting they all have high reliability. Therefore, the analysis of the outputs of the PCA showed the existence of three latent

TABLE 2. *Correlation matrix*

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17
V1	1.000																
V2	0.747	1.000															
V3	0.367	0.117	1.000														
V4	0.440	0.228	0.666	1.000													
V5	0.203	0.010	0.744	0.711	1.000												
V6	0.427	0.190	0.941	0.765	0.754	1.000											
V7	0.543	0.434	0.355	0.255	0.147	0.276	1.000										
V8	0.304	0.174	0.581	0.507	0.510	0.489	0.723	1.000									
V9	0.022	0.115	0.448	0.502	0.567	0.456	0.168	0.451	1.000								
V10	0.714	0.477	0.262	0.480	0.141	0.338	0.356	0.222	0.007	1.000							
V11	0.420	0.328	0.583	0.648	0.631	0.552	0.601	0.720	0.438	0.266	1.000						
V12	0.325	0.344	0.492	0.354	0.432	0.430	0.618	0.757	0.474	0.225	0.498	1.000					
V13	0.377	0.122	0.312	0.411	0.234	0.275	0.441	0.539	0.143	0.477	0.368	0.292	1.000				
V14	0.347	0.309	−0.072	0.096	−0.153	−0.027	0.425	0.216	−0.135	0.423	−0.002	0.202	0.684	1.000			
V15	0.246	−0.092	0.381	0.147	0.288	0.234	0.422	0.535	0.007	0.078	0.391	0.217	0.656	0.246	1.000		
V16	0.442	0.217	0.513	0.406	0.398	0.404	0.491	0.637	0.233	0.394	0.530	0.465	0.790	0.362	0.753	1.000	
V17	0.613	0.461	0.650	0.720	0.657	0.635	0.634	0.792	0.503	0.525	0.786	0.670	0.565	0.282	0.377	0.676	1.000

Legend

V1: Foreign-born citizens

V2: Migration rate

V3: Average cost of rent per square meter

V4: Unemployment rate

V5: No qualification

V6: Household income index

V7: Non-contributory pensions (retirement)

V8: Non-contributory pensions (disability)

V9: Low birth weight rate

V10: Tuberculosis rate

V11: Adolescent fertility rate

V12: Severe disabilities

V13: Crimes against a person's physical integrity

V14: Street robbery

V15: Domestic abuse

V16: Gender-based violence

V17: Electoral abstention

components that have been respectively identified as: social inequality, objective insecurity and demographic vulnerability. The Social Insecurity Ranking (SIR) was then the result of the weighted sum of the original variable included in the analysis composing each of the three components. As an example, the variable weight of component 1 was calculated as follows: (0.889/6.075)*100 (variable 1 weight = 14.63%) + (0.843/6.075)*100 (variable 2 weight = 13.87%) + (0.834/6.075)* 100 (variable 3 weight = 13.73%), and so on. Furthermore, recognising that each factor explains a different portion of the variance, their weight resulted from the ratio of the percentage explained by each of them divided by the cumulative variance explained by the three retained components. The components have been weighted as follows: (31.68/72.63)*100 (component 1 = 43.62%) + (22.29/72.63)*100 (component 2 = 30.69%) + (18.65/72.63)*100 (component 3 = 25.68%). The ranking resulting from the weighted sum of these three components allowed for the establishment of a classification of neighbourhoods according to their degree of social insecurity. Table 4 shows the rank of the 73 neighbourhoods of the city of Barcelona according to the SIR. Positive values indicate areas with high deprivation, whereas those with negative values indicate relative affluence. A score of 0 represents an area with overall mean values.

The SIR puts the neighbourhoods of District 5 (Sarrià-Sant Gervasi) and District 4 (Les Corts) within the most affluent area. Other well-off areas are located along the seaside, namely, the neighbourhoods of Diagonal Mar i el Front Marítim del Poblenou and Vila Olímpica del Poblenou, both having been involved in a huge process of urban regeneration within the context of the organization of the Olympic Games held in Barcelona in 1992. At the opposite end of the ranking, social insecurity seems to be mainly concentrated on the outskirts of the city. The most deprived neighbourhoods, according

TABLE 3. *Rotated Component Matrix*

	Components		
	1	2	3
Low educational attainment	0.889	0.102	-0.017
Low family income index	0.843	0.074	0.249
Monthly rental cost	0.834	0.202	0.141
Unemployment	0.785	0.123	0.335
Low birth weight	0.710	-0.019	-0.034
Adolescent fertility rate	0.705	0.342	0.260
Electoral abstention	0.683	0.449	0.470
Severe disabilities	0.626	0.381	-0.237
Crime against person	0.138	0.860	0.230
Domestic abuse	0.163	0.831	-0.106
Gender-based violence	0.339	0.789	0.210
Non-contributory pensions (disability)	0.601	0.634	0.096
Street robbery	-0.292	0.611	0.437
Non-contributory pensions (retirement)	0.218	0.574	0.453
Foreign-born residents	0.186	0.208	0.888
Migration rate	0.060	-0.031	0.872
Persons diagnosed with tuberculosis	0.139	0.229	0.753
Total factor loading (above cut-off point)	6.075	4.299	2.514
Total variance explained	31.68%	22.29%	18.65%
Components' weight	43.62%	30.69%	25.68%

to the SIR, are La Marina del Prat Vermell (including the industrial area surrounding the port of Barcelona, known as Zona Franca) and Vallbona, respectively located in Districts 3 (Sants-Montjuïc) and 8 (Nou Barris). Both neighbourhoods are also characterized by a clear geographic isolation that accentuates their marginalization. In the case of La Marina del Prat Vermell, for instance, neighbourhood associations have for decades been calling for a new metro station that would better connect them to the rest of the city. Apart from that, this area is also delimited by natural boundaries (the sea, to the south, and Montjuïc mountain, to the east). Similarly, the urban features of the neighbourhood of Vallbona establish a clear geographical separa-

TABLE 4. *Full list of neighbourhoods according to Social Insecurity Ranking (SIR). Socially insecure areas are at the top of the rank while lower values placed at the bottom identify affluent areas in the city of Barcelona. The table also shows the ranking values for each component that emerges from the Principal Component Analysis, respectively labelled social inequality (C1), objective insecurity (C2) and demographic vulnerability (C3)*

Rank	Dist.	Neighbourhoods	C1	C2	C3	SIR
1	3	La Marina del Prat Vermell	2.94	0.87	0.02	3.83
2	8	Vallbona	1.98	0.09	−0.01	2.06
3	9	Baró de Viver	1.23	0.51	0.15	1.89
4	8	Torre Baró	1.27	0.43	0.14	1.83
5	1	El Raval	−0.15	0.46	1.10	1.41
6	7	La Clota	0.29	1.13	−0.19	1.23
7	7	Montbau	1.38	−0.04	−0.11	1.22
8	8	La Trinitat Nova	0.83	0.15	0.23	1.21
9	8	Can Peguera	1.18	0.30	−0.29	1.18
10	8	Ciutat Meridiana	0.40	0.14	0.57	1.11
11	1	La Barceloneta	0.31	0.40	0.31	1.01
12	3	La Font de la Guatlla	0.94	−0.06	0.03	0.91
13	10	El Besòs i el Maresme	0.27	0.11	0.48	0.85
14	9	La Trinitat Vella	−0.02	0.13	0.48	0.60
15	8	El Turó de la Peira	0.45	−0.03	0.15	0.58
16	8	Les Roquetes	0.37	0.05	0.15	0.56
17	8	Verdun	0.40	0.05	0.08	0.52
18	1	El Barri Gòtic	−0.45	0.52	0.43	0.51
19	3	El Poble Sec	−0.07	0.11	0.39	0.42
20	8	La Guineueta	0.65	−0.11	−0.16	0.38
21	3	La Marina de Port	0.33	0.00	0.04	0.37
22	1	Sant Pere Santa Caterina i la Ribera	−0.28	0.21	0.33	0.26
23	8	Porta	0.35	−0.08	−0.02	0.25
24	10	La Verneda i la Pau	0.39	−0.07	−0.09	0.23
25	7	Sant Genís dels Agudells	0.30	−0.17	0.02	0.15
26	6	La Salut	0.33	−0.11	−0.07	0.14
27	9	El Bon Pastor	0.03	0.05	0.04	0.12
28	9	El Congres i els Indians	0.26	−0.09	−0.09	0.08
29	7	El Carmel	0.13	−0.02	−0.08	0.03
30	3	Hostafrancs	−0.21	0.07	0.17	0.03
31	8	Canyelles	0.34	−0.04	−0.29	0.01
32	10	Sant Marti de Provençals	0.23	−0.12	−0.12	−0.01
33	8	La Prosperitat	0.13	−0.11	−0.04	−0.02
34	7	La Teixonera	0.05	−0.06	−0.03	−0.03
35	8	Vilapicina i la Torre Llobeta	0.19	−0.14	−0.11	−0.05

...

TABLE 4. *(continued)*

| Rank	Dist.	Neighbourhoods	C1	C2	C3	SIR
36	6	El Coll	0.19	–0.11	–0.16	–0.08
37	7	Horta	0.08	–0.09	–0.08	–0.09
38	2	Sant Antoni	–0.10	–0.06	0.04	–0.12
39	3	La Bordeta	–0.08	–0.10	0.05	–0.13
40	3	Sants Badal	–0.26	–0.11	0.17	–0.20
41	3	Sants	–0.23	–0.10	0.13	–0.20
42	4	La Maternitat i Sant Ramon	–0.01	–0.16	–0.03	–0.21
43	10	El Camp de l'Arpa del Clot	–0.18	–0.10	–0.03	–0.31
44	2	La Sagrada Família	–0.16	–0.12	–0.04	–0.33
45	9	Sant Andreu	–0.05	–0.12	–0.16	–0.34
46	10	El Parc i la Llacuna del Poblenou	–0.35	0.10	–0.10	–0.35
47	9	Navas	–0.20	–0.11	–0.09	–0.39
48	7	El Baix Guinardó	–0.15	–0.17	–0.08	–0.40
49	7	Can Baró	–0.14	–0.08	–0.19	–0.41
50	10	Provençals del Poblenou	–0.27	–0.09	–0.07	–0.42
51	7	El Guinardó	–0.26	–0.12	–0.08	–0.45
52	9	La Sagrera	–0.26	–0.13	–0.10	–0.49
53	2	La Nova Esquerra de l'Eixample	–0.30	–0.14	–0.06	–0.50
54	6	La Vila de Gracia	–0.39	–0.13	–0.01	–0.52
55	10	El Clot	–0.34	–0.09	–0.09	–0.52
56	10	El Poblenou	–0.43	–0.06	–0.07	–0.56
57	6	El Camp d'en Grassot i Gracia Nova	–0.30	–0.17	–0.11	–0.58
58	7	La Vall d'Hebron	–0.22	–0.18	–0.19	–0.59
59	7	La Font d'en Fargues	–0.21	–0.15	–0.24	–0.60
60	2	La Dreta de l'Eixample	–0.50	–0.01	–0.11	–0.62
61	2	L'Antiga Esquerra de l'Eixample	–0.44	–0.12	–0.06	–0.63
62	6	Vallcarca i els Penitents	–0.30	–0.18	–0.16	–0.64
63	2	El Fort Pienc	–0.48	–0.13	–0.07	–0.67
64	4	Les Corts	–0.41	–0.16	–0.12	–0.69
65	5	El Putxet i el Farro	–0.64	–0.21	–0.15	–1.01
66	5	Vallvidrera el Tibidabo i les Planes	–0.78	–0.11	–0.14	–1.03
67	10	La Vila Olímpica del Poblenou	–1.13	0.18	–0.20	–1.15
68	5	Sant Gervasi Galvany	–0.81	–0.16	–0.17	–1.15
69	5	Sarrià	–0.79	–0.21	–0.18	–1.18
70	10	Diagonal Mar i el Front Marítim del Poblenou	–0.94	–0.14	–0.12	–1.19
71	5	Sant Gervasi la Bonanova	–0.81	–0.20	–0.21	–1.22
72	4	Pedralbes	–0.94	–0.22	–0.08	–1.24
73	5	Les Tres Torres	–1.26	–0.25	–0.26	–1.77

FIGURE 1. *Spatial distribution of the SIR*
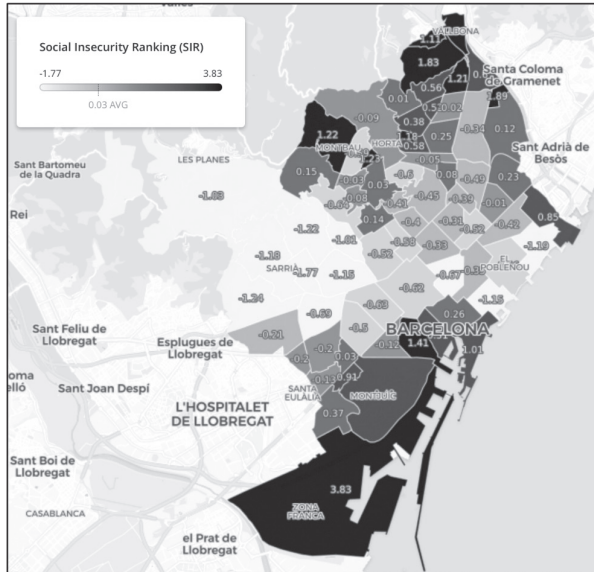
tion from the rest of the district in which it is located. More broadly, the case of Vallbona is indicative of a situation of high deprivation that affects the whole district of Nou Barris in which this neighbourhood is located (i.e. the area in the north-east of the city).

Figure 1 provides an overview of the spatial distribution of the SIR across the neighbourhoods of the city of Barcelona. Areas marked with the darkest black colour identify neighbourhoods recording highest values within the SIR (i.e. comparatively higher levels

FIGURE 2. *Spatial distribution of component 1 labelled "social inequality"*
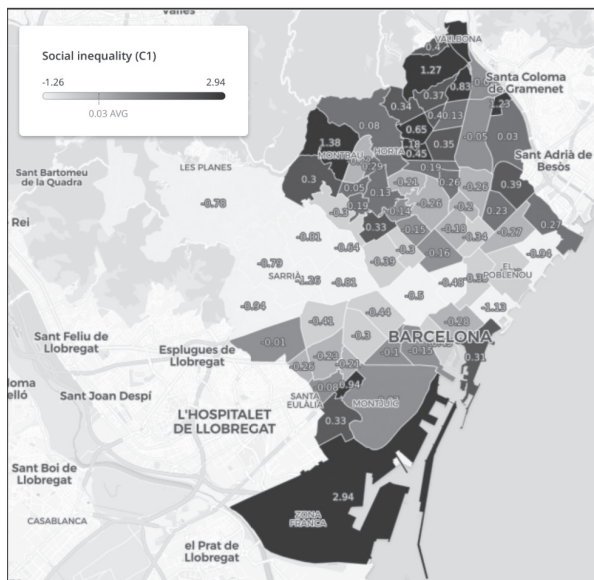
FIGURE 3. *Spatial distribution of component 2 labelled "objective insecurity"*
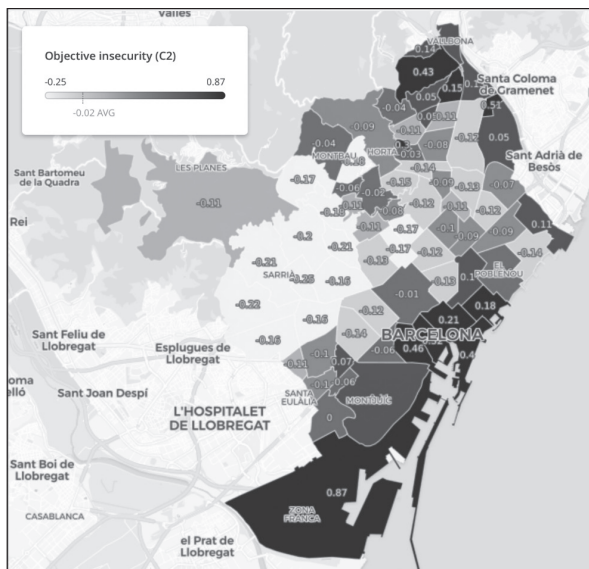
of social insecurity). Areas marked with brightest white colour identify neighbourhoods recording lowest values within the SIR (i.e. comparatively lower levels of social insecurity).

Figures 2 to 4 provide the breakdown of the spatial distribution for each of the three components respectively labelled social inequality, objective insecurity and demographic vulnerability.

The interpretation of Figure 2 suggests that values for social inequality are comparatively higher among the neighbourhoods located along the north-east of the metropolitan area. The majority of them pertain to the

FIGURE 4. *Spatial distribution of component 3 labelled "demographic vulnerability"*
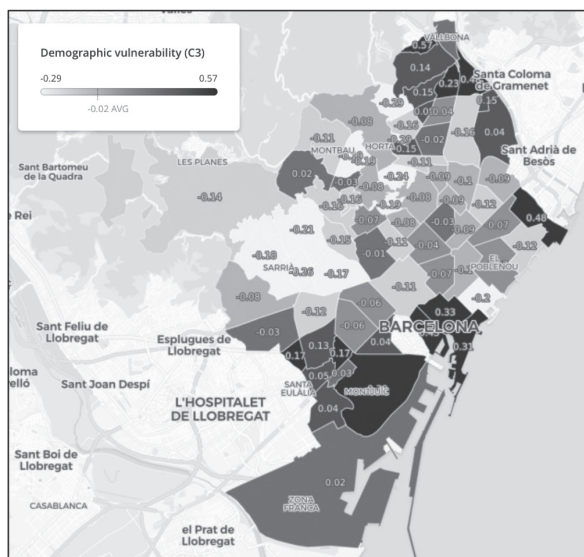
district of Nou Barris. However, the highest value for social inequality is registered in the neighbourhood of La Marina del Prat Vermell (at the south-west end of the city).

As seen in Figure 3, the neighbourhoods located along the coastline are overrepresented within the second component. One possible explanation is that figures related to street robbery might be inflated by the presence of mass tourism in some areas of the city, especially in the district of Ciutat Vella or the neighbourhoods located along the coast.

Finally, Figure 4 identifies demographic vulnerability across the neighbourhoods of the city. Areas marked with the darkest black colour register higher values for this component and are mainly concentrated in the inner-city neighbourhoods of El Raval, Barri Gòtic and La Barceloneta, on the one hand, and peripheral neighbourhoods such as Ciutat Meridiana, Trinitat Nova and Trinitat Vella (at the north-east), El Besòs i Maresme (at the south-east) and, to a lesser extent, along the south-east of the metropolitan area.

CONCLUSIONS AND DISCUSSION

The analysis presents a process of identification of a set of factors shaping social exclusion in the metropolitan area of Barcelona, while at the same time taking into account the unique characteristics of places (e.g. neighbourhoods) in terms of their historical development. The results reveal that the Catalan capital is experiencing growing socio-spatial divisions: in fact, both socially insecure areas and affluent areas are, to a larger extent, spatially concentrated. The outcome of the Social Insecurity Ranking (SIR) also recalls the idea of "living on the edge" proposed by Haesbaert (2014). As in other cities worldwide, in Barcelona a considerable number of people are living on the edge, meaning that they are exposed to an extreme situation of socio-economic deprivation while, at the same time, experiencing

geographic isolation at the margins of the city.

Looking at the results of the PCA, the first component suggests that "social inequality" in Barcelona is a heterogeneous phenomenon merging together elements traditionally related to material and economic vulnerability with health-related concerns. As such, this component reinforces the idea of the multidimensional nature of social exclusion. Low educational attainment seems to play a particularly prominent role as a driver of social exclusion in Barcelona. Parsons and Bynner (2002) already noted, for instance, how in the case of the United Kingdom people with low education tend to be less involved in community and civic participation. Similarly, the results presented above point to the existence of a psycho-social dimension as it is possible to assume that an individual's perception of living in a context of material deprivation, coupled with health issues, may engender feelings of abandonment by public authorities, which could in turn lead to less participative environments (at least when it comes to exercising the right to vote). Although such conclusions need to be interpreted with caution due to the potential overestimation of health-related standard scores in smaller neighbourhoods, the results suggest that the neighbourhoods located in the north-east and south-west of the metropolitan areas are more affected by social inequality.

The second component identifies what has been labelled "objective insecurity", composed of two domains with seemingly incompatible variables (crime and welfare-related). This apparent paradox could be resolved by returning to the idea of a "double regulation of urban poverty" as expressed by Wacquant (2009: XVIII), who argued that public intervention related to poverty is at present characterized by a dual movement involving both welfare cuts and an increasing role for penal institutions. According to Wacquant (2008: 9), "the public aid bureaucracy,

now reconverted into an administrative springboard into poverty-level employment, takes up the mission of inculcating the duty of working for work's sake among poor women" while the police and the prison "assume the task of taming their brothers, their boyfriends or husbands, and their sons". Even though the same interpretation for the case of Barcelona cannot be corroborated by available data, the association between crime recorded by police and the increasing number of welfare recipients appears nevertheless remarkable. What seems most plausible is the spatial concentration of an objective insecurity in the dual sense of *objectively* higher levels of crimes and the presence of people *objectively* affected by economic or health vulnerability.

The third component comprises three variables linked to "demographic vulnerability", two of them directly related to the demographic features of the neighbourhoods (foreign-born residents and migration rate) while a third one (the incidence of tuberculosis) is associated with the health status of residents. It should be noted that the incidence of tuberculosis is noticeably higher among the immigrant population in Barcelona (Muñoz, Orcau and Caylà, 2009). Recent data reinforce the idea of the demographic and context-based nature of the appearance of this disease and, according to Millet *et al.* (2013), patients who had a higher risk of recurrence include men, immigrants, Ciutat Vella (inner-city) residents, drug addicts, those who are HIV positive and individuals who had tuberculosis previously. The report from the Barcelona Public Health Agency (2014) also signals how the incidence of tuberculosis is comparatively higher among the residents of neighbourhoods with lower incomes. As a final note, the analysis of the third component seems to endorse an interpretation suggesting that the combination of demographic (high density), economic (low income) and health factors (incidence of diseases and health problems) may push resi-

dents to move out of the neighbourhood in search of a better place to live. This interpretation appears to be particularly meaningful in the case of the four neighbourhoods of the district Ciutat Vella, where migration rates are among the highest across the city. However, this conclusion may not apply when looking at the neighbourhoods of Ciutat Meridiana, Trinitat Vella and El Besòs i el Maresme, where higher migration rates could be explained by their geographical location at the periphery of the city.

At this point, it should also be noted that the proposed Social Insecurity Ranking (SIR) is affected by three orders of limitations. Firstly, it only provides a relative measure of deprivation and therefore cannot be used to determine how much more deprived one neighbourhood is than another. Secondly, it is sensitive to the number of variables included in the analytical framework, which in turn depends on the availability of data. For example, more data on socio-geographic features of the neighbourhoods (e.g. housing characteristics, public services, etc.), welfare recipients (e.g. receiving job assistance) or on the subjective perception of residents (e.g. neighbourhood-based information on fear of crime and perceptions of social and physical disorder) would have been particularly useful. More generally, addressing subjective perception seems to be particularly relevant when bearing in mind that the term insecurity encompasses a reflection on the subjective dimension of social exclusion (e.g. why people feel insecure and how they interpret their social position within the overall social environment). Thirdly, some variables are controversial, as is the case, for instance, with data on domestic abuse and gender-based violence, given the fact that these types of offences are often under-reported (Palermo, Bleck and Peterman, 2013), likely distorting the true frequency of these crimes.

However, despite these limitations the work outlined above represents a rigorous attempt to analyse the determinants of social

exclusion in the city of Barcelona. At the same time, it establishes solid grounds for replication in other urban contexts. Further research is necessary in order to fill existing gaps, for instance, by developing analysis that could address the topic of social exclusion at a finer geographic level (e.g. census blocks and, ideally, street segments). Approaches that could allow for overcoming the geographical boundaries of a strictly administrative definition of the city are also urgent. Finally, confirmatory rather than exploratory analysis should also be explored in the future.

By way of conclusion, the results seem to confirm the insight of Cassiers and Kesteloot (2012), also in the context of the city of Barcelona, where social exclusion seems to be increasingly coupled with spatial segregation. However, this does not necessarily imply a ghettoization of socially excluded groups in Barcelona, given that, according to Wacquant (2009), contrary to what happens in Northern American cities, processes of marginalization at the European level seem to be essentially determined by class divisions instead of racial exclusion. The outcomes also call attention to the need for overcoming purely economic visions of urban inequality that tend to oversimplify the nature of this phenomenon. Drawing on more comprehensive approaches for analysing social class and distribution, such as those proposed by Bourdieu (1999) or Savage *et al.* (2013), is crucial for a better understanding of the determinants of social exclusion in contemporary cities.

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