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WHEN POLICE PATROLS MATTER. THE EFFECT OF POLICE PROXIMITY ON CITIZENS' CRIME RISK PERCEPTION*

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ABSTRACT: Crime risk perception is known to be an important determinant of individual well-being. It is therefore crucial that we understand the factors affecting this perception so that governments can identify the (public) policies that might reduce it. Among such policies, public resources devoted to policing emerge as a key instrument not only for tackling criminal activity but also for impacting on citizens' crime risk perception. In this framework, the aim of this study is to analyze both the individual and neighbourhood determinants of citizens' crime risk perception in the City of Barcelona (Spain) focusing on the effect of police proximity and taking into account the spatial aspects of neighbourhood characteristics. After controlling for the possible problems of the endogeneity of police forces and crime risk perception and the potential sorting of individuals across neighbourhoods, the results indicate that crime risk perception is reduced when non-victims exogenously interact with police forces. Moreover, neighbourhood variables, such as proxies of social capital and the level of incivilities, together with individual characteristics have an impact on citizens' crime risk perception.

JEL Codes: C21, H50, K42

Keywords: Crime risk perception, police forces, multilevel ordered logit model.

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1. Introduction

Crime is a major concern for both individuals and governments in many countries. Its negative effects on people's well-being as well as its direct economic and social costs justify devoting large quantities of public resources to its prevention and control.

From an individual standpoint, crime affects the well-being of those that directly suffer criminal activity and, more generally, of all citizens through the insecurity it creates.[1] At an aggregate level, governments dedicate a sizeable share of public resources to crime prevention and control. A wide range of policies are employed to reduce criminal attitudes and here police forces are the main tool used. Proximity or community policing is frequently the strategy adopted to reduce insecurity.[2] In the US, the Community Oriented Policing Services (COPS) Office[3] recognizes that people need not only to be safe, but to feel safe. As Cordner (2010) points out, "*treating both of these issues [to be safe and to feel safe] as two parts of a greater whole is a critical aspect of community policing*".

In this paper we estimate the main individual and neighbourhood determinants of citizen insecurity in the City of Barcelona (Spain)[4] by using a multilevel ordered logit model and a unique individual victimization survey for the period 2008 - 2010. By drawing on such a rich dataset for an urban setting[5] we are able to address various issues, including a number of new questions, regarding crime risk perception and so contribute substantially to the existing literature. First, we report new evidence about individual and neighbourhood determinants of perceived insecurity (measured as crime risk perception).

[1] Citizen insecurity is a common concern. For instance, in Latin America and the Caribbean, one of the regions with the highest homicide rates in the world, feelings of insecurity in the region are widespread (see Latinobarometro, 2009:77) and studies from the Inter-American Development Bank show that around 60% of the population report not feeling safe in their neighbourhoods. In a European country such as Spain, with much lower crime rates, the Centre of Sociological Research reported that citizen insecurity, between 2006 and 2008, was among the three main concerns of almost one in every five Spaniards (note that, in this case, citizen insecurity does not include concerns about terrorism).

[2] Proximity units comprise police officers that work in the community with citizens. The officers, who typically patrol on motorbike or on foot, are therefore more visible and are able to establish contact with citizens, associations and neighbours in order to learn about their main problems and needs on matters of security.

[3] http://www.cops.usdoj.gov/

[4] The City of Barcelona is a large, highly populated, modern, tourist city where petty crime rates are on the increase. Newspapers tend to focus increasingly on the impact of pick-pocketing and burglaries on crime risk perception; see for instance La Vanguardia (2012); http://www.lavanguardia.com/sucesos/20121129/54355929103/consecuencias-psicologicas-robos-domicilios.html.

[5] Note that the literature on crime acknowledges that the urban setting is the optimal environment in which to analyze the determinants and impact of criminal behaviour. For instance, cities present higher crime rates than rural areas and, moreover, in urban settings social interactions (crucial nowadays to our understanding of criminal behaviour) are more prevalent (Glaeser and Sacerdote, 1999).

Second, we examine the effect of police proximity on people's crime risk perception, controlling for the spatial effects of citizen evaluation of police performance as well as other neighbourhood characteristics. Third, we are able to overcome two important identification problems; on the one hand the likely problem of endogeneity between police proximity and the individual level of insecurity by means of exogenous source of interaction between these two variables, and on the other hand the likely problem of the endogenous sorting of individuals across neighbourhoods by means of a subsample of the surveyed individuals.

Our main finding is that the simple fact of being stopped by a police officer (in a traffic control) to be a signal of police proximity lowers the level of crime risk perception, albeit only for those individuals that had not recently suffered victimization. Hence, we find a positive causal relation between police forces and individual security feelings. These results add to the empirical literature concerned with understanding the impact of the police on crime (Corman and Mocan, 2000; Di Tella and Schargrodsky, 2004; Draca *et al*., 2010; Evans and Owens, 2007; Klick and Tabarrok, 2005; Levitt, 2002; McCrary, 2002) and on citizens' insecurity (Della-Giustina and Silverman, 2001; Ferguson and Mindel, 2006; Groff *et al.*, 2013; Moore and Trojanowicz, 1988; Pate *et al.* 1987; Trojanowicz, 1982). This literature had not produced clear cut results in part due to the difficulty and methodological challenges faced when trying to establish causal relations between these variables.[6] A shortcoming we rectify here.

Moreover, the need still exists to obtain a better understanding of the determinants of individual crime risk perception, especially as to how individual and neighbourhood characteristics interact in shaping people's insecurity. Such an analysis should help in the design of preventive public policies that can be effective in reducing crime risk perception. There is also a need to evaluate the impact of police on reducing crime risk perception as this should provide essential insights as to the effectiveness of public resources devoted to security issues, at least as regards those aimed at increasing individual well-being and, hence, the overall well-being of society.

In short, in the light of the existing literature, given the importance of the analysis of the determinants of crime risk perception, and the debate on the effectiveness of police measures to reduce this perception, here we focus on the individual and neighbourhood

[6] For instance, as police resources may be allocated geographically according to the level of criminal activity across an area, results would tend to indicate that a greater number of police officers increase criminal activity, unless police intervention is random and exogenous.

determinants of crime risk perception paying special attention to the impact of police proximity. This analysis is novel not only for Spain but also for the European case, and serves to contrast the results obtained here with those in the broader literature focused mainly on the US case.[7]

The remainder of the paper is organised as follows. Section 2 describes the data and the institutional setting. Section 3 presents our empirical approach and the potential estimation problems. Section 4 presents the results obtained. Finally, section 5 summarizes the main conclusions of the study.

2. Data Description and Institutional Details

2.1 The City of Barcelona

Barcelona is one of Spain's largest cities with a population in 2011 of over 1.5 million inhabitants. It lies in the Autonomous Community of Catalonia, on the north-east coast of Spain, and is one of the country's leading tourist destinations and a magnet of economic activity. This modern, open, international city is organized in 38 neighbourhoods and 10 districts, over which four police forces have jurisdiction.[8] Spain's process of decentralization granted Catalonia its own police force, the *Mossos d'Esquadra*, which plays the leading role in the region's security. In addition, Barcelona operates a local police force, the *Guardia Urbana*, which is also responsible for security at the city level. The main Spanish State police forces, the *Cuerpo Nacional de Policia* and the *Guardia Civil*, have retained some competences in Barcelona following the deployment of the autonomous police in 2005, including administrative duties (issuing of ID/passports and immigration documentation) and the fight against terrorism and other specific crimes (drug trafficking, organized crime, etc.). Here, we examine the impact of both the local and the

[7] In particular, quantitative studies linking crime, crime risk perception and police forces are scarce for the European case. The British case has been examined drawing on the well-known British Crime Survey (Gray *et al.* 2008). Other studies include one conducted for Greece by Tseloni and Zarafonitou (2008), while for Spain the only analysis relating fear of crime and police interventions is that undertaken by Medina (2003) who shows that the so-called Belloch Plan (named after the head of the Spanish Home Office, the socialist Juan Alberto Belloch (1994-1996), involved increasing the number of police officers in Spain's main cities in 1995 in order to increase public safety, reduce the fear of crime and cut the response time to emergency calls) did not have any impact on people's fear of crime but it did have an effect on people's perception of the police.

[8] A fifth police force, the "Harbour Police", does operate but it only has jurisdiction over the traffic within the city's harbour and, as such, has no impact on common crime typologies such as property crimes or crimes against the person.

regional police forces (*Guardia Urbana* and *Mossos d'Esquadra*) on crime risk perception given that they are known to be the closest to the citizens.[9]

2.2 Individual Survey Data

We use individual level data from the Barcelona public security survey, a victimization survey carried out annually by the City Council.[10] The survey was first carried out in 1984 and it consists of between 4,500 and 6,000 phone interviews conducted each year with Barcelona residents across the 38 neighbourhoods. The survey explores victimization experiences and gathers information about the respondents' socio-economic and personal characteristics. Importantly, its sampling methods are representative at the neighbourhood level. The survey is divided in three parts: the first collects the respondents' personal information; the second enquires about the possible victimization of individuals and gathers detailed information about criminal acts they have suffered; the third (which is carried out with just 50% of those surveyed) records opinions about the police forces and safety issues.

Table 1: Descriptive statistics.

Individual/Neighbourhood variables	**Obs.**	**Mean**	**Standard Dev.**	**Min.**	**Max.**
crime_risk_perception	11,608	1.68	0.98	0	4
police_call	11,608	0.22	0.41	0	1
police_stop	11,608	0.14	0.35	0	1
age	11,608	46.19	17.85	16	95
gender	11,608	0.51	0.50	0	1
victim_property	11,608	0.35	0.48	0	1
victim_person	11,608	0.06	0.24	0	1
foreign_born	11,608	0.09	0.28	0	1
education	11,608	4.14	1.47	1	9
N_crime_rate	11,608	0.38	0.13	0.19	0.89
N_incivilities	11,608	5.79	0.63	3.96	6.79
N_male_immigrant	11,608	3.46	1.89	1.71	10.73
N_youth_male	11,608	9.67	1.41	7.33	17.29
N_average_income	11,608	3.01	0.07	2.64	3.17
N_education	11,608	3.95	0.46	3.09	4.83
N_election_partc	11,608	51.87	5.49	32.87	60.91
N_police_perception	11,608	5.68	0.19	5.34	6.29

[9] In the case of Catalonia one of the main goals of the regional police (*Mossos d'Esquadra*) is to reduce citizen insecurity and, so, many police officers patrol the streets not only to prevent crime but also to make citizens feel safer.

[10] Table 1 presents the basic descriptive statistics of the variables described in this section and used in the empirical estimations.

In this study, we use data for the years 2008, 2009 and 2010,[11] giving a total number of, after removing missing values, 11,608 individuals.[12] The survey is not conceived as a panel since respondents change from one year to the next. Therefore, in order to take advantage of all the data available, we construct a pooled cross-sectional database for the three years of study including all the variables of interest.

Dependent variable

Our main dependent variable, "*crime_risk_perception*" is based on the following survey question: "*Assess from 0 to 4 the level of insecurity in your neighbourhood where 0 means very unsafe and 4 means very safe*".[13] This measure of insecurity can be considered as being close to the concept of crime risk perception as it assesses the cognitive component of perception more than it does its emotional component. Therefore, henceforth we refer to our dependent variable as individual crime risk perception. Note to facilitate the interpretation of the empirical results we reverse the valuation of the response (with 0 being very secure and 4 very insecure). According to Map 1 in Figure 1a some neighbourhoods present a high number of respondents with high levels of crime risk perception especially in the north-east and south-west of the city, corresponding to neighbourhoods that present specific socio-economic characteristics, as we see below.

Individual exposure to police forces

The survey offers two possible approximations for our variable of interest, that is, a measure of police proximity. These two variables are "*police_call*" and "*police_stop*". The first variable is a dichotomous variable taking a value of 1 if there has been contact between the individual and the police either by telephone (a request for help, a complaint or a request for information) or in person (reporting crimes to the police) and 0 otherwise. Note, however, that this variable can suffer from reverse causality given that an individual's level of risk perception can determine their propensity to contact the police. To overcome this problem, we employ an exogenous (to the individual crime risk

[11] We choose this sample period as the data for earlier years presented problems of homogeneity for the time span of the main variables of interest, which could affect the interpretation of our results.

[12] Missing values represent around 2,000 observations; however, this does not constitute a risk of sample selection bias given that the deleted individuals do not systematically present a tendency not to respond to a certain type of question.

[13] From the outset it is essential we clarify what we understand by the main concept addressed in this study, namely, citizen insecurity. Insecurity, in the broad and interdisciplinary literature dealing with it, is given a wide range of interpretations, but typically two related concepts are distinguished: fear of crime and crime risk perception. LaGrange and Ferraro (1987) suggest that the former can be conceived as the emotional or affective component of perception, while the latter is the cognitive component of perception. However, as further suggested by LaGrange *et al*. (1992) perceived risk mediates the effect on emotionally generated fear. In other words, the greater the individual's crime risk perception, the greater is their fear of crime. This is confirmed by Wilcox and Land (1996) who report considerable alignments between these two concepts.

perception) variable that is indicative of police proximity. In this case, "*police_stop*" is also a dichotomous variable taking a value of 1 if someone has been stopped by a police officer and 0 otherwise. In our survey, we select those individuals that have been stopped because of an alcohol/drug test when driving or in routine traffic controls (documentation). We consider this variable as exogenous because police stop citizens independently of their individual crime risk perception, while the location of police officers when stopping individuals for car/documentation controls is also exogenous to the neighbourhood crime level, given that some of these controls are performed outside the City of Barcelona. Consequently, by using this variable our estimations of police-citizen contact can be seen as being causal and not as being driven by reverse causality issues.[14]

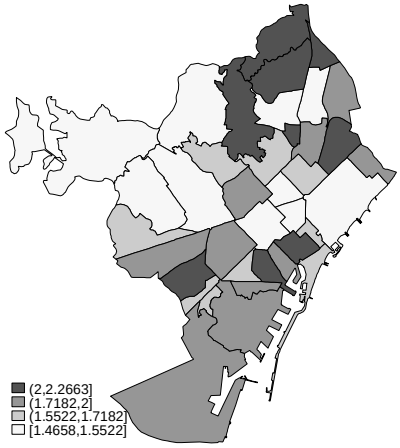
In our sample 21.2% of the respondents reported having had contact with the police ("*police_call*") and 16.24% had been stopped ("*police_stop*"). Maps 3 and 4 (in Figure 1a) present the distribution of these variables across the neighbourhoods. As expected the spatial distribution of the "*police_call*" variable resembles closely the distribution of the victimization index (see Map 2 in Figure 1a) and this should also determine a higher presence of police officers in these neighbourhoods. Note, however, that given its nature, the spatial distribution of the "*police_stop*" variable does not appear to be related to the victimization index. Therefore, we employ this "exogeneity" to identify the impact of police contact on crime risk perception.

The expected results of the impact of citizen-police contact on individual crime risk perception could, in principle, be either positive or negative. A negative impact (a positive sign in our multilevel ordered logit model) would imply that someone that has been stopped by the police is more likely to report lower levels of crime risk perception than someone who has not (a greater sense of protection). By contrast, a positive impact might also occur if an individual's crime risk perception is increased after their being stopped (a greater sense of danger). Indeed, Braga (2001) and Hinkle and Weisburd (2008) report that those living in neighbourhoods where police crackdowns are frequent, despite the reduction in crime, may suffer an increase in their levels of crime risk perception.

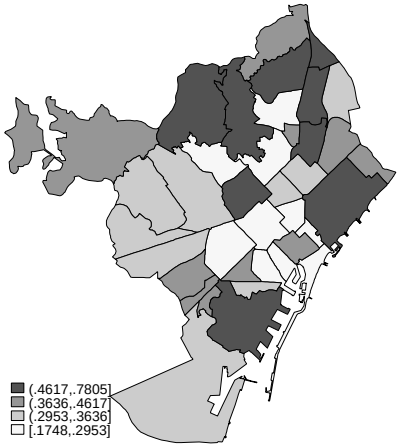
[14] See section 3.1 for more details on the exogeneity of the variable "*police_stop*" with respect to the individual crime risk perception.

Figure 1a: Maps for main variables of interest across the 38 Barcelona neighbourhoods

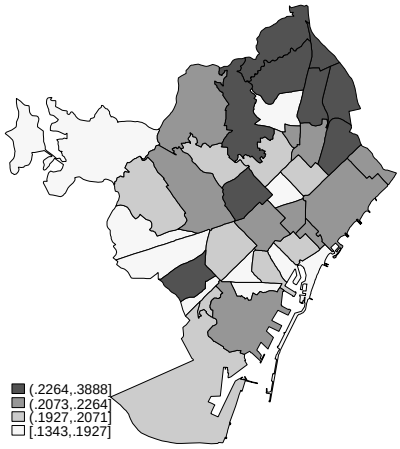
Map 1: Crime risk perception



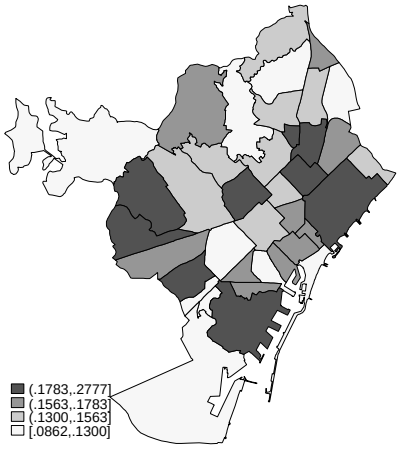
Map 2: Distribution of victimization index



Map 3: *Police_call*



Map 4: *Police_stop*



Other individual explanatory variables

Moreover, we include several variables that may affect people's crime risk perception. First, we account for an individual's physical and social vulnerability by including a dummy variable ("*gender*") that takes a value of 1 if the individual is a woman and 0 otherwise. We also include the age of the individual ("*age*") since, like women (Ferraro, 1996), the elderly are also expected to present less physical strength and competence (Clemente and Kleiman, 1977) and, hence, a higher crime risk perception.[15]

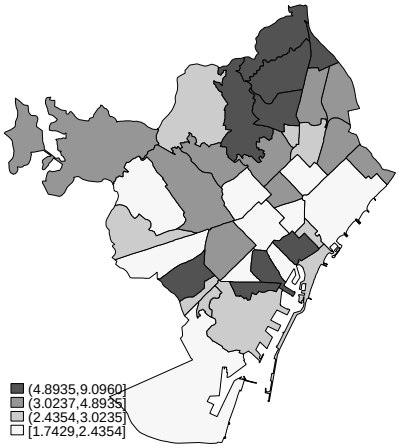
The literature has also identified a strong relationship between crime risk perception and prior direct or indirect (knowing a victim) victimization (Ho and McKean, 2004; Mesch, 2001; Rountree and Land, 1996; Skogan, 1986; Tseloni and Zarafonitou, 2008). This relationship has been found to be both positive and negative. In the former case, being victimized eliminates people's belief of their being invulnerable to negative events and of

[15] Rountree and Land (1996) showed that this result may be reversed if instead of crime risk perception a study uses the emotional fear of crime as its dependent variable.

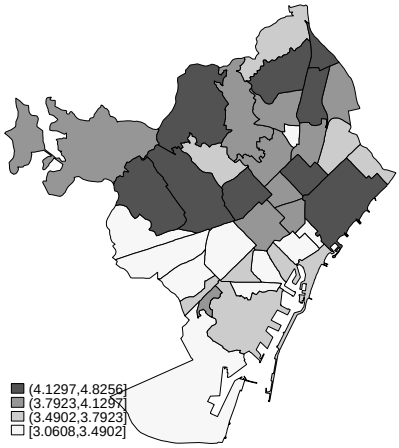
their living in a substantially benevolent and meaningful world (Janoff-Bulman, 1989). In the latter case, Hill *et al.* (1985) and McGarrell *et al.* (1997) report that previous victimization might lead some individuals to believe that they are at greater risk of future victimization, but those who have experienced prior victimization might also avoid certain areas or people they deem dangerous, thereby reducing their perceived vulnerability and fear. An alternative explanation is that individuals who were previously victimized may consider that the odds of their suffering another crime are now quite low. As such, they might present lower levels of crime risk perception.

Figure 1b: Maps for main variables of interest across the 38 Barcelona neighbourhoods (cont)

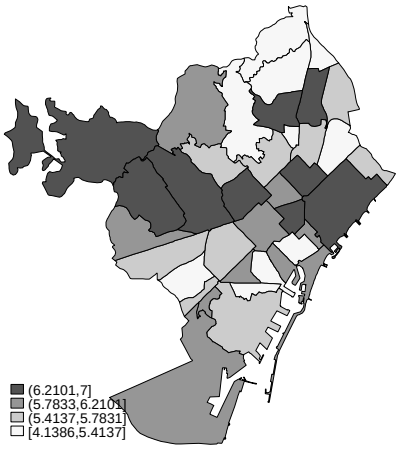
Map 5: Distribution of male immigrants



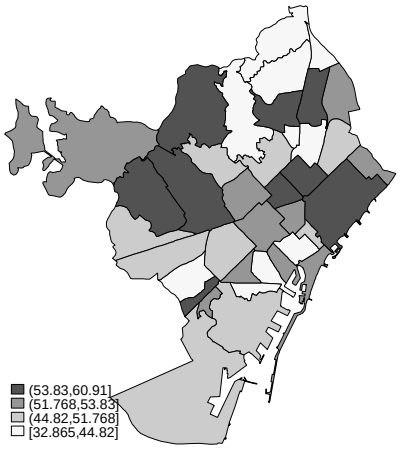
Map 6: Distribution of educational level



Map 7: Distribution of perceived incivilities



Map 8: Distribution of electoral participation



In our empirical model we include the variables "*victim_property*" and "*victim_person*" to account for prior victimization related to crimes against property or crimes involving interpersonal violence, albeit with a number of restrictions. First, the variables account solely for direct victimization, since no questions are asked about relatives/friends' victimization and, second, the survey enquires solely about victimization

experiences during the previous year. It should be pointed out that prior victimization may not be correlated with crime risk perception if unobservable characteristics of individuals are not taken into account (Maris and Ortega, 2013). However, as the authors point out, using pooled cross sections can overcome this issue. Map 2 (in Figure 1a) plots the overall victimization index and shows that the spatial distribution does not necessarily coincide with that of crime risk perception.

We include the variable "*foreign_born*" which takes a value of 1 if the individual is foreign born and 0 otherwise. By adding this variable we seek to account for the effect of immigration on crime risk perception (Map 5 in Figure 1b presents the distribution of male immigrants across the 38 Barcelona neighbourhoods). Foreign born individuals may present a different level of crime risk perception if, for instance, in their countries of origin crime and violence are more common events or even if such events are perceived differently from a social perspective.

We also include the individual level of education. The variable "*education*", plotted in Map 6 in Figure 1b, may influence the levels of crime and, therefore, the levels of crime risk perception. By including this variable we measure both the income level of each individual (given the correlation between income and education) and, also, the general level of knowledge that individuals possess. It seems reasonable to assume that the more educated perceive reality clearer as their sources of information tend to be broader. Similarly, they tend to socialize more (Lochner and Moretti, 2007) and read the press more frequently, which suggest that information concerning the reality of their neighbourhood is likely to be obtained almost instantly and in a clear fashion. This variable ranges from 1 if individuals have received fewer than five years of education (primary school completed) up to 9 if they have a university degree.

2.3 Neighbourhood Data and Variables[16]

As discussed above, we also conduct our estimates taking into account neighbourhood characteristics as possible determinants of crime risk perception in a multilevel framework. Our neighbourhood data are taken from the official statistics published by the Barcelona City Council. Given that we use data for three years at the individual level, we need to homogenize the yearly neighbourhood data. We do this simply by taking the average of

[16] To distinguish these from individual variables, we refer to the neighbourhood variables as "*N_namevariable*".

each variable for each neighbourhood over the three-year period of study. By doing this, we cancel out any yearly fluctuations (white noise) in the neighbourhood variables (Hoogue *et al.*, 2011). Hence, we implicitly assume a certain stability in the neighbourhoods' characteristics.

In the case of data being unavailable from the Barcelona City Council's Statistics Department, we draw on information from the survey clustered at the neighbourhood level. We include the victimization index of each neighbourhood "*N_crime_rate*" to account for the effect of the total neighbourhood victimization crime rate on individual crime risk perception (Roundtree and Land, 1996). Moreover, the "*broken window*" thesis claims that incivilities or minor disorders are likely to influence a chain of events that will affect crime risk perception.[17] To test this, we include the level of perceived incivilities at the neighbourhood level calculated as the average of the perceived incivilities for all the individuals belonging to a certain neighbourhood, "*N_incivilities*", in order to approximate these minor disorders. This variable is defined from 0, many incivilities perceived in the neighbourhood, to 10, no incivilities perceived (see Map 7 in Figure 1b).

The neighbourhood composition may also affect people's crime risk perception since those living in neighbourhoods with a large influx of immigrant population may perceive this as "an invasion" by different racial and ethnic groups (Skogan, 1995). If the local population are prejudiced towards immigrants and hold them responsible for increased crime rates,[18] seeing immigrants around the neighbourhood might be interpreted as a sign of their being at a greater risk of falling victim to crime. For this reason, we include the variable "*N_male_immigrant*", defined as the proportion of male immigrants in each neighbourhood. Similarly, we also control for the number of male youths "*N_youth_male*" since, as Buonanno and Montolio (2009) point out for the Spanish case, young people are more likely to engage in criminal activities. Socio-economic status is also one of the main determinants of crime risk perception (Wyant, 2008) and, here, we employ the average income "*N_average_income*" of individuals in each neighbourhood to obtain an approximation of this status.

[17] The "broken window" thesis (Wilson and Kelling, 1982) holds that personal and neighbourhood characteristics can account for the fear of crime and even for crime itself. The thesis draws links between three important neighbourhood concepts, namely, disorder, fear and crime. Thus, a minor disorder such as a broken window, if left unchecked, will generate the perception that no one cares about it, generating increasing levels of fear. Levels of distrust among the neighbours rise and they start to behave differently - staying at home more and socializing less with each other. In turn, this leads to a reduction in natural surveillance permitting further disorder and minor crimes.

[18] The 2008 European Social Survey revealed that almost 40% of Spanish citizens surveyed agreed or strongly agreed that "immigrants make the country a worse place to live in".

Following Lochner and Moretti (2007), who find that education increases opportunities of obtaining legitimate rents from the legal labour market, which implies that education may negatively affect both property and violent crime and, consequently, lead to an overall reduction in the crime risk perception, we introduce the average level of education in the neighbourhood "*N_education*".

We also consider a proxy for the level of social capital in the neighbourhood since community values, relationships between individuals and involvement in public affairs may create a sense of community trust and union. We include an approximation of the neighbourhood level of social capital, "*N_election_partc*", which is the voter turnout at the 2006 local elections (see Map 8 in Figure 1b). In this regard, social capital is seen as an increasing function of participation in civic life, and voter turnout has been used broadly as an approximation of social capital since it is hypothesized to capture civic involvement and participation in community decision making. Again, the larger this share, the greater the implication of individuals in public affairs and, therefore, we would expect a negative effect on crime risk perception.

Finally, we also control for the average perception of the work done by the police as revealed by the individuals surveyed in each neighbourhood. This variable, "*N_police_perception*", takes a value from 0 (highly unfavourable view of police forces) to 10 (the highest assessment of their work). A priori, we expect that the better the outcomes of police officers in solving neighbourhood crime, the higher the assessment given by individuals.

3. Empirical Strategy

3.1 Endogeneity Issues of Crime Risk Perception and Police Contact

Our empirical approach is parsimonious and we begin by running a multilevel cumulative logit model (see Appendix A for technical details) in which individual and neighbourhood level control variables are introduced.[19] Our variables of interest can then be added. First, we include the "*police_call*" variable which, as explained, is potentially endogenous, that is, its estimated coefficient may be biased because individuals who present a higher crime risk perception are more likely to contact the police when they witness something suspicious. For instance, someone with a high crime risk perception that

[19] As a robustness test regarding the empirical model estimated, we provide in the Appendix B the (main) results using an ordered logit model (instead of our multilevel strategy) with neighbourhood and year fixed effects. In general, we qualitatively obtain the same results as those presented in the following sections.

sees a group of youths in the park at night may call the police because she believes they are likely to cause trouble (get into fights, consume drugs, vandalise public facilities, etc.). As such, police contact may reflect a positive impact on crime risk perception.

Therefore, the key concern in our estimates is that we address the causal effects of policing on individual crime risk perception properly. We deal with this endogeneity issue by using the alternative measure of police contact, the "*police_stop*" variable, which takes into account citizen-police contact when the former are stopped by the police. As previously explained this is, a priori, an exogenous measure since police traffic controls typically stop citizens "at random".[20] Given the importance of this aspect to our estimations, we devote some efforts to proving this point in greater detail by regressing the individual crime risk perception on the probability of being pulled over at a police traffic control point ("*police_stop*") using a Probit model. The non significance of our crime risk perception variable would indicate the exogeneity of this police variable (see Table 2).

However, as discussed in Cornaglia and Leigh (2011), an important issue to account for is the distinction between victims and non-victims, since previous victimization experiences may bias the relation between the "*police_stop*" variable and an individual's crime risk perception. More precisely, we expect police encounters to have a different effect on victims and non-victims given their previous experience. Here, victims are likely to have had recent contact with the police (during the previous year) and so it might be that coming into contact with the police again reminds them of their victimization experience, hence distorting the impact of police contact on crime risk perception. By contrast, for non-victims the effect of "exogenous" police encounters should, in principle, not be biased by previous experiences involving crime and, quite likely, the police.

The results in Table 2 support our empirical strategy. First, the estimation reported in column 3 shows, as expected, that the individual level of crime risk perception is not significant in explaining the probability of being stopped by the police for non-victims (and for the whole sample), yet it is significant for victims. The latter result indicates that the higher the level of crime risk perception of individuals that have recently been victimized, the greater their probability of being stopped by police officers in car controls. This result might reflect the fact that victims alter their behaviour towards the police,

[20] Clearly, however, there are individual stereotypes that the police tend to pull over more frequently. Drivers of red cars, youths, and late-hour and weekend drivers are more likely to be stopped. However, while this is true for drug- and drink-driving tests, there are also generic police car controls for documentation that, in principle, may stop any citizen independently of their age, appearance or vehicle type.

tending, for example, to show increased levels of nervousness or anxiety that can induce police officers to stop them.

Table 2: Probit regressions on the probability of being pulled over (Dependent variable: "*police_stop*").

VARIABLES	(1) *Whole Sample*	(2) *Non-victims subsample*	(3) *Victims subsample*
gender	-0.524***	-0.529***	-0.514***
	(0.0430)	(0.0479)	(0.0793)
age	-0.0144***	-0.0116***	-0.0190***
	(0.00114)	(0.00116)	(0.00232)
crime risk perception	0.0155	-0.0237	0.0537**
	(0.0193)	(0.0243)	(0.0268)
education	0.0879***	0.0902***	0.0869***
	(0.0140)	(0.0143)	(0.0248)
victim_property	0.360***		0.317*
	(0.0357)		(0.185)
victim_person	-0.0587		-0.0910
	(0.0980)		(0.136)
foreign_born	-0.238***	-0.229***	-0.259**
	(0.0668)	(0.0753)	(0.111)
Constant	-0.639***	-1.058***	-0.223
	(0.0974)	(0.0912)	(0.260)
Observations	11,608	7,270	4,321
Year fixed effects	YES	YES	YES
Neighbourhood fixed effects	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In sum, the results in Table 2 demonstrate that our empirical strategy allows us to obtain a causal relation between police contact and crime risk perception. Our "*police_stop*" variable, which is not completely random (a driver's age, sex, education or their being a foreigner influence the probability of being pulled over at a vehicle control point), is exogenous to the individual crime risk perception, especially for those individuals that have not been previously victimized.

3.2 Controlling for Spatial Issues and Endogenous Sorting of Individuals

A further aspect to be taken into account when working in urban settings is spatial dependence. Individuals do not make their choices independently; their decisions and perceptions are also the consequences of their social environment (including their neighbours, friends or ethnic groups). These peer influences have given rise in the literature to the theory of social interactions (Akerlof, 1997). Since our dependent variable measures opinions expressed by individuals, responses are likely to be influenced not just

by neighbourhood characteristics, but also by the characteristics of surrounding neighbourhoods, with the expectation that closer neighbourhoods are more likely to exercise an influence.

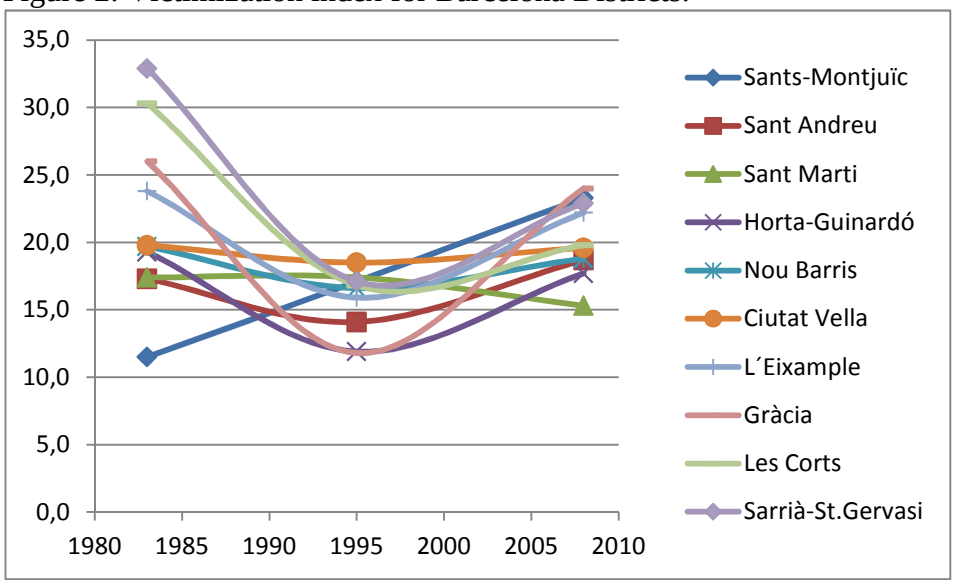
To address this important issue we include spatial lags for the dependent variable as well as for "*N_crime_rate*", "*N_incivilities*" and "*N_police_perception*" using a binary distance based matrix of 500 and 1,000 meters threshold. We consider that these variables will not only affect citizens' crime risk perception in a given neighbourhood, but given the distance (Barcelona occupies a municipal area of 101.4 km^2) and the high level of mobility between neighbourhoods (for reasons of work or leisure), they could also affect the crime risk perception of individuals in adjacent neighbourhoods.

Finally, a possible sorting problem of individuals across neighbourhoods, i.e. people with higher levels of crime risk perception tending to live in areas with lower levels of crime or with certain specific characteristics, should not have any impact on our main variable of interest ("*police_stop*") given its exogenous nature. However, it could have an impact on the estimated effect of the main neighbourhood explanatory variables. For instance, in the case of the "*N_crime_rate*" if we obtain a negative effect on crime risk perception, this correlation could be simply driven by the presence of unobservable factors and/or by an endogenous sorting of individuals into areas depending on, precisely, the crime rates. If this issue is not dealt with, the estimated results could be biased and, thus, lead to misleading conclusions.

In order to deal with the possible sorting problem, we restrict our sample to those surveyed individuals who have been living in the same neighbourhood for five years (or more). The intuition of this empirical strategy is that these individuals would have had to choose where to live several years ago, taking into account the characteristics of each neighbourhood (victimization indexes, number of immigrants, etc.) at that time. These characteristics may well have changed over the years and, consequently, people may be sorted according to the characteristics of the past but not to the characteristics of the years of the study. Figure 2 presents the evolution of the victimization index for the ten districts of Barcelona for 1983, 1995 and 2009. It can be seen, for instance, that the aggregate evolution of the victimization index has changed considerably over the years, which supports our strategy.[21]

[21] Unfortunately, we do not have neighbourhood data of the victimization index for such a long period.

Figure 2: Victimization index for Barcelona Districts.



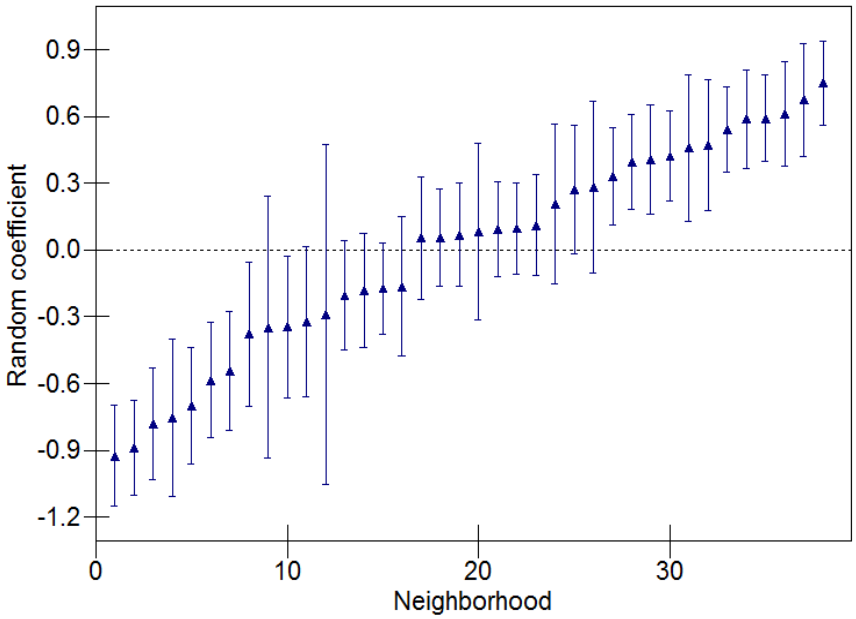
4. Empirical Results and Discussion

Tables 3 to 7 present the results for all the approaches adopted in the present study. To interpret the coefficients obtained when estimating our multilevel ordered logit model, and given the ordering of our dependent variable, note that a negative estimated sign for a given variable corresponds to a decrease in the probability of being in a lower part of the distribution of the crime risk perception and, hence, to a negative impact of that variable on the individual's crime risk perception (an increase in insecurity).

Before explaining the results in detail, it is worth determining the percentage of the variance of the individual crime risk perception that is due to neighbourhood characteristics. The results show that approximately 6.71% of the variance in the individual crime risk perception is due to neighbourhood characteristics. This seems to be lower than results in other studies including Taylor (1997) who reported a figure of 11% and Wyant (2008) who reported 12%.[22] Figure 3 confirms the need to account for the differences across neighbourhoods since several neighbourhoods are statistically different from the mean.

[22] However, when we use the data for just a single year, the variance is similar to that reported in these other studies.

Figure 3: Estimated residuals for the 38 Barcelona neighbourhoods.



4.1. Police Effects on Individual Crime Risk Perception

Table 3 presents the results for the estimation of the determinants of the individual crime risk perception. In relation to our main variables of interest capturing police proximity to citizens, the results when using the "*police_call*" variable (column 1) present the expected negative sign, indicating that direct contact with the police decreases the probability of individuals reporting a lower level of crime risk perception (i.e., greater insecurity after contact with the police). However, as pointed out above, this variable suffers problems of endogeneity as it is quite likely that those that are most prone to feelings of insecurity will present a higher propensity to contact the police. The negative sign obtained for this variable seems to reflect this hypothesis.

Table 3: Multilevel estimations for crime risk perception with "*police_call*" and "*police_stop*".

VARIABLES	(1) *Police_call*	(2) *Police_stop*
α_0	-12.72***	-13.09***
	(1.888)	(1.934)
α_1	-9.905***	-10.29***
	(1.887)	(1.933)
α_2	-8.221***	-8.613***
	(1.886)	(1.933)
α_3	-6.885***	-7.283***
	(1.886)	(1.932)
Individual level variables		
police_call	-0.403***	
	(0.0427)	
police_stop		-0.0295
		(0.0518)
gender	-0.257***	-0.263***
	(0.0350)	(0.0354)
age	-0.00714***	-0.00654***
	(0.00104)	(0.00105)
victim_property	-0.721***	-0.748***
	(0.0383)	(0.0384)
victim_person	-0.469***	-0.537***
	(0.0725)	(0.0721)
foreign_born	0.891***	0.877***
	(0.0652)	(0.0652)
education	0.0831***	0.0762***
	(0.0130)	(0.0130)
Neighbourhood level variables		
N_crime_rate	-0.340*	-0.346*
	(0.189)	(0.190)
N_incivilities	0.606***	0.599***
	(0.151)	(0.155)
N_education	-0.228	-0.225
	(0.166)	(0.170)
N_youth_male	0.0160	0.0191
	(0.0424)	(0.0435)
N_male_immigrant	0.0735	0.0687
	(0.0472)	(0.0483)
N_average_income	0.776*	0.812*
	(0.439)	(0.450)
N_police_perception	0.395*	0.427*
	(0.239)	(0.245)
N_election_partc	0.0538***	0.0547***
	(0.0194)	(0.0198)
η_{jk}	0.0308***	0.0334***
	(0.0106)	(0.0113)
Observations	11,602	11,602
Number of groups	38	38

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The intercepts (α_k) represent the log-odds of being in each category or lower.

Column 2 in Table 3 presents the results when using the alternative variable for police proximity, "*police_stop*", which captures the fact of being exogenously stopped by a police officer. Here, recall, we are confident that the estimated coefficients do not suffer the same bias as suffered by the "*police_call*" variable. The results are not statistically significant

when we consider the effect to be the same for victims and non-victims; however, as shown above, the exclusion restriction (required for our empirical strategy to work) does not hold for the non-victims.

Therefore, in Table 4 we perform the estimations again, but now we distinguish between these two groups and we relax the proportional odds assumption, that is, up to this juncture we have assumed that the effect of the "*police_stop*" variable is the same across different types of respondents. However, the effect of contact with the police could differ across individuals depending on their crime risk perception: someone who is more fearful, in general, may be positively affected by contact with the police. By contrast, someone who does not perceive any risk of crime may not be affected by having contact with the police. By allowing the effect of the "*police_stop*" variable to vary across the intercepts we can capture these differences.

The results show that coming into contact with the police is more likely to affect those that present a high crime risk perception and who have not been victims in the previous year. In general, contact with the police reduces citizens' insecurity. As expected, for the subsample of victims this effect seems to be non-significant for almost all levels of crime risk perception, but when it is significant (for low levels of crime risk perception) it presents the opposite sign to that shown by non-victims; in other words, the crime risk perception of victims with low perception levels when being pulled over by the police tends to increase. As explained above, this would seem to be related to their recent experience with the police resulting from an earlier episode of victimization.

To fully interpret the results, it should be stressed the fact that individuals are stopped by the police in controls possibly located in other neighbourhoods or outside the city. As such, the channel via which the fact of being pulled over affects individuals' crime risk perception is likely to be psychological, since individuals are asked about their crime risk perception in their neighbourhood of residence. The fact that being stopped in a different neighbourhood affects individuals' (non-victims) crime risk perception suggests that individuals do not take into account where they have been stopped. Simply coming into contact with police officers gives non-victims a certain degree of security in their place of usual residence, even though this contact might have taken place in other locations.

Table 4: Multilevel estimations for crime risk perception with *police_stop*.

VARIABLES	*Non-Victims subsample*	*Victims subsample*
α_0	-12.84***	-12.01***
	(1.664)	(2.791)
*police_stop_*0	-0.302*	-0.227
	(0.156)	(0.181)
α_1	-9.991***	-9.434***
	(1.662)	(2.790)
*police_stop_*1	0.132	-0.216***
	(0.0844)	(0.0823)
α_2	-8.161***	-7.993***
	(1.660)	(2.788)
*police_stop_*2	0.481***	-0.0505
	(0.149)	(0.0889)
α_3	-6.824***	-6.649**
	(1.660)	(2.788)
*police_stop_*3	0.512*	-0.0773
	(0.270)	(0.130)
Individual level variables		
gender	-0.229***	-0.321***
	(0.0455)	(0.0569)
age	-0.00450***	-0.0101***
	(0.00129)	(0.00182)
victim_property		-0.525***
		(0.141)
victim_person		-0.443***
		(0.0949)
foreign_born	0.991***	0.699***
	(0.0866)	(0.100)
education	0.0950***	0.0436**
	(0.0165)	(0.0216)
Neighbourhood level variables		
N_crime_rate	-1.020***	-0.146
	(0.298)	(0.224)
N_incivilities	0.792***	0.330
	(0.138)	(0.230)
N_education	-0.100	-0.137
	(0.161)	(0.244)
N_youth_male	0.0265	-0.0223
	(0.0377)	(0.0628)
N_male_immigrant	0.0869*	0.0589
	(0.0453)	(0.0711)
N_average_income	0.791*	0.437
	(0.418)	(0.649)
N_police_perception	0.251	0.690*
	(0.222)	(0.357)
N_election_partc	0.0365**	0.0649**
	(0.0181)	(0.0282)
η_{jk}	0.0217***	0.0670***
	(0.00714)	(0.0241)
Observations	7,255	4,340
Number of groups	38	38

Note: see Table 3.

The predicted probabilities of reporting a lower category of crime risk perception (feelings of greater security) for someone who has been pulled over by the police are shown in Table 5. The overall conclusion is that non-victims who have been randomly stopped by police officers have a lower crime risk perception (lower insecurity), especially when their level of crime risk perception is high. However, there is also evidence that for individuals with low levels of crime risk perception random contact with the police may increase their perception of insecurity.

Table 5: Predicted probabilities (non-victims).

	Police_stop = 0	*Police_stop* = 1
Predicted probability of reporting crime risk perception = 0	0.068	0.052
Predicted probability of reporting crime risk perception = 1 or lower	0.557	0.589
Predicted probability of reporting crime risk perception = 2 or lower	0.886	0.926
Predicted probability of reporting crime risk perception = 3 or lower	0.967	0.979

Note: All the variables have been fixed at their means or in the case of binary data at their proportions.

Finally, the joint estimation of the individual level equation jointly with the neighbourhood intercept (both the fixed and the random part) shows, as expected, that the effect of being stopped by the police does not vary significantly across neighbourhoods. This result, indeed, reinforces the exogeneity assumption of our main independent variable.

4.2. Individual and Neighbourhood Determinants of Insecurity

Note that the obtained results for the individual and the neighbourhood variables are very similar in Table 3 and Table 4 (and across the various columns presented). More precisely, the approximation to the physical and social vulnerability of individuals' "*age*" and "*gender*" present a negative and statistically significant coefficient, implying that the elderly and women have a higher crime risk perception: more specifically, women ("*gender*" = 1) and the elderly are more likely to be in a higher category of crime risk perception. Moreover, the variables reflecting prior victimization against the person "*victim_person*" and against property "*victim_property*" reflect a negative estimate sign meaning that people who have suffered recent prior victimization (in the preceding year) are more likely to report a higher crime risk perception. Here our results are in line with those reported previously in the literature (see, for instance, Quann and Hung, 2002). Being a victim of a property crime has a greater effect on an individual's crime risk perception than being the victim of a crime against the person. This result is somewhat unexpected as we expected those who had directly suffered a crime against the person (for

instance, an assault) to be more likely to feel insecure. However, the results seem to be driven by the fact that the majority of property crimes suffered in Barcelona involve muggings or larceny, which differ from a burglary where the victims tend not to see the criminals.

The results for the "*foreign_born*" variable present a positive sign, indicating that immigrants' crime risk perception is lower than that of residents. This result may be explained by the fact that foreign-born individuals (especially from developing countries) are used to (even worse) criminal environments in their countries of origin and, therefore, in relative terms, living in Barcelona might be perceived as being safer for them. This result contradicts findings reported by Skogan and Maxfield (1981) who found that racial and ethnic minorities tend to be more fearful. This difference might be due to the fact that in our study the racial issue is not explicitly taken into account (as we control for country of origin rather than race).

The "*education*" variable presents a positive and significant sign indicating that more educated people have a higher probability of being among the lower values of the crime risk perception variable, that is, less perception of insecurity. This seems to show that the social interactions of more highly educated citizens decrease their crime risk perception. Additionally, more educated people tend to be better informed and, consequently, understand the reality of their neighbourhoods more accurately.

As for the neighbourhood determinants of crime risk perception, our results seem to indicate that two of the variables are statistically significant, while the rest generally present the expected sign. Several results draw our attention. First, "*N_incivilities*" shows a positive estimated coefficient with crime risk perception,[23] indicating that the higher the citizens' assessment of incivilities in the neighbourhood, the lower the probability of their reporting a lower level of crime risk perception; or, in quantitative terms, on average, a one-point increase in the assessment of incivilities in the neighbourhood increases the probability of being in a higher category of the crime risk perception distribution by 0.60 (from results in Table 3). This effect is strongly significant serving to demonstrate that "fear in the urban environment is above all a fear of social disorder" (Hunter, 1978) and lending support to the "*broken window*" theory. Second, as expected, the "*N_crime_rate*" variable has a positive effect on crime risk perception. Thus, citizens living in neighbourhoods with higher crime rates are less likely to report a lower category of crime

[23] Recall that "*N_incivilities*" ranges between 0 (many incivilities perceived) and 10 (no incivilities perceived).

risk perception (greater insecurity). Third, the variable capturing each neighbourhood's social capital, approximated by "*N_election_partc*", also presents a positive and significant effect on crime risk perception. This suggests that the higher the political participation (i.e., a proxy of the levels of trust and civic involvement in community decision making) the higher the probability of citizens' reporting a lower level of crime risk perception.

4.3 Robustness Checks

Spatial patterns

Table 6 presents the results for the multilevel ordered logit model when taking into account the spatial effects of some of the variables of interest. The prefix W reflects the spatial lag of the variable that follows it. The two columns present different matrix definitions. When using binary distance based matrix of 500 metres threshold (first column) the results show positive and significant impact of all variables from neighbouring areas on individual crime risk perception (the weakest result is obtained for *W_police_perception*).

Table 6: Estimations for crime risk perception with spatial lags (whole sample).

	W= Binary distance based matrix of 500m threshold	*W*= Binary distance based matrix of 1,000 m threshold.
W_crime_risk_perception	0.0442**	0.0295*
	(0.0215)	(0.0151)
W_incivilities	0.0136**	0.0101**
	(0.00692)	(0.00495)
W_police_perception	0.0120*	0.00959*
	(0.00674)	(0.00502)
W_crime_rate	0.293***	0.134*
	(0.113)	(0.0702)
Individual variables	YES	YES
Neighbourhood variables	YES	YES
Observations	11,605	11,605
Number of groups	38	38

Note: Robust Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The individual and neighbourhood variables present the same sign and statistical significance as those reported in previous tables.

Column 2 of Table 6 uses a binary distance based matrix of 1,000 metres threshold showing consistent results, although with lower statistical significance as expected. The results show that, first, the higher the crime risk perception in contiguous neighbourhoods (greater insecurity), the higher the probability of a lower crime risk perception (greater security) being reported. Second, the perception of a greater number of incivilities in other neighbourhoods increases the level of crime risk perception (greater insecurity). This is logical if we realise that incivilities are directly perceived by individuals (unlike a

neighbourhood's crime rate or a neighbourhood's crime risk perception), given that they can take the form of broken windows, dirty streets or abandoned cars in the street. Third, the spatial lag of "*N_police_perception*" shows the expected positive sign indicating that the higher the valuation of police forces in contiguous neighbourhoods, the greater the probability of a lower category of crime risk perception being reported. Fourth, the higher the crime rate in the contiguous neighbourhoods, the greater the probability of a lower level of crime risk perception (more security) being reported. This result can be explained by the fact that individual perceptions are expressed in relative terms. Thus, if individuals know that crime rates are higher in other neighbourhoods, they may think that their own neighbourhood is more secure.

Endogenous sorting

Table 7 presents the results for the restricted sample constructed to avoid possible problems of sorting of individuals into certain neighbourhoods. The sample comprises those citizens living in the same place for five years or more. Note that there are fewer observations in this sample because the question regarding length of residence was posed to just 50% of the individuals surveyed. Having fewer observations reduces the power of our estimations; however, we performed these estimations as it is the only way to deal with the potential endogeneity arising from the neighbourhood variables and the sorting of individuals in these neighbourhoods. Consequently, these results should be interpreted with some caution given that the individual observations may not be fully representative at the neighbourhood level and, as before, we further distinguish individuals between victims and non-victims.

Interestingly, our main variable of interest, "*police_stop*", presents the same effect as before. Citizens that have not recently suffered victimization and who present a high crime risk perception are positively affected (reduced crime risk perception) by the fact of their having been stopped by the police. Likewise, at the individual level, the variables seem to present the same signs with the exception of "*age*" which is no longer significant. Indeed, the individual variables should not change (sign and significance), since by restricting the sample only the neighbourhood variables should be affected. However, the minor variations in the results for the individual variables may, we believe, be driven by the reduction in the number of observations in the demanding multilevel estimations.

In the case of neighbourhood variables, when using the whole restricted sample, the neighbourhood crime rate index still does not affect citizens' crime risk perception, although it does present the expected sign. However, when using the non-victims

subsample, the effect is similar to that described above. Moreover, note that incivilities are still positive and significant at the 1% level. We obtain the same result for the variable capturing the average assessment of the police but our proxy for the level of social capital ("*N_election_part*") is no longer significant.

5. Conclusions

This study has analyzed the main individual and neighbourhood determinants of crime risk perception paying particular attention to the role of police proximity in the level of insecurity expressed by citizens. In order to account for the hierarchical structure of the data (at both individual and neighbourhood levels) and given the ordering of our dependent variable capturing an individual's crime risk perception, we used an ordered multilevel logit model. This model has enabled us to account for the differences both within and across neighbourhoods and to obtain robust estimations.

The results show that individual characteristics such as being old, being a woman, being a native resident, having suffered victimization and being poorly educated increase the reported level of crime risk perception. In the case of neighbourhood characteristics, the level of perceived incivilities and the level of social capital (measured by means of voter turnout) seem to affect crime risk perception in the expected way – that is, the lower the assessment of the neighbourhood (i.e. the greater the number of incivilities), the higher the level of crime risk perception. In the same line, increased voter turnout as a measure of social capital seems to reduce the level of crime risk perception. Both variables, together with the assessment of police institutions, are spatially correlated with the level of crime risk perception. This means that crime risk perception is not only affected by the level of social capital, the number of incivilities and the citizens' assessment of the police in a given neighbourhood, but also by the levels of these variables in the contiguous neighbourhoods.

Table 7: Multilevel estimations for crime risk perception with restricted sample (living in same place for five years or more).

VARIABLES	(1) *Restricted sample*	(2) *Non-victims*	(3) *Victims*
α_0	-14.58***	-13.25***	-16.16***
	(2.107)	(2.607)	(3.568)
*police_stop*_0	-0.251	-0.277	-0.537
	(0.211)	(0.261)	(0.334)
α_1	-11.72***	-10.44***	-13.60***
	(2.104)	(2.604)	(3.562)
*police_stop*_1	-0.0810	0.131	-0.232*
	(0.0957)	(0.131)	(0.138)
α_2	-10.07***	-8.695***	-12.16***
	(2.101)	(2.601)	(3.559)
*police_stop*_2	0.123	0.469**	0.130
	(0.120)	(0.212)	(0.151)
α_3	-8.640***	-7.528***	-10.57***
	(2.101)	(2.601)	(3.556)
*police_stop*_3	0.0276	0.774**	-0.126
	(0.187)	(0.390)	(0.223)
Individual level variables			
gender	-0.204***	-0.214***	-0.218**
	(0.0594)	(0.0702)	(0.0971)
age	-0.00387**	-0.000750	-0.00573*
	(0.00171)	(0.00194)	(0.00301)
victim_property	-0.675***		-0.476**
	(0.0642)		(0.238)
victim_person	-0.559***		-0.367**
	(0.120)		(0.168)
foreign_born	0.733***	0.677***	0.935***
	(0.144)	(0.174)	(0.218)
education	0.0769***	0.115***	0.00533
	(0.0215)	(0.0249)	(0.0359)
Neighbourhood level variables			
N_crime_rate	-0.552*	-1.095**	-0.529
	(0.290)	(0.476)	(0.367)
N_incivilities	0.752***	0.806***	0.570*
	(0.186)	(0.222)	(0.324)
N_education	-0.0447	-0.0511	0.428
	(0.210)	(0.260)	(0.381)
N_youth_male	-0.0228	0.00305	-0.0400
	(0.0498)	(0.0594)	(0.0865)
N_male_immigrant	0.117**	0.106	0.0475
	(0.0595)	(0.0720)	(0.105)
N_average_income	0.545	0.286	0.611
	(0.534)	(0.678)	(0.904)
N_police_perception	0.717**	0.576	1.161**
	(0.298)	(0.353)	(0.528)
N_election_partc	0.0376	0.0300	0.0179
	(0.0241)	(0.0296)	(0.0433)
η_{jk}	0.0229*	0.0341*	0.0935**
	(0.0130)	(0.0186)	(0.0427)
Observations	4,153	3,040	1,113
Number of groups	38	38	38

Note: see Table 3.

We have tackled the potential issue of individual sorting across neighbourhoods by using a subsample consisting of those individuals that had lived for more than five years in

the neighbourhood. The results seem to be unchanged for the majority of the variables used, confirming the results obtained.

As for our main variable of interest, i.e., police proximity (having first controlled for the potential endogeneity derived from the fact that individuals with higher crime risk perception are more prone to contact the police), we found the simple fact of being exogenously stopped by a police officer to be a signal of police proximity that lowers the level of crime risk perception, albeit only for those individuals that had not recently suffered victimization. This result differs across different levels of crime risk perception. More insecure individuals (those reporting higher levels of crime risk perception) are more positively affected by contact with the police. Indeed, we find no evidence that contact with the police affects the level of crime risk perception (insecurity) in the case of those non-victims that present the lowest level of crime risk perception (fearless).

In the case of citizens that have suffered prior episodes of victimization, we find some evidence of their being negatively affected by contact with the police (feelings of greater insecurity). It might be that victims, when coming into contact with the police again, are reminded of their previous victimization experience and, hence, feel more insecure.

These results have a number of important policy implications especially as regards security, since they serve to reinforce the call for the police to play a greater socializing role – in other words, patrolling the streets preventing crime should not be the sole role of community police officers. Stopping citizens and interacting with them can have an important impact on levels of security, making citizens feel safer. It could therefore be interesting if police officers were to enhance their socializing skills so as to learn how to get closer to citizens and to handle situations with the aim of making people feel safer.

Finally, the socializing role of police forces should be taken into account when estimating their output since the sole consideration of crime clear-up rates could be misleading. Public expenditure on policing should be seen as an investment in deterring crime as well as an investment in individual, and overall, well-being since, as we have shown in this study, individual benefits can be gained from police proximity.

References

Akerlof, G. (1997). Social distance and social decisions. *Econometrica* 65, 5, 1005-1028.

Anselin, L. (1988). *Spatial Econometrics: Methods and Models*. Boston: Kluwer Academic.

Braga, A. A. (2001). The effects of hot spots policing on crime. *Annals of the American Academy of Political and Social Sciences*, 578, 104-125.

Buonanno, P. and Montolio, D. (2009). Juvenile Crime in Spain. *Applied Economics Letters*, 16:5, 494-500.

Clemente, F. and Kleiman, M.B. (1977). Fear of Crime in the United States: A Multivariate Analysis. *Social Forces*, 56, 519-31.

Conklin, J.E. (1975). *The Impact of Crime.* New York: Macmillan.

Cordner, G. (2010). *Reducing Fear of Crime. Strategies for Police*. U.S Department of Justice, Office of Community Oriented Policing Services. Kutztown University.

Corman, H and Mocan, H. (2000). A Time Series Analysis of Crime, Deterrence and Drug Abuse. *American Economic Review*, 87, 270-290.

Cornaglia, F. and Leigh, L. (2011). Crime and Mental Wellbeing. *CEP Discussion Paper* No 1049.

Della-Giustina, J. and Silverman, E. (2001). Urban policing and the fear of crime. *Urban Studies*, 38(5-6), 941-957.

Di Tella, R. and Schargrodsky, E. (2004). Do Police Reduce Crime? Estimate Using the Allocation of Police Forces After a Terrorist Attack, *American Economic Review*, 94, 115-133.

Draca, M., Machin, S., and Witt, R. (2010). Crime Displacement and Police Interventions: Evidence from London's "Operation Theseus". *In The Economics of Crime: lessons for and from Latin America*, 359-374. University of Chicago Press.

Evans, W. and Owens, E. (2007). COPS and Crime, *Journal of Public Economics*, 91, 181-201.

Ferguson, K. and Mindel, C. (2006). Modeling fear of crime in Dallas neighborhoods. A test of social capital theory. *Crime & Delinquency*, 49, 1-27.

Ferraro, K. F. (1996). Women's fear of victimization: Shadow of sexual assault? *Social Forces*, 75, 667-690.

Glaeser, E.L. and Sacerdote, B. (1999). Why is there more crime in cities? Journal of Political Economy, 225-228.

Gray, E., Jackson, J., and Farrall, S. (2008). Reassessing the fear of crime. European Journal of Criminolgy, 5(3), 363-380.

Groff, E., Johnson, L., Ratcliffe, J. H., and Wood, J. (2013). Exploring the relationship between foot and car patrol in violent crime areas. *Policing: An International Journal of Police Strategies & Management*, 36(1), 119-139.

Hill, G. D., Howell, F. M. and Driver, E. T. (1985). Gender, Fear, and Protective Handgun Ownership. *Criminology*, 23, 541-52.

Hinkle, J.C. and Weisburd, D. (2008). The irony of broken windows policing: A micro-place study of the relationship between disorder, focused police crackdowns and fear of crime. *Journal of Criminal Justice*, 36, 503-512.

Ho, T., and McKean, J. (2004). Confidence in the police and perceptions of risk. *Western Criminology Review*, 5(2), 108-118.

Hoogue, M., Vanhoutte, B., Hardyns, W., and Birgan, T. (2011). Unemployment, inequality, poverty and crime. *British Journal of Criminology*, 51, 1-20.

Hunter, A. (1978). Symbols of incivility: social disorder and fear of crime in urban neighbourhoods. In *Annual Meeting of the American Criminological Society*, Dallas.

Janoff-Bulman, R. (1989). Assumptive worlds and the stress of traumatic events: Applications of the schema construct. *Social Cognition*, 7(2), 113-136.

Klick, J and Tabarrok, A. (2005). Using Terror Alert Levels to Estimate the Effect of Police on Crime, *The Journal of Law and Economics*, 48, 267-279.

LaGrange, R.L., and Ferraro, K.F. (1987). The Elderly's Fear of Crime: A Critical Examination of the Research. *Research on Aging*, 9(3), 372-391.

LaGrange, R.L., Ferraro, K.F. and Supanic, M. (1992) Perceived Risk and Fear of Crime: Role of Social and Physical Incivilities. *Journal of Research of Crime and Delinquency*, 29, 311-334.

Latinobarometro (2009). *Report 2009*, Santiago de Chile.

Levitt, S. D. (2002). Using electoral cycles in police hiring to estimate the effects of police on crime: Reply. *American Economic Review*, 92 (4) 1244-1250.

Lochner, L. and Moretti, E. (2004). The effect of education on crime: evidence from prison inmates, arrests, and self-reports. *American Economic Review*, 94.

Maris, L. and Ortega, D. (2013). Crime perceptions and reality in Latin America. *mimeo.*

McCrary, J. (2002). Using Electoral Cycles in Police Hiring to Estimate the Effects of Police on Crime: Comment, *American Economic Review*, 92(4) 1236-43.

McGarrell, E. F., Giacomazzi, A. L. and Thurman, Q. C. (1997). Neighbourhood Disorder, Integration, and the Fear of Crime. *Justice Quarterly* 14, 233-50.

Medina, J. (2003). Inseguridad Ciudadana, Miedo al Delito y Policía en España. *Revista Electrónica de Ciencia Penal y Criminología*, 3-21.

Mesch, G.S. (2001). Perceptions of risk, lifestyle activities, and fear of crime. *Deviant Behavior: An Interdisciplinary Journal*, 21(1), 47-62.

Moore, M. H. and Trojanowicz, R. C. (1988). Policing and the Fear of Crime: Perspectives on Policing. Washington, DC: National Institute of Justice.

Pate, A., Wycoff, M., Skogan, W. and Sherman, L. (1987). *The Effects of Police Fear Reduction Strategies: A Summary of Findings from Houston and Newark*. Washington DC: Police Foundation.

Quann, N. and Hung, K. (2002). Victimization experience and the fear of crime. A cross-national study. In P. Nieuwbeerta (ed.) *Crime victimization in comparative perspective. Results from the International Crime Victims Survey, 1989-2000*, 301-316. The Hague: NSCR, BJU.

Rabe-Hesketh, S., and Skrondal, A. (2008). *Multilevel and longitudinal modelling using Stata*. STATA press.

Rountree, P.W., and Land, K. C. (1996). Perceived risk versus fear of crime: Empirical evidence of conceptually distinct reactions in survey data. *Social Forces*, 74(4), 1353-1376.

Skogan, W. G., and Maxfield, M. G. (1981). *Coping with crime: Individual and neighbourhood reactions*. Beverly Hills: Sage Publications.

Skogan, W. (1986). Fear of crime and neighbourhood change. In: Reiss, A. J., Jr., and Tonry, M. (eds.), *Communities and Crime* (Vol. 8), University of Chicago Press, Chicago, 203-230.

Skogan, W. G. (1995). Crime and the Racial Fears of White Americans. *Annals of the American Academy of Political and Social Science* 539, 59-71.

Taylor, R. B. (1997). Crime, Grime, and Responses to Crime: Relative Impacts of Neighbourhood Structure, Crime and Physical Deterioration on Residents and Business Personnel in the Twin Cities. Pp. 63-75 in *Community Crime Prevention at the Crossroads*, edited by S. P. Lab. Cincinnati, OH: Anderson.

Trojanowicz, R. (1982). An Evaluation of the Neighbourhood Foot Patrol Program in Flint, Michigan. East Lansing, MI: Michigan State University Press.

Tseloni, A., and Zarafonitou, C. (2008). Fear of crime and victimization: A multivariate multilevel analysis of competing measurements. *European Journal of Criminology*, 5(4), 387-409.

Wilcox, P. and Land, P. (1996). Perceived risk versus fear of crime: Empirical evidence of conceptually distinct reactions in survey data. *Social Forces*, 74, 1353-1376.

Wilson, J. Q. and Kelling, G. (1982). Broken Windows. *Atlantic Monthly*, 211, 29-38.

Wyant, B. (2008). Multilevel Impacts of Perceived Incivilities and Perceptions of Crime Risk on Fear of Crime: Isolating Endogenous Impacts. *Journal of Research in Crime and Delinquency*, 45, 39-64.

Appendix A (Multilevel Ordered Logit Model)

In order to explain the main individual and neighbourhood determinants of individual crime risk perception and the impact of police proximity on this perception, and as we measure crime risk perception on a scale from 0 (no crime risk perception at all) to 4 (maximum level of crime risk perception) as our dependent variable, we need to use a link function. This link function may be either logit or probit; however, here, for simplicity's sake, we opt for the logit function.[24] The dependent variable can take up to five values and, hence, the probability of each response is denoted by:

$$\Pr(y = k) = \pi_k \text{ where } \sum_{k=1}^{4} \pi_k = 1 \text{ for } k = 0,1,2....4 \quad \text{(A.1)}$$

where y represents our dependent variable (crime risk perception) and π_k is the probability of response k. As the data is ordered, we can define the cumulative response probabilities that reflect the ordering of the values of y. We define γ_k the cumulative probability of being in category k or lower as:

$$\gamma_k = \Pr(y \leq k) = \pi_1 + \pi_2 + ... + \pi_k . \quad \text{(A.2)}$$

Suppose we have m control variables, then the cumulative logit model (or ordered logit model) for individual i is defined as:

$$\log\left(\frac{\Pr(y_{ij} \leq k}{\Pr(y_{ij} > k)}\right) = \text{logit}(\gamma_{kij}) = \alpha_k + \sum_m \beta_m X_{mi} , \quad \text{(A.3)}$$

where α_k refers to a threshold parameter or intercept in each category of the dependent variable. As individuals are clustered into neighbourhoods (denoted by j), they may follow a certain distribution within each neighbourhood, which needs to be taken into account by using a multilevel approach. The use of multilevel models is justified mainly on statistical grounds. If observations are clustered into categories and ordinary least squares (OLS) is used, the estimations will be unbiased but inefficient since the variances of errors could be underestimated leading to incorrect inferences. A potential way of dealing with clustered data would be to introduce dummy variables that account for the cluster specific effect. However, it is not possible to observe cluster specific errors or the effects due to observed and unobserved group characteristics. In a multilevel (*random effects*) model, the effects of both types of variables can be estimated separately and the residual variance is partitioned into a between-group component (variability across groups) and within-group component (variability across

[24] The two functions are similar and the results do not vary considerably when using the probit model. In the case of the logit specification taking exponentials of the estimated coefficients gives the odd ratios and they are, therefore, easily interpretable.

individuals). Therefore, estimations will have the correct standard errors as well as providing estimates of the between-group and within-group variances.

The estimation is performed by maximum likelihood (ML), implying some OLS starting values are given and, then, adopting an iterative procedure, the likelihood function converges to the efficient, unbiased values. If both the coefficients and the random effects are included in the likelihood function, we use a full maximum likelihood (FML) procedure. Alternatively, if only the random effects are included, we use a restricted maximum likelihood (RML) procedure. The former presents certain advantages over RML, including the fact that it provides for easier computations as well as the possibility of testing differences between two nested models that differ only in the fixed part. Here we present the general multilevel logit ordered model to be estimated:

$$\log\left(\frac{\Pr(y_{ij} \le k}{\Pr(y_{ij} > k)}\right) = \text{logit}(\gamma_{kij}) = \alpha_k + \beta_{0jk} + \sum_m \beta_{mjk} X_{mij} \quad \text{(B.4)}$$

$$\beta_{0jk} = \gamma_{0k} + \sum_l \beta_{mlk} Z_{lj} + \eta_{jk} \quad \text{(B.5)}$$

$$\beta_{mj} = \gamma_m + \varepsilon_{jm} \quad \text{(B.6)}$$

The above model presents three equations. Eq. (A.4) represents level 1 or the individual level with threshold parameters of the single level logit model. However, this model differs from Eq. (A.3) in two respects. First, β_{0jk} is the intercept (see Eq. A.5) and represents level 2, which varies across neighbourhoods and comprises a fixed part $\gamma_{0k} + \sum_l \beta_{mlk} Z_{lj}$ where the latter are the *l* explanatory variables of neighbourhood *j*, and a random part $\eta_{jk} \sim \text{N}(0, \sigma^2_{\text{u0}})$. Second, Eq. (A.6) is the random and fixed part for the coefficient *m* of neighbourhood *j*. It also comprises the fixed part γ_m, and the random part $\varepsilon_{jm} \sim \text{N}(0, \sigma^2_{\text{um}})$. The coefficients present the subscript *k* because the impact of the random intercept or the variables may be different for the four categories of crime risk perception (proportional odds assumption). We test if this assumption holds by means of a Wald test.

Since we are using an ordered multilevel logit model the coefficients are interpreted as the effect of a 1-unit change in the independent variable on the log-odds of being in a lower category of the dependent variable as opposed to being in a higher category (Rabe-Hesketh and Skrondal, 2008). Taking exponentials of each estimated coefficient yields the multiplicative effect of a 1-unit increase in the independent variable on the odds of being in a lower category of crime risk perception holding constant the group effect. Alternatively, if we apply $exp(\beta+\alpha_k)/[1+exp(\beta+\alpha_k)]$ to the coefficients, we would

obtain the predicted probabilities. As for the cut-offs or interceptions, each α_k (if taking exponentials) represents the predicted probability of being in category "*k*" or lower (holding constant the group effect) and, because of the ordering of the dependent variable, it increases with the response variable.

Appendix B (Ordered logit estimates)

Table 8: Ordered logit estimation for crime risk perception.

VARIABLES	*Non-Victims subsample* (1)	*Victims subsample* (2)
α_0	6.881***	8.130***
	(1.356)	(1.894)
*police_stop_*0	0.331**	0.245
	(0.152)	(0.279)
α_1	4.008***	5.530***
	(1.358)	(1.863)
*police_stop_*1	-0.106	0.210**
	(0.0741)	(0.104)
α_2	4.008***	4.068**
	(1.358)	(1.860)
*police_stop_*2	-0.430***	0.0244
	(0.154)	(0.104)
α_3	0.240	1.924
	(1.351)	(1.878)
*police_stop_*3	-0.565*	0.0847
	(0.315)	(0.265)
Individual level variables		
gender	0.236***	0.317**
	(0.0483)	(0.125)
age	0.00468**	0.0104***
	(0.00229)	(0.00376)
victim_property		0.588**
		(0.240)
victim_person		0.462***
		(0.160)
foreign_born	-0.990***	-0.763***
	(0.134)	(0.176)
education	-0.0959***	-0.0516
	(0.0269)	(0.0409)
Neighbourhood level variables		
N_crime_rate	0.907***	0.173
	(0.343)	(0.321)
N_incivilities	-0.370***	0.0134
	(0.136)	(0.0346)
N_youth_male	-0.0152**	0.00342
	(0.00726)	(0.00907)
N_male_immigrant	-0.0529**	-0.613***
	(0.0209)	(0.157)
N_average_income	-0.0427	0.440
	(0.241)	(0.507)
N_police_perception	-0.158	-0.0765
	(0.127)	(0.198)
N_election_partc	-0.0147	-0.0755***
	(0.0257)	(0.0225)
Observations	7,270	4,341
Time fixed effects	YES	YES
Neighbourhood fixed effects	YES	YES

Note: Robust standard errors clustered at neighbourhood level in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *N_education* has been automatically dropped since its inclusion causes a collinearity problem.

2011

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